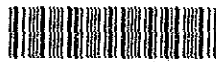


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BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR EXPANSION
OF
THE NATIONAL TUBERCULOSIS CONTROL PROGRAMME
IN
THE REPUBLIC OF YEMEN

MARCH 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

国際協力事業団

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Preface

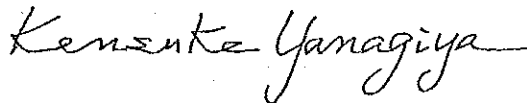
In response to a request from the Government of the Republic of Yemen, the Government of Japan has decided to conduct a Basic Design Study on the Project for Expansion of the National Tuberculosis Control Programme and has entrusted this study to the Japan International Cooperation Agency (JICA). JICA sent to Yemen a study team headed by Mr. Tadashi Isobe, Assistant Director Grant Aid Division, Economic Cooperation Bureau, Ministry of Foreign Affairs, from November 1 to 28, 1990.

The team exchanged views with the officials concerned of the government of Yemen and conducted a field survey. After the team returned to Japan, further studies were made and the present report was prepared.

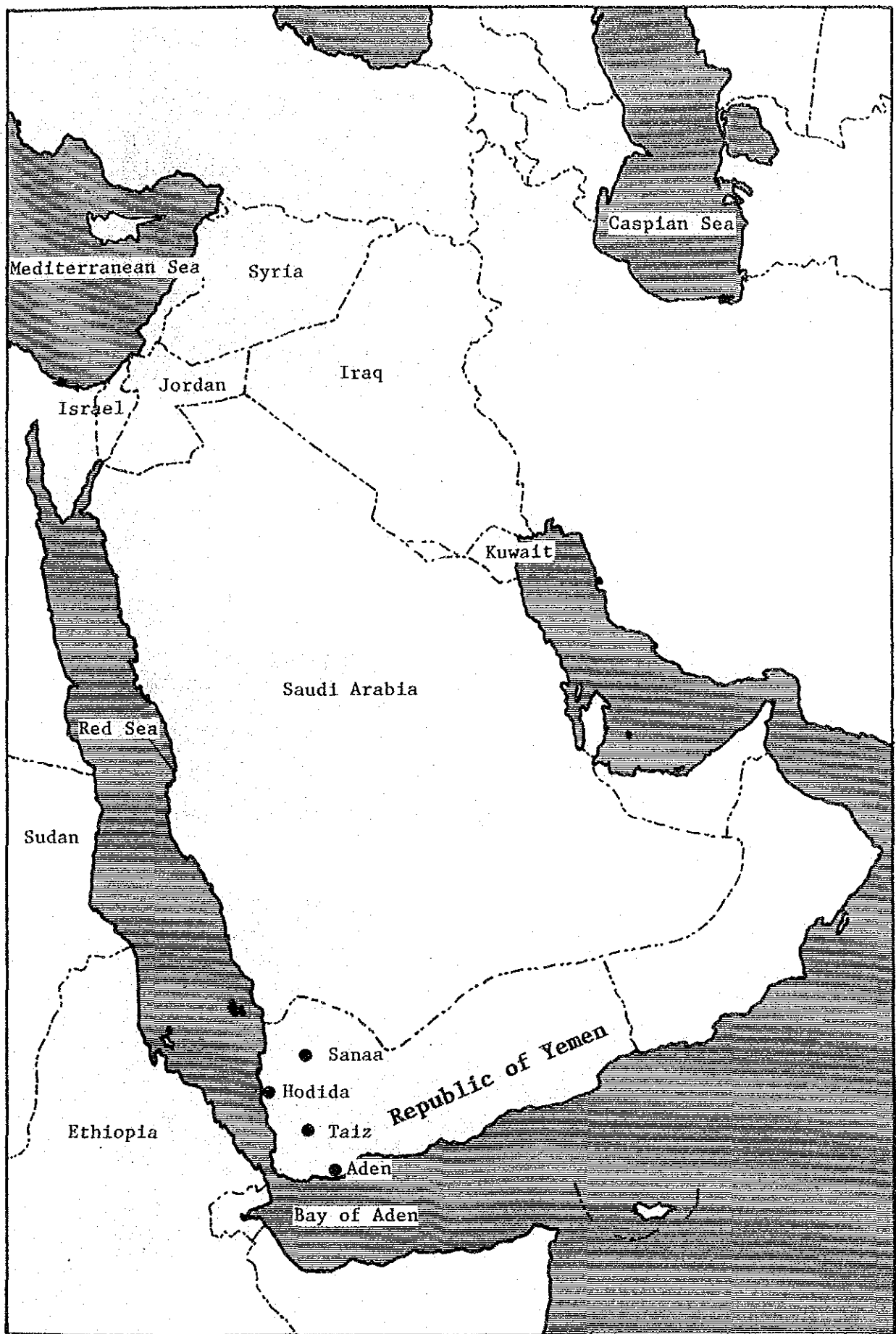
I hope that this report will help in the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Yemen for their close cooperation extended to the team.

March 1991



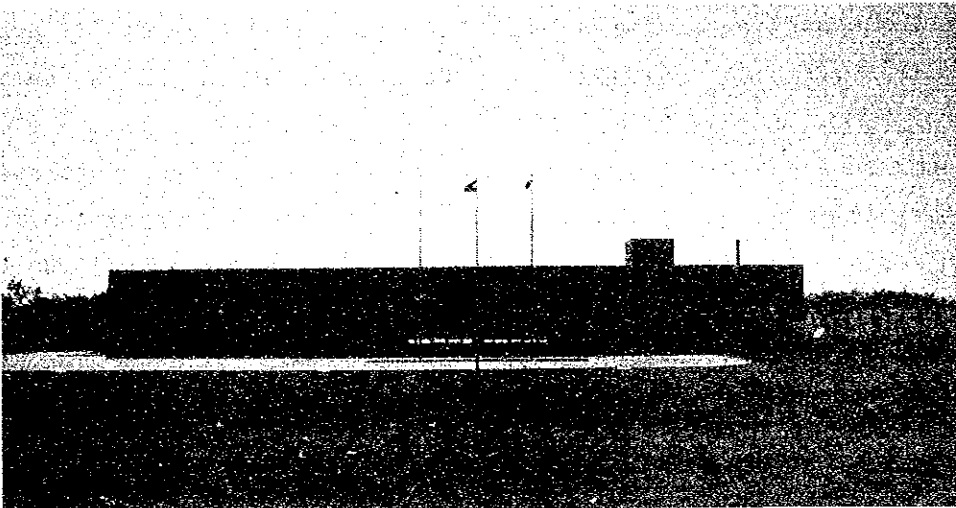
Kensuke Yanagiya
President
Japan International Cooperation Agency



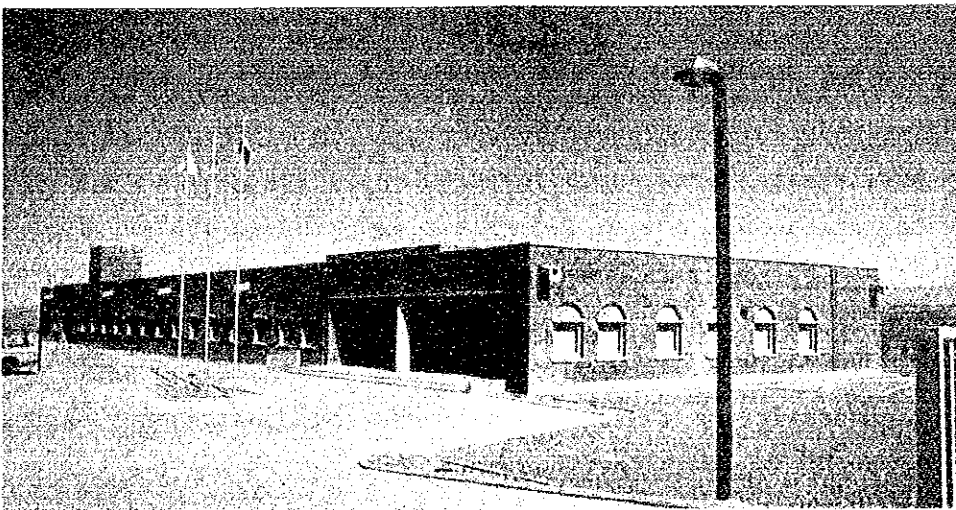
Photographs of Existing Facilities



National Tuberculosis Institute (NTI)



Hodida Subcenter



Taiz Subcenter

SUMMARY

The Republic of Yemen, located at the southern extremity of the Arabian Peninsula, is a nation which was established by the integration of The Yemen Arab Republic (formerly North Yemen) and The People's Democratic Republic of Yemen (formerly South Yemen) in May 1990. The land area is about 528,000 km², approximately 1.4 times the size of Japan, and the population is 13 million. The country is based on agriculture and produces mainly cotton, wheat, millet and coffee. The central part of the land is occupied by 1,600 to 3,600 m high mountains and the rest is desert experiencing extremely little rainfall, that faces the Red Sea and the Indian Ocean. Agriculture is carried out in scattered places in the innumerable mountain valleys and development of the cultivated land has its limit. Presently, 1.5 million people work in other countries, which forms the main source of foreign currency.

To alleviate these circumstances, the Government has set a national development target of promoting industrialization by developing oil fields on a large scale with the introduction of foreign capital and by making Aden, the former capital of South Yemen, a free trade city. The improvement of social and economic bases required for this purpose have been the most important task confronting the Government.

By concentrating efforts on improving the living environment and preserving public health in addition to the above improvement, the Government has made steady efforts in establishing the National Health Programme which has existed since the age of the former North Yemen.

Among the outbreak ratio of diseases in the country, tuberculosis, diarrhea, and malaria are high, especially the annual death rate from tuberculosis is estimated to be 1.6 to 1.7 percent according to the data of the former North Yemen. This means that over 200,000 people out of the population of 13 million after the integration are infected annually. The death rate is high and it has especially increased among the younger generation. For a nation that faces social reconstruction

after its integration, broad activities in terms of tuberculosis control have become more important.

Under such circumstances, in 1976, as measures against tuberculosis had become the most important task facing former North Yemen, the National Tuberculosis Control Program was launched with the assistance of the World Health Organization and partial use of existing health and medical facilities was begun. In 1983, a project-type technical cooperation programme was started by the Japan International Cooperation Agency (JICA) and was intended to run for five years. During this period, in 1986 the National Tuberculosis Institute (NTI) was established in Sanaa, the capital of the country, under grant aid from Japan. In 1987, subcenters were constructed in Hodeida and Taiz, marking the start of a full-scale tuberculosis control programme in the country. Technical assistance also has been vigorously extended in order to improve the organization, give support in training and investigate the program for tuberculosis control which has been extended from 1988 to 1992.

Against this background, the Government established the Expansion of National Tuberculosis Control Programme, the purpose of which was to improve the existing facilities and replenish medical equipment at regional health centers in order to expand nationally the tuberculosis control system and by taking advantage of the integration. Thus, a request to the Government of Japan for grant aid for the project was made.

In response to this request, the Government of Japan decided to conduct a basic study, and JICA dispatched a basic design study group from October 30 to November 28, 1990. This study group held discussions with representatives of the Ministry of Health of the Republic of Yemen, and investigated the NTI, two subcenters and medical conditions in various regions as requested. After returning to Japan, the study group carried out analytical work, made a basic plan of the facilities and equipment and prepared a basic design report.

The purpose of the project is to develop the nationwide organization of services for tuberculosis control activities by replenishing medical equipment at NTI, two subcenters and terminal health centers and major facilities. The outline of the plan is as follows:

1. Improvement of National Tuberculosis Institute (NTI) facilities.
 - . Providing a function befitting that of the headquarters of the tuberculosis control activities.
 - . Reconstruction of the existing garage (42 m²) to create storage for medicines.
 - . Construction of a garage for an X-ray motorcar (54 m²).
2. Reinforcement work on the slope in the grounds of the Taiz Subcenter

Stable protection and reinforcement work is to be carried out because the slope on the grounds that was constructed under Yemen's scope of work in 1987 has eroded and endangers safe operation of the facility.

3. Replenishment of medical equipment at health centers in every state

Replenishment of microscopes, first-aid kits, 4-wheel drive vehicles and other medical fixtures required to improve the function of the regional health centers in seventeen states and Sanaa city region.

The project execution authority is the Ministry of Health. The number of staff in the Ministry of Health who will participate in the project was originally planned to be 31 but is now over 110. Leading staff to be fully trained with Japan's technical cooperation are planned. Regarding the management of tools and materials for the facility, it

should not become a problem as the previous project under grant aid was smoothly operated and managed.

Presently, the cooperative project under grant aid plays an effective role as the center of tuberculosis control activities.

If the above contents of the plan are fulfilled, it is expected that a network of tuberculosis control activities will be formed, more precise information on the investigation of tuberculosis control in NTI and both the Taiz and Hodida Subcenters can be obtained, personal skills at health centers in various regions will be developed, the technologies of preventing, diagnosing and treating tuberculosis can be improved, and medical services in the country after its unification will be enhanced.

Thus, prompt execution of the project is expected.

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Map of the Republic of Yemen	
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CHAPTER 1 INTRODUCTION

CHAPTER 1 INTRODUCTION

The Government of Yemen's request for assistance from the Government of Japan with this project dates back to 1983, many years prior to the integration of South and North Yemen in 1990. In 1976, the National Tuberculosis Control Program (NTP) was launched in the Yemen Arab Republic (formerly North Yemen) with the assistance of the World Health Organization (WHO). The program was aimed at controlling tuberculosis through the existing medical facilities. In 1983, a project-type technical cooperation programme was initiated in the country by the Japan International Cooperation Agency (JICA). The technical cooperation programme required a facility that would play a key role in the implementation of the project, and in 1986 the National Tuberculosis Institute (NTI) was established in Sanaa, the capital of the country, under grant aid from Japan. In 1987, subcenters were constructed in Hodeida and Taiz, marking the start of a full-scale tuberculosis control programme in the country. At the same time, the term of the technical cooperation programme was extended from 1988 to 1990 in order to make the programme more viable. After the integration of South and North Yemen in 1990, the government of the new Republic of Yemen decided to expand the tuberculosis control programme, which had centered around the activities of NTI and the two tuberculosis subcenters in former North Yemen, to include former South Yemen and to promote the establishment of nationwide system under which patients could utilize the nearest health centers. A request to the Government of Japan for grant aid for this project was made.

The request covered procurement of equipment for use in the promotion of the above activities, expansion of the facilities of NTI headquarters, and sustainable measures to cope with the erosion of the slope in the grounds of the Taiz Subcenter. This erosion, in particular, has caused direct damage to the structure of the Taiz buildings, making the people uneasy about utilizing its facilities, and in turn has had an adverse effect on health care activities at the subcenter. In response to this request, the Government of Japan decided to conduct a basic design study in Yemen, and the Japan International Cooperation Agency dispatched a

basic design study team headed by Mr. Tadashi Isobe, assistant manager of the Grant Aid Cooperation Department of the Ministry of Foreign Affairs, from October 30 to November 28, 1990. This study group held discussions with representatives of the Ministry of Health of the Republic of Yemen, investigated NTI and the two subcenters, and conducted a field study of medical facilities in the north and south (formerly South Yemen) of the country. After returning to Japan, the study team carried out analytical work based on the data and information collected during the visit to Yemen, and prepared a basic design study report on the basis of their results in March 1991.

Attached to this report is a list of the members of the basic design study team, the schedule of the basic design study visit to Yemen, the minutes of discussions, and other relevant materials.

CHAPTER 2 PROJECT BACKGROUND

CHAPTER 2 PROJECT BACKGROUND

2-1 General Situation in the Republic of Yemen

The Republic of Yemen is situated at the southern extremity of the Arabian Peninsula, and is a nation constituted by the unification on 22 May 1990 of the Republic of Arabic Yemen (formerly North Yemen) and the People's Republic of Yemen (formerly South Yemen).

In ancient times, this nation was a major trading country. The Kingdom of Sheba, known as the "Princess of Sheba," was also located here, forming the ancient kingdom of South Arabia.

The nation faces Saudi Arabia to the north, the Republic of Somalia to the south across the Gulf of Aden, Ethiopia across the Red Sea to the west, and touches the Arabian Sea to the east. Topographically, the coastal plains on the Red Sea to the west rise to a north-south mountain range in the center of the country. Gentle hills drop gradually down to large plains towards the south and east.

With this topography, the climate ranges from temperate to tropical, and both Tihamah and the coastal area along the Red Sea are deserts, with annual average temperatures reaching 30°C.

The annual temperature difference is large, varying from 20°C down to 5°C, and annual rainfall is 100 mm or so, rising to a high of 350-760 mm/year in the Taiz area. Some areas receive as much as 1,000 mm.

The nation has a long history and has twice suffered north/south separation under the government of Osman Turkey and when Aden was occupied by the UK. The political and economic stagnation in what was South Yemen became the rallying call for unification, which took place just before that of East/West Germany.

Post-unification Yemen is a republic, with a presidential cabinet within a presidential council consisting of five councillors. The head of state is the chairman of the presidential council Ali Abdullah Sirlehan, and a multi-party system is in operation.

The area of the country is 528,000 km², equal to about 1.4 times that of Japan, and the population is 13 million. Gross national product (GNP) is US\$500 (north) and US\$470 (south) per capita (figures as of 1982).

The major industry is agriculture, with products such as raw cotton, wheat, sugar cane, millet, coffee. Fisheries and petroleum also contribute. No more than about 1.6 million hectares can be used for farming, because of topographic restrictions, and the number of people leaving for Saudi Arabia and other countries to seek employment has reached 1.5 million. As development of oil resources increases, the social infrastructure may also gradually be completed, giving hope for further development of the country.

2-2 Outline of the Major Areas of Medical Care in Yemen

(1) Present Situation

1) Current Disease Occurrence and Priority of Countermeasures

Reports on patient numbers from the hospitals are the only source of information on the occurrence of disease, and a fully-fledged registration or reporting system has yet to be established. Accordingly, data on epidemics in the northern part of the country (formerly the Yemen Arab Republic), as given in Table 1, will be referred to in examining the overall occurrence of disease in the country. No nationwide data is available on the occurrence of disease since unification, as this event only took place six months ago.

Table 1 Epidemics and Number of Cases (1982-1988)

Epidemic	1982	1983	1984	1985	1986	1987	1988
Typhoid	3,111	2,349	3,482	2,089	3,501	-	9,042
Infectious hepatitis	7,779	9,986	14,111	11,112	9,689	-	25,200
Meningitis	180	337	849	1,266	682	-	7,968
Measles	20,045	25,707	34,389	9,387	10,848	-	23,238
Varicella	936	2,301	6,141	2,808	3,680	-	8,543
Polioomyelitis	211	542	692	310	579	-	4,358
Diphtheria	506	967	827	394	141	-	2,400
Parotitis	5,131	7,134	9,533	4,731	5,809	-	10,717
Pertussis	25,490	27,534	20,309	16,053	9,753	-	36,753
Tetanus	182	361	421	219	520	-	937
Puerperal fever	1,330	1,095	1,178	807	1,162	-	3,679

Epidemic	1982	1983	1984	1985	1986	1987	1988
Malaria	152,025	179,155	180,104	13,677	15,712	-	199,205
Tuberculosis	18,561	32,755	24,130	2,078	2,175	-	17,017
Leprosy	371	306	284	47	124	-	267
Amoebic dysentery	71,828	69,986	95,928	42,464	40,492	-	128,049
Gastroenteritis	169,978	159,177	221,111	116,267	92,795	-	252,140
	264	688	475	491	584	-	791
Rabies	147	1,658	727	191	391	-	441
Schistosomiasis	34,644	27,439	35,959	43,754	43,634	-	40,700
Syphilis	230	229	503	358	310	-	951
Gonorrhoea	427	557	64	62	131	-	1,269

Source: Central Planning Organization (CPO): Statistical Year Book 1988

It is difficult to carry out an accurate epidemiological analysis of the spread of tuberculosis in the Republic of Yemen because there is insufficient demographic data or statistical data on epidemics available in the country. However, the results of tentative calculations based on survey data taken during the tuberculin test conducted in the north of the country in 1982 under the guidance of WHO and the provisional estimate by Dr. Tadao Shimao of the Research Institute of Tuberculosis, J.A.T.A. indicate that the annual rate of incidence ranges from 1.6 percent to 1.7 percent.

It shows that 200 thousand people get infected with tuberculosis every year out of the post-integration population of 13 million. Moreover, by showing positive reactions to a sputum smear test, 80 to 100 people annually are found to be infected in former North Yemen for every 100,000. This means that 5,600-7,000 cases of

tuberculosis, out of the 7 million, are recognized as new patients every year, including young people infected or dying from it. In a country which has to promote social reconstruction following integration, the necessity for expansive countermeasures against tuberculosis, which has a high incidence among young people, has remarkably increased. In former North Yemen, the priority of countermeasures against these diseases was determined on the basis of such criteria as the rates of incidence, the death rate, effects on industrial productivity, relationships with other diseases, the degree of public interest, and the countermeasures' effectiveness in relation to cost and technical factors. Although different sets of priorities were determined after unification, tuberculosis control still ranks second.

Priority	Disease
1st	Diarrhea
2nd	Tuberculosis
3rd	Malaria, snail fever
4th	Maternal diseases, measles, respiratory diseases
5th	Inflammatory eye diseases
6th	Helminthiasis
7th	Whooping cough
8th	PCM, vitamin deficiency
9th	Traffic accidents
10th	Dysentery, anemia

2) Present Medical Countermeasures

① Medical Experts

As the Republic of Yemen has only just been unified, there is a lack of nationwide data on the status of

health care in the country. Accordingly, data on health care in former North Yemen before unification is used here in descriptions of the state of health care in the new Republic of Yemen.

It should be noted, therefore, that the descriptions of health care given in this report may not represent the complete picture.

One noteworthy aspect of health care in the country is that, as shown in Table-2, there are many foreign health care experts working at the country's medical facilities. The Government of the Yemen Arab Republic worked hard to nurture this influx of health care experts in the first five-year plan (1977-81), the second five-year plan (1982-86), and the third five-year plan (1987-1991). However, the fact is that there still is a considerable shortage of experts in the country. At present, the following institutions are responsible for the training of health care experts:

a. Sanaa Health Manpower Institute

This institute was established in 1980 with the financial assistance of WHO. It admits 140 new students every year to its three-year training courses. The students train as nurses, paramedics, dietitians, medical technicians, or assistant pharmacists.

b. Professional Nursing Course at the Medical Department of Sanaa University

This course was established in 1982. There is no reliable data on the present activities of

graduates of this course. Training at the Central Laboratory in Sanaa is part of the curriculum of the university's professional nursing course.

c. Paramedical Training Schools attached to the Central Laboratories in Hodida and Taiz

Most of Yemeni medical doctors are educated in Egypt, the Soviet Union, China, and other countries. At present, about 600 Yemeni students are studying medicine, pharmacology, and dentistry overseas.

A number of problems related to the training of health care experts can be pinpointed. One is that many Yemenis who complete medical courses overseas prefer to stay abroad. Even those who return to Yemen tend to change their place of work (especially at public medical facilities), frequently in search of better pay or working conditions. This tendency is most prominent among medical doctors. Many prefer to establish themselves in private practice rather than choose a career at a public medical facility.

Table 2 Yemen's Medical Experts

	Doctors			Dentists			X-ray technicians			Inspection technicians		
	Total	Over-seas	Yemeni	Total	Over-seas	Yemeni	Total	Over-seas	Yemeni	Total	Over-seas	Yemeni
1984	1069	575	494	41	18	13	85	50	35	157	76	81
1985	1176	599	577	45	18	27	91	53	38	165	76	89
1986	1234	601	633	51	14	37	89	41	48	147	65	92
1987	-	-	-	-	-	-	-	-	-	-	-	-
1988	1320	342	978	73	31	42	126	74	52	293	82	211
Sanaa	674	135	639	38	11	27	66	42	24	164	50	114
Taiz	293	18	275	5	2	3	16	3	13	60	2	58
Ibb	54	21	33	10	10	-	7	5	2	13	4	9
Hodeidah	92	20	72	2	0	2	10	1	9	24	2	22
Hajja	28	18	10	1	1	-	2	2	-	7	5	2
Dhamar	30	11	19	6	6	-	2	-	2	4	-	4
Saadah	83	73	10	-	-	-	11	11	-	16	16	-
Baida	30	17	13	-	-	-	5	4	1	4	2	2
Mahweet	10	6	4	-	-	-	3	2	1	-	-	-
Mareb	19	16	3	-	-	-	3	3	-	-	-	-
Al-Jawaf	7	7	-	-	-	-	1	1	-	1	1	-

	Nurses			Assistant nurses			Pharmacists			Dietitians		
	Total	Over-seas	Yemeni	Total	Over-seas	Yemeni	Total	Over-seas	Yemeni	Total	Over-seas	Yemeni
1984	1283	31	452	1157	31	1126	114	31	83	15	14	1
1985	1394	924	470	1308	31	1277	121	32	89	16	14	2
1986	1415	928	487	1317	28	1289	107	25	82	16	14	2
1987	-	-	-	-	-	-	-	-	-	-	-	-
1988	1893	117	776	1539	1	1538	88	11	77	-	-	-
Sanaa	897	626	268	372	1	371	68	9	59	-	-	-
Taiz	281	132	149	616	-	616	4	-	4	-	-	-
Ibb	122	45	77	93	-	93	3	-	3	-	-	-
Hodida	177	35	142	309	-	309	8	-	8	-	-	-
Hajja	63	31	32	47	-	47	-	-	-	-	-	-
Dhamar	56	12	44	34	-	34	1	-	1	-	-	-
Saadah	155	123	32	48	-	48	-	-	-	-	-	-
Baida	41	30	11	2	-	2	-	-	-	-	-	-
Mahweet	25	12	13	10	-	10	1	-	1	-	-	-
Mareb	49	41	8	10	-	10	3	2	1	-	-	-
Al-Jawaf	30	30	-	8	-	8	-	-	-	-	-	-

(Source: CPO Statistical Year Book 1988)

② Health Care System

The health care system of the new Republic of Yemen is as described in Figure 1. After unification, health centers were reorganized throughout the country. Then in each of 18 places in total covering 17 province (including Sanaa Province) and Sanaa City region, a new central health center was established. All of the centers were raised in status to become the largest-scale health center in each region.

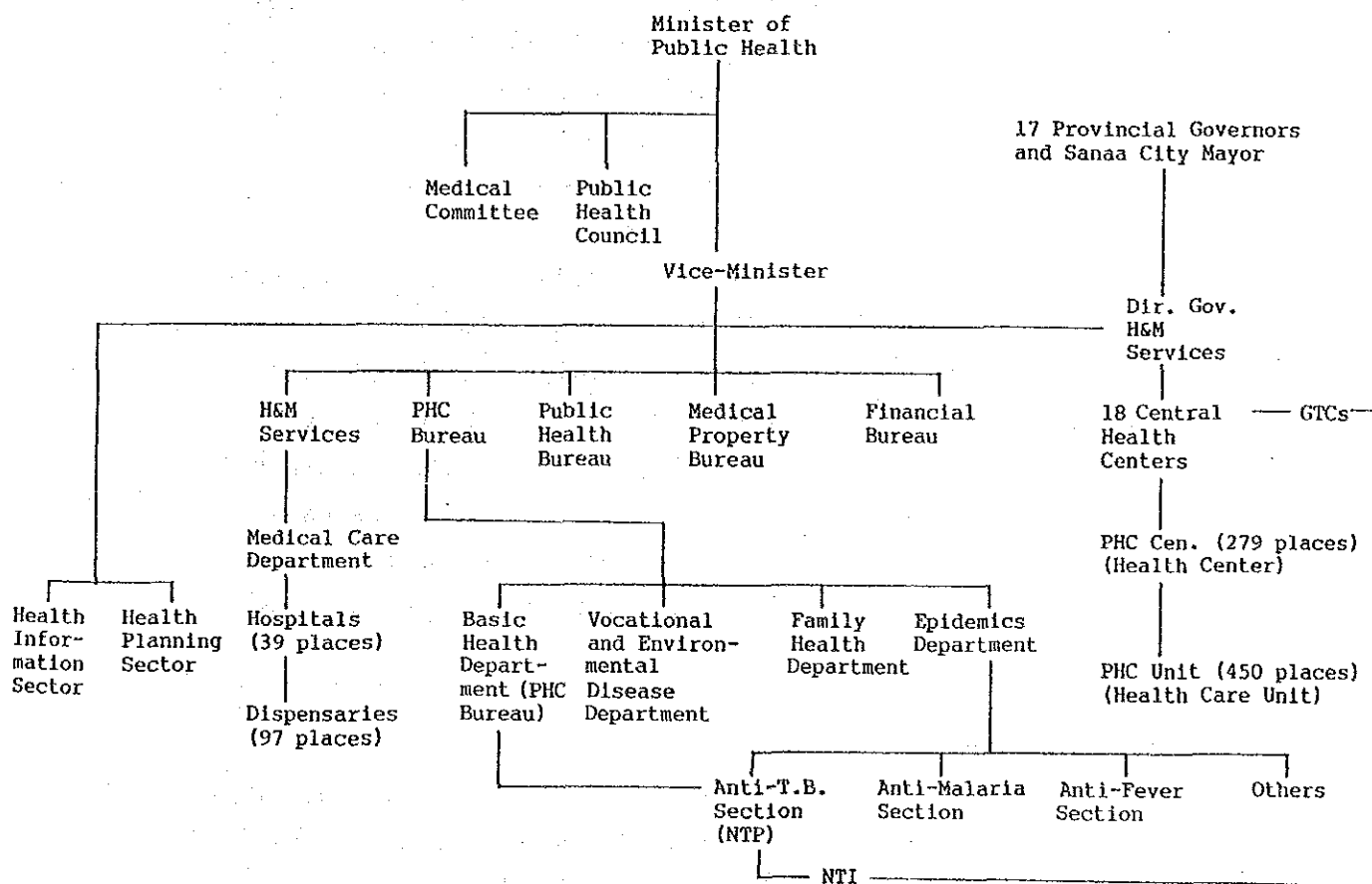


Fig. 1 Organizational Chart of Health Ministry

As for the government organization responsible for primary health care, what was previously the Department of PHC of the Ministry of Health in former North Yemen has been raised to the status of a bureau (Bureau of PHC). It consists of the Department of Basic Health, the Department of Occupational/Environmental Diseases, the Department of Family Health, and the Department of Epidemics. The bureau's Department of Epidemics is directly responsible for tuberculosis control.

Additionally, one GTC (Governorate Tuberculosis Coordinator) is stationed in every central health center in order that the guidance system to ensure countermeasures against tuberculosis can be organized consistently through the terminal centers.

The health care system of the country is generally divided into medical care and primary health care. The former is promoted mainly by hospitals and dispensaries, the latter by health centers and health care units. The number of those health care facilities is indicated in Table-3. (The data used was obtained in the period of the former North Yemen, since those for post integration are now being collected.)

The health care facilities, consisting of 39 hospitals, 25 dispensaries (not noted in the table), 297 health centers and 361 primary health care units, play a pivotal role in the country's medical and health care services. As with people engaged in medical service, the number of health and medical facilities is too small to meet the incidence of diseases (Table-1) and it is hard to regard them as sufficient to satisfy the demand for medical and health care.

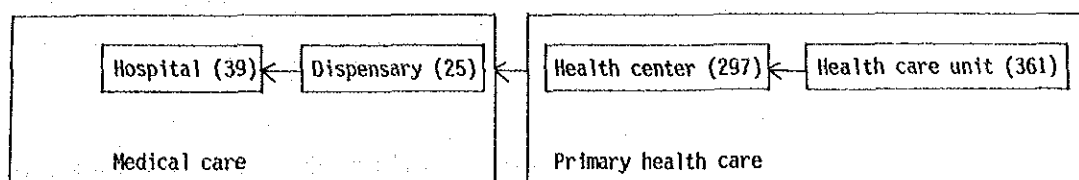


Table 3 Health Care Facilities

Year, state	Hospitals		Health centers			Total Number of health care center	Number of primary health care units
	Number	No. of beds	Sickbeds		Empty beds No. of health centers		
			No. of health centers	No. of beds			
1984	33	4,158	51	1,277	184	235	299
1985	34	4,553	51	1,277	221	272	306
1986	35	4,644	70	1,342	209	279	399
1987	-	-	-	-	-	-	-
1988 (by state)	39	4,703	70	1,342	227	297	361
Sanaa	9	1,741	18	258	33	51	54
Taiz	9	1,106	5	120	57	62	36
Ibb	7	383	8	160	29	37	18
Hodeidah	3	904	4	220	24	28	85
Hajja	2	117	13	203	4	17	88
Dhamar	1	150	7	140	9	16	24
Saadah	2	87	4	92	8	12	13
Al-Baida	2	85	1	20	9	10	8
Mahweet	1	35	4	40	4	8	10
Mareb	3	95	3	37	29	32	13
Al-Jawf	-	-	3	52	24	27	12

(Source: CPD Statistical Year Book 1988)

3) National Health Programme

The Government of the new Republic of Yemen continues in the belief held by the former Government of the Yemen Arab Republic that the development of health care sectors as promoted in the 3rd 5-year plan (1987-1991) is essential for the country's socio-economic development and for modernization of the country. This idea is based on the viewpoint that improvement of the socio-economic conditions peculiar to the country, such as living conditions, social infrastructure, the quality of education, national income, and quantitative and qualitative improvements in local health care, should be achieved in tandem with other development goals of the country. In accordance with this basic policy, the Government of the Yemen Arab Republic clearly defined the role of each sector in formulating the first five-year plan (1977-81), the second five-year plan (1982-86) and the third five-year plan (1987-1991) to make socio-economic development efforts more concrete and to ensure that all sectors had a positive influence on each other while implementing their development programs.

A good example of this in the health sector is the establishment in 1976 of a comprehensive health care program called the "National Health Program" (NHP). This program was closely linked to the first, second, and third five-year plans, and was at the same time designed to play a strategic role in the implementation of development strategies in the area of health care. To achieve an improvement in the current condition of the country's health care services, the NHP includes the following active policy measures:

① Basic Health Service (BHS)/Primary Health Care (PHC)

As one of the central government's policy measures to improve the quality of health care in provincial areas, dispensaries, health centers and health care units (HCUs) have been established to expand the scope of the country's health care services, build a comprehensive network of health care activities, and provide residents with health care services that cover every possible contingency.

. Dispensaries, which serve as both clinics and health centers and which are provided at a rate of one unit per 50,000 residents, are responsible for supervising and directing the smaller health care facilities, providing comprehensive health care services including family planning and treatment of inpatients who require short-term (one or two days) observation, and training the primary health care workers and assistants dispatched from provincial areas. A health center's staff includes two paramedics, two nurses, an assistant midwife, a health technician, a medical test expert, a pharmacist, and a clerk, and is equipped with two vehicles for use in mobile medical examinations (and two drivers).

. Health centers, provided at a rate of one unit per 10,000 residents, are responsible for supervising and directing the health care, supplying medicinal drugs, and administering vaccinations. A dispensary is usually staffed by several primary health care workers, a midwife, a paramedic, a student nurse, and a general worker.

. Health care units (HCUs), which are provided at the rate of one unit per 2,500 residents, are the most basic health care facilities operating within the scope of BHS and PHC activities. The smallest health care unit is staffed by a primary health care worker and a midwife. Public health advisors with basic training in primary health care consultation are responsible for running these health care units.

② Vaccination Programme

In this programme, vaccination centers which administer vaccinations against tuberculosis, polio, tetanus, whooping cough, and measles have been established, vaccination experts are trained, and routine vaccination of infants (0 to 5 years old) and newborn babies is carried out. In addition, a travelling vaccination service using motorcycles and bicycles is provided.

③ Improvement Programme for MOH Departments
Responsible for Health Care Operation and Management

Under this programme, a Department of Health Planning and Department of Health Information were established for the first time. The two departments are responsible for setting up an efficient medical administration system, promoting the implementation of nationwide health planning along with the collection and exchange of health information, and effectively supplying and managing medical equipment and medicinal drugs.

④ Integrating the Country's Hospitals and Improving
Quality of Service

Under this programme, the country's hospital services have been integrated, each hospital's role has been defined, and a hierarchical network of hospitals has been built to solve the problem of a lack of a hospital for medical expert training, the shortfall of budgetary appropriations, and the poor working conditions, including salaries and medical care services. Hospitals at various levels carry out the training of medical experts to work at hospitals at that level, as well as the training of experts to take charge of operation and management. The hospitals also aim to standardize their respective operation and management systems.

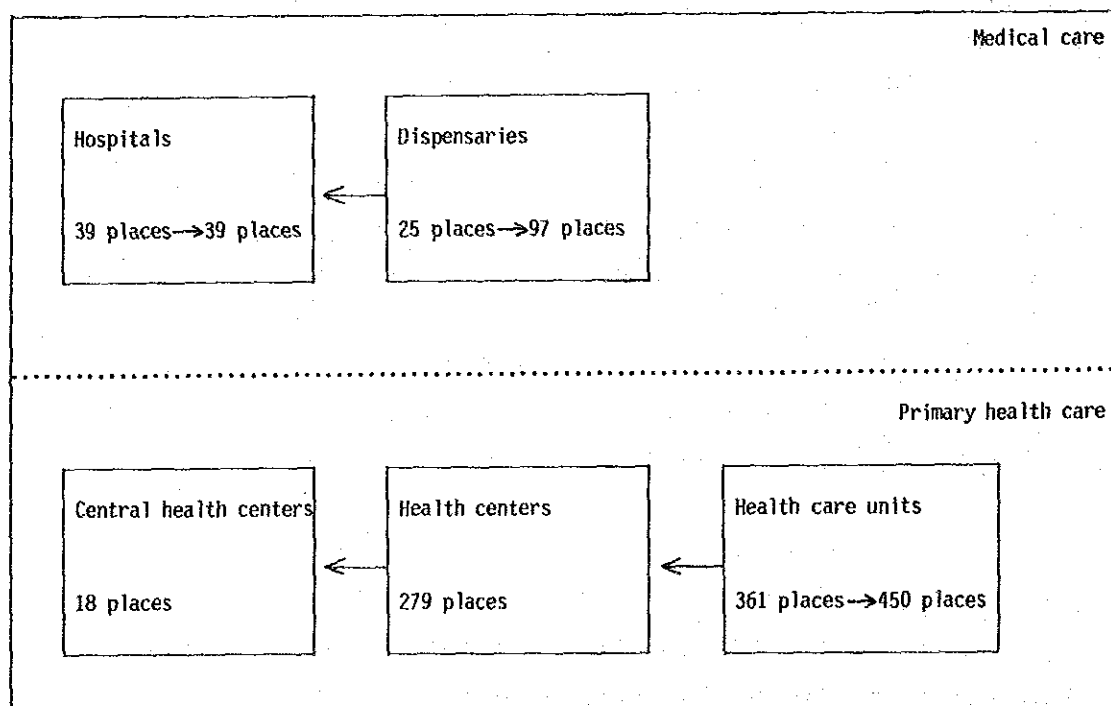
⑤ Health-Manpower Development Programme

This programme is aimed at promoting comprehensive health care services for the country that meet the demands for human and technical resources at various levels of health care by improving both quantitatively and qualitatively the training and nurturing of health care experts and expanding the scope of activities undertaken by those experts.

Apart from this overall framework, the formulation of guidelines for the implementation of actual measures against such major diseases as snail fever and malaria have been drawn up under the programme. Improvement of living conditions and the social infrastructure, in addition to basic health education are also included in this programme.

For the purpose of promoting implementation of the NHP, the third five-year plan emphasizes quantitative and qualitative improvements to local health care facilities in addition to improving and

expanding hospitals in urban areas. By 1991, the final year of the third five-year plan, it is forecast that the number of health care units will be increased from 361 to 450 and that the number of dispensaries will have risen from 25 to 97 by the end of this period. As for the health centers, the total number will not be changed, but central health centers will be designated, one for each of the 18 regions, including 17 national provinces and Sanaa City region, in order to promote primary health care activities.



But the health center's supervisory and training functions will be improved so as to put them at the top of the hierarchical organization for local primary health care activities.

4) National Tuberculosis Control Programme (NTP)

A combination of poor living conditions and malnutrition was considered to be the main cause of the spread of tuberculosis in the country. Accordingly, the main objectives of the NHP include raising the national standards of public health as well as the following aims:

- ① Reducing the incidence of tuberculosis through the early discovery of sources of infection and the instigation of chemical treatment.
- ② Making people fully aware of the importance of preventive measures against tuberculosis by promoting the vaccination of young people.

Furthermore, the central government adopted the following policy measures to bolster and improve ongoing programs on the basis of its belief that countermeasures against tuberculosis are the best way of greatly alleviating tuberculosis infection in provincial areas;

- ③ Improvement and expansion of the facilities at Sanaa Tuberculosis Center (present NTI).
- ④ Improvement of the tuberculosis subcenters in Taiz and Hodeida.
- ⑤ Improvement and integration of countermeasures against tuberculosis in local health care facilities.
- ⑥ Opening of tuberculosis centers in Ibb, Saadah, Hajja, and Dhamar.
- ⑦ Rearrangement and regrouping of hospital beds for tuberculosis patients.

Furthermore, the need to coordinate this programme with BHS/PHC programmes described above is emphasized and to improve the social infrastructure (particularly the water supply and sewerage systems) as countermeasures against tuberculosis in provincial areas.

The new Republic of Yemen has basically still been planning to promote the NTP of the former North Yemen after unification. To enhance the effect of local NTP activities, Governorate Tuberculosis Coordinators, GTCs have already been stationed in every central health center in 18 places throughout the country (including 17 provinces and Sanaa city region), which were formerly designated in the NHP. The coordinators will take a leading role in supervising local NTP activities and supporting training systems.

As for NTI and the two subcenters operating at present, the chief of NTI also holds the post of GTC of Sanaa City region and those of the Taiz and Hodeida Subcenters serve concurrently as the GTC of each province.

GTC of Sanaa City
(NTI's chief serves
concurrently)

GTC of Taiz Province
(TAI's Subcenter's
chief serves concurrently)

GTC of Hodeida Province
(Hodida Subcenter's chief
serves concurrently)

+15 GTCs = 18 GTCs
including GTC of
Sanaa Province

(2) Details of Preventive Measures against Tuberculosis

Since the 1962 revolution, in the face of the drastic socio-economic changes such as a civil war between republicans and monarchists, separation and integration (1990) of South and North Yemen and the establishment of the new Republic of Yemen, tuberculosis control is one of the biggest challenges in the area of health care to a country aiming at social reconstruction, now that the number of young people infected by and dying from the disease has remarkably increased.

The country's random sampling-based epidemiological data are simply based on a 1982 tuberculin reaction test, which was conducted in the former North Yemen under WHO's guidance, and calculations made by Dr. Tadao Shimao of the Research Institute of Tuberculosis, J.A.T.A. The test and calculations estimated the annual possibility of tuberculosis infection at 2.3 percent and 1.6-1.7 percent respectively.

Even a percentage of 1.6 means that 110,000 people become infected out of the 7 million population of the former North Yemen meaning that the problem is quite serious. Although no reliable data for the former South Yemen have been obtained as yet, it has been confirmed in the current survey that a delay in tuberculosis control is a serious social problem in the southern part of the country also.

In light of this serious situation, the government of former North Yemen organized, with the assistance of WHO, a national tuberculosis control programme (NTP) aimed at improving and expanding the country's measures against tuberculosis through the existing health care facilities. Moreover, activities to improve measures against tuberculosis were also started in 1983 by a project team from the Japan International Cooperation Agency (JICA). During the few years immediately after those activities began, the programme made no systematic

progress due to the lack of operational and managerial abilities, the poor health service network, and the shortage of experienced health care workers.

Meanwhile, the National Tuberculosis Institute (NTI) was established in Sanaa, the capital, in 1986 with grant aid from Japan, and subcenters were constructed in Hodida and Taiz in 1987. At these facilities, germ inspection is carried out with great emphasis on the discovery and treatment of tuberculosis patients. Since 1987, measures have been taken to strengthen the treatment and supervision system and to educate tuberculosis patients on the importance of treatment and supervision in provincial areas. These measures have gradually been producing satisfactory results.

The Yemeni Ministry of Health formed a national organization by providing central health centers in each of the 17 provinces and Sanaa City region throughout the country and appointing governorate tuberculosis coordinators (GTCs) to take charge of local measures against tuberculosis in a move designed to implement the national tuberculosis control programme, which had until then been centered around NTI and the subcenters, on a nationwide basis. At the same time, activities were launched to implement NTP in each province, by increasing cooperation with primary health care facilities.

(3) Present Central Government Policy on Diagnosis and Treatment of Tuberculosis

- 1) The central government's organization for health administration in the area of public health, primary health care and tuberculosis control is illustrated on the following page.

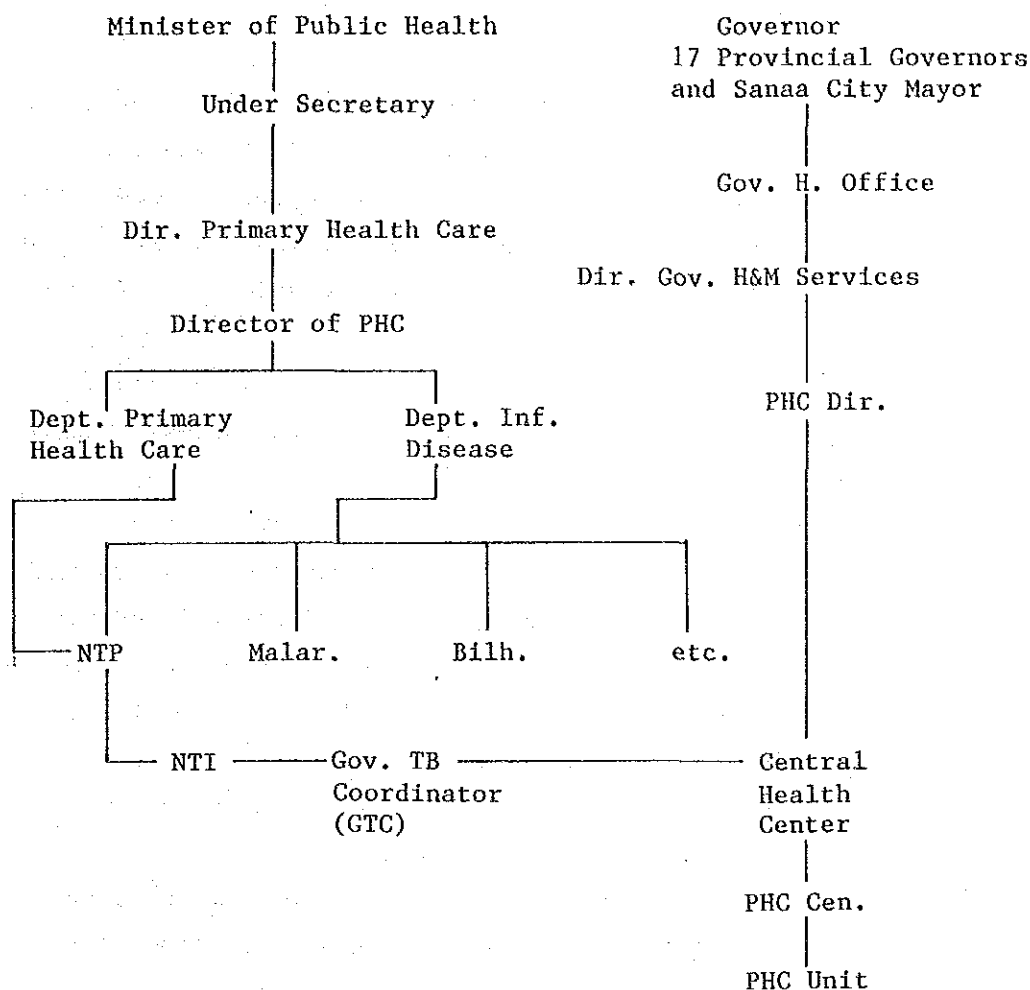


Fig. 2 Organizational Chart of MOH & NTP

This organizational chart was prepared after the south-north integration. However, the present organization is almost identical to that of the former North Yemen, the only difference being that the number of provinces has increased from 11 to 17 plus Sanaa City region as a result of integration. It should be noted, however, that the ministerial posts are held by those from the northern part of the country, the vice-ministerial posts by those from the southern part and the post of Director of Primary Health Care is a person who hails from the north. The actual tuberculosis

control operations are being carried out by individual central health centers, PHC centers, and PHC units under the joint supervision of NTI, operating under the direct control of the Director of The Dept. of Primary Health Care and the GTCs, who operate under the direction of PHC Directors.

2) Present State of the National Tuberculosis Control Programme

As the Republic of Yemen was unified only recently in May 1990, the country's present tuberculosis control policy measures are based mainly on those of the former North Yemen, which is now the northern part of the country. No reliable data is available on tuberculosis control measures taken in the former South Yemen, which is now the southern part of the country. Under such circumstances, the present state of tuberculosis control in the new Republic of Yemen is described below.

The countermeasures against tuberculosis launched in 1976 with the assistance of WHO have been strengthened through the establishment of the National Tuberculosis Institute (NTI) and the enhancement of its status within the Ministry of Health on the one hand, and also by the establishment of tuberculosis subcenters in Taiz and Hodeida, the nurturing of health care experts, the diagnosis and treatment of tuberculosis patients, the registration of patients and follow-up work on their condition, and research and study.

As for organizational improvements, an NTP Office was established within the Ministry of Health and the number of NTI staff members has been increased from 23 in 1986 to 45 at present. In three of the eight provinces outside Sanaa, Taiz and Hodida in the north, GTCs have

been appointed and, as a result, NTI's links with hospitals and other health care facilities in provincial areas have been strengthened.

In the area of manpower development, a total of 168 germ examination technicians, radiographers, nurses, health educators, and health nurses received on-the-job training in 1989, of whom 27 were sent to Japan for further training. The 27 health care experts who received training in Japan are all now engaged in tuberculosis control activities. In addition to these training programmes, mobile guidance has been given and such educational events as symposiums and special lectures on tuberculosis control have been implemented. At present, a manual on the subject of tuberculosis control is being prepared in Arabic and plans to promote measures against tuberculosis -- particularly, diagnosis and treatment techniques and follow-up work/care on tuberculosis patients -- using this manual are being worked out.

In terms of research, operational research is being carried out on the registration of tuberculosis patients, and follow-up surveys of those patients who discontinue treatment and tolerance tests of antitubercular drugs are being carried out. Preliminary surveys of tuberculosis patients were implemented in six areas last year. A nationwide survey is scheduled for October 1991.

In the area of publicity for tuberculosis control, a special radio campaign has already been staged, and three posters have been produced in collaboration with welfare support organizations in provincial areas. At present, a tuberculosis control campaign video is being produced.

A quantitative analysis of the health care activities at each of the above facilities in 1989 reveals that the

total number of patients who underwent diagnosis was 39,535 in Sanaa, 27,346 in Taiz, and 8,096 in Hodeida. There was an annual increase of 18 percent in Sanaa and 17 percent in Taiz (no data for the previous year was available in Hodeida). Of those undergoing diagnosis, 2,017 (a 24 percent increase over the previous year) came forward for diagnosis and treatment for the first time in Sanaa, 827 (a 40.8 percent increase over the previous year) in Taiz, and 511 in Hodeida. Except in Hodeida, there was a marked annual increase in the number of those patients undergoing diagnosis and treatment for the first time. The ratio of patients showing a positive reaction to the sputum examination is important as an indicator of the qualitative evaluation of tuberculosis patient discovery. For this reason, each of these health care facilities is ordered to give any patient suspected of being a tuberculosis case a sputum examination. In 1989, the number of patients who underwent the sputum examination was 8,471, or an 8.6 percent annual increase in Sanaa, 5,922 or a 35.3 percent annual increase in Taiz, and 5,549 or a 53 percent annual increase in Hodeida. The increase in the number of patients taking the sputum examination in the three provinces was higher than the rise in the number of patients who received diagnosis. It can be said, therefore, that the staff members of these health care facilities have become fully aware of the importance of germ examination.

The ratio of patients showing a positive reaction to the sputum examination in their first diagnosis was nearly 40 percent in Taiz, a little under 20 percent in Sanaa, and 60.0 percent (1988) in Hodeida. There is still room for further examination and analysis of the high ratio in Hodeida. The ratio in Sanaa, which is a little under 20 percent, increases to 24 percent if it is limited to pulmonary tuberculosis patients (the tuberculosis center

in Sanaa accepts many cases of non-pulmonary tuberculosis from other hospitals).

As regards treatment of tuberculosis patients, the target treatment completion rate is more than 70 percent. In the years immediately after Japanese cooperation began, the rate was about 10 percent. In a follow-up survey of patients who started receiving treatment during the first quarter of 1989, the rate was 51.8 at NTI, 66.2 percent at the subcenter in Taiz, and 36.5 percent at the subcenter in Hodeida. It can be said that in Taiz the actual rate is approaching the national target. The ratio of use of the short-term chemical treatment method on patients showing a positive reaction to the sputum examination, the spread of which WHO and the International Union for Tuberculosis Control are actively promoting, is on the increase; 93 percent at NTI, 91 percent at the subcenter in Taiz, and 74 percent at the subcenter in Hodeida.

It must be remembered that all the above data reflect the actual situation in North Yemen only, which forms the northern part of the new Republic of Yemen. No significant data has been obtained on tuberculosis control in South Yemen, which is now the southern part of the country. In the new Republic of Yemen, an integrated national organization for tuberculosis control has been formed and is established in 18 places (the number of provinces increasing from 11 to 17, excluding Sanaa City region) as described in 1) above, and measures against tuberculosis already in operation in North Yemen have been continued.

(4) Present State of the Facilities Concerned

1) National Tuberculosis Institute (NTI)

The National Tuberculosis Institute (NTI) is about 7 kilometers from the center of Sanaa, on a hill about 900 meters east of the main road connecting Sanaa and Taiz. The number of buildings along the neighboring main road has increased dramatically since the institute was founded (in 1986). The areas surrounding the institute are now alive with the hustle and bustle of city life. However, the approach to the institute, which is about 900 meters long, has not yet been paved. Particularly noteworthy in respect to the usage of facilities was the inadequacy of the warehouse. The present warehouse is used for storing not only drugs but also spare parts and food supplies such as wheat. It is stretched beyond its designed capacity. Wheat and other foods are distributed to outpatients as part of the institute's nutritional guidance.

Most items of equipment installed in the institute are in good operating condition, and they seldom break down. This is presumably attributable to scrupulous management and guidance by the Japanese experts.

Hard water is the norm in the country, so the filter in distillation equipment provided under a previous grant aid scheme has to be replaced very frequently, and this is considered to be the main cause of equipment breakdown.

There are many parts of the institute's facilities which could be improved simply through maintenance work by the staff -- for example, addition of a roof over the oratory in the courtyard, improvements to the lighting in the

patients' waiting room and installation of carpets in the classrooms to reduce the noise level.

2) Hodeida Subcenter (City of Hodeida)

Partly because of its location which is adjacent to the Republican Hospital, this subcenter is the easiest of the three health care facilities to reach by a main road. The areas surrounding the subcenter are far greener than they were when it was founded, and this gives the subcenter a rich environment.

The most important problem revealed in respect to the usage of subcenter's facilities is that the parking lot is not being used effectively. The reason for this is presumably the heat: it is very hot in Hodeida, a city facing the Red Sea, and this forces many drivers to park their cars out of the sun. Therefore, this problem should be solved by planting tall trees around the parking lot.

Most items of equipment are in good operating condition. As in the case of NTI, this is probably because of the guidance and instructions by the Japanese experts periodically dispatched from NTI for the purpose of giving guidance. At present, X-ray photographs are developed using an automatic developer in NTI, but manually in the Hodeida and Taiz Subcenters. In view of the fact that demand for X-rays has increased substantially in the subcenters (medical organizations specializing in tuberculosis control are only NTI and the two subcenters) and that it is desirable to conduct education and training for trainees from other health centers in radiography using clearer X-ray photographs, it is time that an automatic developing machine was installed. Again, the water is hard in Hodeida, as in

Sanaa, so the filter in the distillation equipment procured under a previous Grant Aid Program has to be replaced extremely often, and this is considered the main cause of equipment breakdown.

3) Taiz Subcenter (City of Taiz)

This subcenter is located east of Revolution Hospital. It is on improved land, and work to protect the slopes was insufficient. In addition, Taiz has the largest average annual rainfall in the country. As a result, this subcenter is faced with such problems as sinking of the buildings and erosion of the slopes. For this reason, the major problems facing the subcenter can be divided broadly into those related to the buildings and those related to the slopes, and a survey to find suitable ways to cope with these problems was conducted.

Most items of equipment are in good operating condition, and they seldom break down. As with NTI and the Hodeida Subcenter, this is presumably because they are scrupulously maintained through technical guidance of the Japanese experts. As is the case in Sanaa and Hodeida, the water is hard in Taiz, so the filter in the distillation equipment procured under a previous Grant Aid Program has to be replaced very often, and this is considered the main cause of equipment breakdown. For the same reason as the Hodeida Subcenter, it could be time that an automatic developer for X-ray photographs be introduced.

4) Organizations Responsible for Tuberculosis Control in the Provinces

As mentioned in 2-2-(1) "Present Situation" (of medical care), the Yemeni medical health care system is generally

divided into medical care and primary health care (PHC). Tuberculosis control is included in the PHC activities. PHC is promoted mainly by health centers and health care units.

Since the country's unification, the total number of PHC facilities has almost doubled. The Department of PHC at the Ministry of Health has been raised to the status of a bureau (Bureau of PHC). This is evidence of a marked improvement in the country's organization of PHC activities.

After unification of the country, the Bureau of PHC replaced the Department of Preventive Medicine of the Bureau of Public Health of former North Yemen as the organization directly responsible for tuberculosis control.

The country's tuberculosis control efforts have remained stagnant despite the fact that such efforts were one of the top priorities in the area of health care. This is because the efforts were not well defined within the country's health care organization and because there were shortages of health care workers, facilities, and equipment. After unification, the Ministry of Health established central health centers in 17 provinces and the Sanaa City region; 18 places in total, and appointed a GTC in each place. It can be said, therefore, that a comprehensive tuberculosis control program has been achieved.

5) Southern Yemen (formerly South Yemen)

In the southern part of the new Republic of Yemen, the former South Yemen, a survey was carried out in a hospital and a clinic in the City of Aden. There were

many items of outdated Hungarian equipment in both health care facilities.

These health care facilities requested new Japanese X-ray equipment because the existing equipment (Hungarian; tubular bulb from East Germany) breaks down frequently. Tuberculosis control is by method imported from the Soviet Union, in which tuberculosis prevention and treatment are included not in primary health care but medical care, different to those promoted in the northern part of the country under the ongoing Japanese technical cooperation.

In former South Yemen, it is expected that health care activities by NTI and the subcenters, which have thus far been concentrated in former North Yemen, will be promoted earlier against tuberculosis nationwide.

2-3 Outline of Related Plans

(1) National Development Plan

This plan, which was formulated by the Government of the Yemen Arab Republic (now the northern part of the Republic of Yemen), was inherited by the Government of the new Republic of Yemen.

The major overall goals and the major development strategies of the ongoing third five-year plan are as itemized below.

① Overall goals

- a. Increasing the national income and the gross national product (GNP)
- b. Enhancing the quality of education and eliminating illiteracy
- c. Developing natural resources, and increasing the production sector's contribution to the country's GNP through restructuring
- d. Promoting well-balanced overall regional development
- e. Promoting rapid and extensive agricultural development and improving the basic health, cultural, social, and economic conditions in provincial areas
- f. Improving economic management of both the public sector and the private sector
- g. Modernizing local administration systems and improving local public services

- h. Rationalizing public and private spending and increasing investment capital

2 Major Development Strategies

- a. To make full use of the human and physical resources currently available
- b. To improve educational, health care and social services
- c. To promote agricultural development
- d. To construct dams and make better use of water resources
- e. To promote Research & Development activities for the revitalization of economic development efforts
- f. To increase the country's grain production and promote agriculture-related industries
- g. To enhance productivity and control and curb central government's annual expenditure
- h. To encourage saving and the rationalization of consumption
- i. To improve the distribution among local governments of the gains from economic development
- j. To promote the development of mineral resources
- k. To establish a viable system of self-sufficiency

The following table is a breakdown by sector of the planned grand total of investment during the third five-year plan.

Table 4 Total of Investment under the Third Five-Year Development Plan

Item	1987	1988	1989	1990	1991	Total
Agriculture	491	558	565	658	801	3,073
Mining	1,152	1,076	935	1,010	1,260	5,433
Manufacturing	600	689	692	700	758	3,489
Electric power, water supply and drainage	550	582	430	510	500	2,572
Construction	40	40	40	40	40	200
Commerce, commodities	418	401	406	429	303	1,957
Transport, communication	633	782	766	1,132	1,524	4,837
Banking	50	60	60	60	70	300
Housing, real estate	610	620	625	625	615	3,095
Government agencies	2,116	2,356	2,750	3,080	3,310	13,612
Total	6,660	7,164	7,269	8,244	9,181	38,518

(Source: CPD, The third five-year plan)

Of the total planned investment by government agencies as shown in the above table (13,612 million YR), 1,037 million YR was earmarked for investment in health-related services.

(2) Development Plan for the Health Sector

As for the health/medical sector, the basic guidelines for a national overall health and medical care system were established in the National Health Programme (NHP) of former North Yemen (1976). The third five-year plan also aims to

adhere to these guidelines in order to meet the final basic goal through the following concrete measures:

- a. To improve basic health services
- b. To further develop primary health care
- c. To implement preventive vaccination programmes
- d. To strengthen operating and managerial departments for health and medical care
- e. To unify hospitals and reinforce their facilities
- f. To carry out a health and medical care staff recruitment programme

The following development goals and strategies were worked out for the health sector to be implemented within the framework of the third five-year plan.

① Development Goals

- a. To promote the nationwide spread of basic health and preventive-medicine services
- b. To establish a system for the prevention of epidemics and endemics and to improve and expand the mobile health units that provide health care services in remote areas
- c. To supply and import all necessary medical supplies, and control their distribution
- d. To promote health education

② Development Strategies

- a. To restructure and improve existing health centers and other health care facilities

- b. To encourage students to participate in the services provided by health care facilities
- c. To give in-service training to health workers working at local health care facilities
- d. To improve the methods of operating and managing hospitals and health centers
- e. To have the hospitals and health centers conduct 24-hour diagnosis and treatment
- f. To increase the number of hospitals and health centers and ensure a stable supply of the necessary medical equipment and personnel
- g. To sell medical supplies at low prices

These goals and strategies are more specific descriptions of the overall goals e. and g. and strategy b. in the third five-year plan. The Government of the Republic of Yemen earmarked 1,037 million YR for investment in the health sector in its third five-year plan.

The following table shows a breakdown by item of the total investment in the health sector under the third five-year plan.

Table 5 Planned Investment in the Health Sector under the Third Five-Year Plan

(Unit: million YR)

Item		Investment
Health sector		
Basic health services	Renewed	400.0
Prevention	Renewed	4.0
Health education	Renewed	5.0
Health training	Renewed	66.0
Aid to Health Ministry	Renewed	51.0
Improvement in hospitals	Renewed	382.0
Aid to clinical centers and blood banks	Renewed	18.0
Pharmaceutical Research Center	New	8.0
Prosthetic Devices Center	Renewed	19.0
Health and hygiene laboratories	Renewed	80.0
Nutrition Balancing Program	Renewed	4.0
Total investment in Health sector		1,037.0

(CPO, The third five-year plan 1987-1991)

(3) Positioning this project

The Government of the new Republic of Yemen continues in the belief held by the former Government of the Yemen Arab Republic that the development of health care sectors as promoted in the 3rd 5-year plan (1987-1991) is essential for the country's socio-economic development and for modernization of the country.

A good example of the development of health and medical sector is the establishment in 1976 of a comprehensive health care program called the "National Health Program" (NHP). This

program was closely linked to the first, second, and third five-year plans, and was at the same time designed to play a strategic role in the implementation of development strategies in the area of health care.

For the purpose of promoting implementation of the NHP, the third five-year plan emphasizes quantitative and qualitative improvements to local health care facilities in addition to improving and expanding hospitals in urban areas. As for the health centers, the total number will not be changed, but central health centers will be designated, one for each of the 18 regions, including 17 national provinces and Sanaa City region, in order to promote primary health care activities.

In the NHP, the priority of disease countermeasures has been determined according to criteria such as incidence, mortality rate, effects on labor productivity, links to other diseases, the degree of concern and anxiety, the cost of implementation and efficacy, etc. Of those diseases, tuberculosis ranks second after diarrhea, and tuberculosis control is one of the most important tasks of the NHP.

The National Tuberculosis Control Program (NTP) was set up as one contribution to the task. The NHP's philosophy is that tuberculosis control should be systematically applied in each local area to substantially reduce tubercular infection. The program has already made steady progress through the activities of the NTI and the Hodeida and Taiz subcenters. Additionally, governorate tuberculosis coordinators (GTCs) have been appointed, one to each central health center in the 18 areas demarcated in the country after unification. Given this clear position and role within the NHP, the NTP has been effective nationwide.

2-4 Details of the Request

(1) Details of the Request

1) Details of JICA's Cooperation in the Country's Tuberculosis Control Project

JICA's cooperation in the country's tuberculosis control project dates back to the time of former North Yemen. In implementing its first five-year plan (1976-81), the Government of North Yemen regarded the tuberculosis control project, part of its health care policy measures under the five-year plan, as one of the top priorities, and launched the project at a tuberculosis center in the City of Sanaa which was converted from a medical facility. Because of the poor facilities and the lack of substantial assistance from foreign countries, however, the project failed to make significant progress despite again being a top priority under the government's second five-year plan (1982-86).

Meanwhile in response to a request from the Government of former North Yemen, a technical cooperation project commenced in September 1983, as a programme of the Japan International Cooperation Agency (JICA). Under this technical cooperation project, the following aid has continued: a) organizational improvement and manpower development for the implementation of the national tuberculosis control project; b) development of techniques for prevention, diagnosis, and treatment for use at the National Tuberculosis Institute (NTI) and the local tuberculosis subcenters; and c) research and study for the purpose of improving the tuberculosis control project.

In line with the Government of North Yemen's request, the Government of Japan's grant aid cooperation program was begun as support for the technical cooperation in the tuberculosis control project. In 1986, the National Tuberculosis Institute (NTI) was established in Sanaa, the capital of the country, under a Grant Aid Program, and in 1987 tuberculosis subcenters were established in Hodeida and Taiz. The term of the technical cooperation project was extended from 1990 to 1992 in order to implement the program nationwide and to carry out a nationwide survey of actual numbers of tuberculosis patients as a preliminary step to the nationwide implementation of the project.

As a result of these efforts, there has been a gradual but steady improvement in the activities of these health care facilities, including the discovery and treatment of tuberculosis patients, the strengthening of local treatment and supervision systems and the publicity activities to educate tuberculosis patients on the importance of treatment and supervision.

2) Details behind the Request

The Ministry of Health of the Republic of Yemen is in the process of establishing a system to expand the scope of tuberculosis control activities by NTI and the subcenters to allow them to operate on a nationwide basis. In more concrete terms, the Ministry plans to offer mobile guidance, which has thus far been carried out by the subcenter's with staff being periodically dispatched to health centers and some of the health care units, and has been conducted by the central health center in every region. However, it would be very difficult to organize a nationwide network of tuberculosis control activities using the existing equipment provided to central health

centers (which have been raised to the status of the largest health center in every region). Furthermore, there is the problem of the inadequacy of the three subcenters' existing facilities. For example, the capacity of the NTI warehouse in Sanaa is too small, and the subcenter in Taiz is faced with the problem of damage to buildings caused by the erosion of slopes on the site. The latter problem has become particularly serious as the slopes have suffered erosion due to exceptionally heavy rainfall over the past two years, and the buildings are now seriously affected. Measures to stop the erosion of the slopes are urgently needed. Under these circumstances, the Government of the Republic of Yemen concluded that it was necessary to improve existing equipment and to take the aforementioned measures if the tuberculosis control project were to be implemented nationwide, and therefore made a request to the Government of Japan for grant aid cooperation.

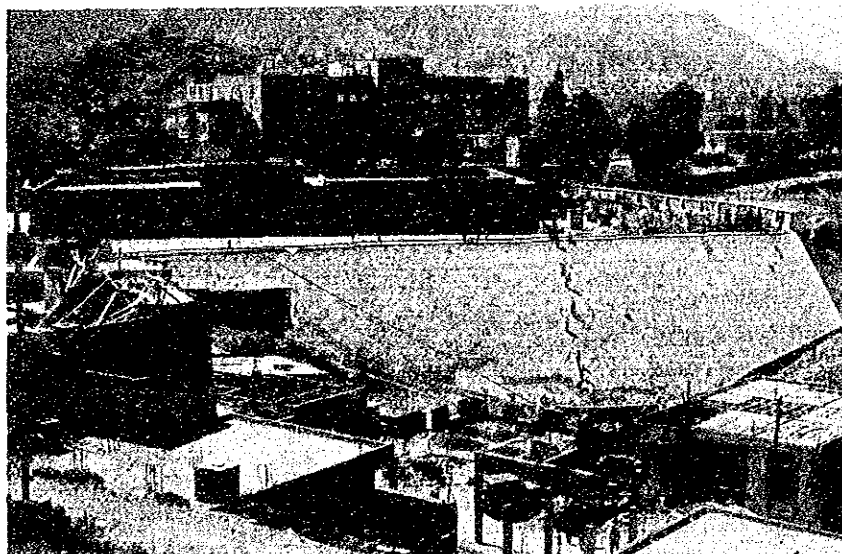


Photo-1 The slope on Taiz Subcenter site

3) Problems Facing the Taiz Subcenter

a) Construction of the Taiz Subcenter

Construction of the Taiz Subcenter was begun in October 1985 and completed in November 1986. The subcenter building, which is a one-storey reinforced-concrete structure, has a total floor area of 1,450 square meters. It was built on a site east of the Taiz Revolution Hospital. The site for the subcenter was prepared by the Yemeni side on the grounds that it was necessary to develop the area around Taiz Revolution Hospital as a health care zone and that this subcenter should be included in such a zone.

b) Work to Shore up the Slopes and Damage Caused to the Building

The problems with slopes on the Taiz site and the resulting damage to the subcenter's building surfaced as follows. In October 1986, the Ministry of Health carried out excavation work on a piece of land near the northeastern end of the building to prepare a temporary road for use in construction work to shore up the slopes. This was carried out within the scope of work by the Yemeni side. The excavation work was large and extended to within 3 meters of the northeastern end of the building. As a result, the subcenters foundations, the nearby LPG shed and even the rainwater collection tank began to subside. It was in May 1987, 8 months after excavation work began, that a multitude of cracks visible to the naked eye developed in both the interior and exterior walls of the subcenter, and the LPG shed began to incline.



Photo-2 The slope after cutting soil and excavation

The direct cause of the increasing damage was an interruption of the excavation work due to a budgetary deficiency. During the interruption, the land was not taken care of. Generally speaking, the structure of a piece of land in such a situation is not adversely affected by rainfall during the dry season, but it can be during the rainy season. It is probable, therefore, that during the interruption the land was eroded by rainwater. (In Yemen there are two rainy seasons a year, and the first lasts from March to April.) In addition, the building, being of a reinforced concrete structure, resisted subsidence at its northeastern end, resulting in a delay before the subsidence was discovered. Meanwhile, work to protect the slopes by the Yemeni side was resumed in June 1987 and completed in October 1988.

c) Confirmation of the Damage to the Building

An investigation of the actual damage to the building was carried out in October 1987 by the Japanese consultant and contractor. The investigation revealed subsidence of the building's foundations (particularly at the northeastern end; maximum: 278 mm), cracks in the exterior walls of the building, subsidence of the berms located close to the slopes, inclination of the LPG shed toward the slopes and changes in the position of the rainwater collection tank. There were even cracks in corridors on the opposite side of the courtyard. As mentioned above, the main reason for this was that the reinforced concrete building stood up to the subsidence at its northeastern end. At the time of the investigation, about 75 percent of the slope protection work had been completed and refilling of the excavated land had also been completed.

d) Emergency Measures to Cope with the Damage

In January and April of 1988, the Japanese consultant and contractor again investigated the actual damage to the building, and discussed possible emergency measures to cope with it, as well as the problem of the delay in completing the slope protection work, with representatives of the Yemeni side. The April investigation and discussions, in particular, confirmed that emergency preventive measures against rainwater erosion of the refilled area, reinforcement of the northeastern section of the foundations, and early completion of the slope protection work were necessary for protection against the year's rainy season from September to October. The foundation reinforcement work was

carried out between July and October of the same year.

In March 1989, the Japanese consultant and contractor confirmed the effectiveness of the reinforcement work. Work to cover the flat areas of the land with stones had been completed by that time.

However, cracks developed in the stone facing installed over the slopes from October to November 1989, and the upper slopes began to subside.

e) Implementation of a Follow-up Investigation

Taking into account these details of the damage, JICA conducted a follow-up investigation in January and February 1990. The main objectives of this follow-up investigation were to investigate the relationship between the slopes and the building and to work out both long-term and emergency countermeasures.

As a result of this investigation, it was confirmed that the collapse of the slope was attributable not to failure over the entire site but to inadequate shoring work which did not take into account rainfall during the rainy season. It was also confirmed that the formulation and implementation of long-term measures were urgently needed on the assumption that it would be possible to maintain the safety of the building only if the safety of the slopes was ensured. On the other hand, emergency countermeasures including driving 1.5 meter-long reinforcing bars, three at one point, into the slopes at intervals of 3 meters were implemented to

protect the slopes during the rainy season of that year.

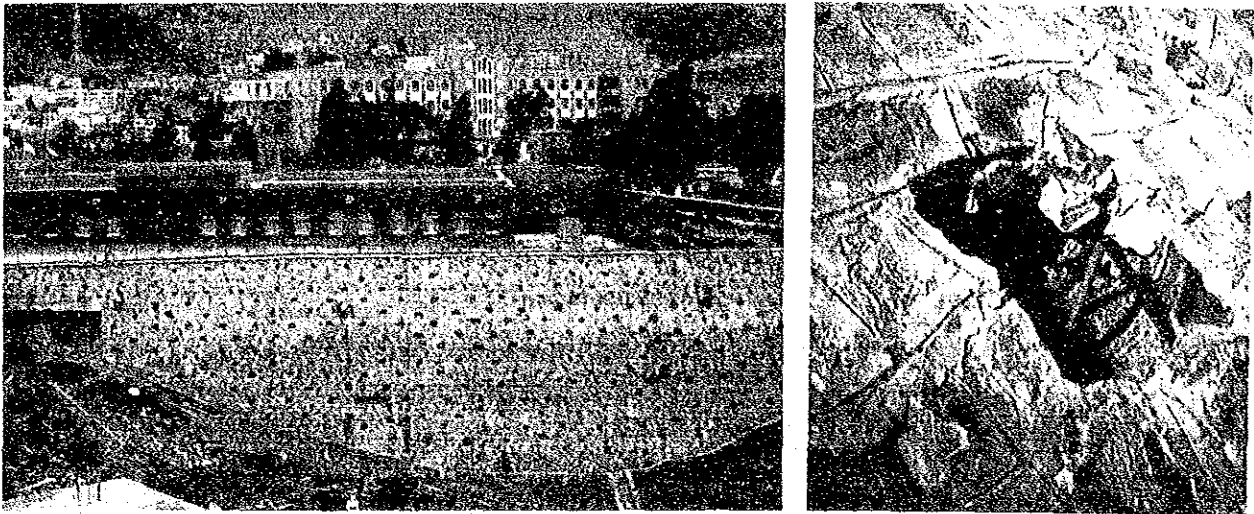


Photo-3 Emergency measures for the slope

(2) Status of the Request

1) Objectives

The objectives of the Government of the Republic of Yemen's latest request for grant aid cooperation are to provide central health centers, appoint GTCs and improve the equipment for tuberculosis control as a way to assist nationwide implementation of the tuberculosis control programme which has so far been carried out by the three facilities in the northern part of the country, to investigate the state of the slope collapse at the Taiz Subcenter, and to work out long-term measures to cope with the collapse.

2) Project Implementation Organization

The Bureau of PHC (Primary Health Care) will be the organization responsible for the implementation of the

project. The Ministry of Health of North Yemen endeavored to organize the governmental tuberculosis coordinators (GTC's), active in six of the country's 11 provinces, under the direction of this bureau for the purpose of implementing the tuberculosis control project which was previously carried out by NTI and the subcenters. After the unification of South and North Yemen, the Ministry of the Republic of Yemen has been promoting the activities to implement NTP by placing GTCs in 17 provinces and Sanaa City region, integrating the southern part of the country into this program (including improvement of the system for referring patients to their nearest health care facility).

3) Details of the Request

① Microscopes for use in the Tubercular Bacillus Examination (100 units)

Tuberculosis patients are usually discovered through the sputum examination, but not all local health care facilities are equipped with a microscope for use in the sputum examination, and this has resulted in delays in the discovery of tuberculosis patients. The country's tuberculosis control activities would be improved if such a microscope were installed in each of the local health centers and if examination experts and other health workers received training in the methodology of the sputum examination.

② Automatic X-Ray Developing Machines (3 units)

These machines will be introduced for the purposes of helping local health care facilities cope with a possible increase in demand for the development of X-rays taken in group examinations, improving the

quality of X-ray photographs, and promoting research and study at NTI and the subcenters.

③ Instrument for Bacteria Test for Use in the Hodeida Subcenter (1 set)

One instrument for bacteria test installed in the Hodida Subcenter under the Grant Aid Program implemented in 1985 has worn out due to high temperature, high humidity, and salt damage.

④ Resuscitator Sets (20 sets) and First Aid Kits (50 sets)

These resuscitator sets and first aid kits will be provided in local health care facilities for use in emergency treatment of cases of hemoptysis, difficulty in breathing, and serious injury.

⑤ Ambulances (4 units)

As there are no facilities for in-patients at NTI and the subcenters, it is essential for these health care facilities to transport cases of hemoptysis and difficulty in breathing to nearby hospitals and to keep in close contact with these hospitals. One ambulance each will be provided to the Revolution Hospital (Sanaa), Red Crescent Hospital (Sanaa), Revolution Hospital (Taiz), and Republican Hospital (Hodeida).

⑥ Four-Wheel Drive Vehicles (12 units)

These vehicles are required for the mobile guidance service provided mainly by NTI and the subcenters, and will be used by GTCs for research and

transportation of equipment and materials of local health centers: 1 unit to MOH NTP, 1 unit to NTI, 2 units to the subcenters, and 8 units to the GTCs.

- ⑦ Personal Computers (5 units) and Administrative Office Equipment (13 sets)

The personal computers are required for processing data and analysis of research and study results: 1 unit each to MOH NTP and the Bureau of PHC, 1 unit to NTI, and 2 units to the subcenters. The administrative office equipment will be used for streamlining work operations at MOH NTP, The Bureau of PHC, NTI, the two subcenters, and the eight GTC Offices.

- ⑧ Video Camera (1 set) and Video TVs (8 sets) for Use in Health Education

These devices are required to prepare videos for use in education on tuberculosis control for tuberculosis control experts and tuberculosis patients.

- ⑨ Increased storage for medical supplies at NTI
- ⑩ Provision of garages and parking space at NTI
- ⑪ Measures for restraining the slopes and protecting the building at the Taiz Sub-Center

CHAPTER 3 DETAILS OF THE PROJECT

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3-1 Objectives of the Projects

(1) Objectives of Facility Plans

Regarding the slopes on the site of the Taiz center, since the erosion of protective work is a problem for the whole site, and can be attributed to improper work to protect against rainfall during the rainy season, the aim is to establish permanent measures which will prevent the damage from increasing every rainy season, as has happened every year so far. As for the National Tuberculosis Institute (NTI), the intention is to supplement any inadequate facilities, pursuant to an expansion in medical activities and its role as headquarters of the anti-tuberculosis countermeasures activities.

- ① Permanent measures to prevent collapse of the site slopes and its effects on the buildings of the Taiz Subcenter.
- ② Such additions to the National Tuberculosis Institute (NTI) as medicine storage, a garage for X-ray vehicles, etc.

(2) Objectives of Equipment Plan

The Tuberculosis Control Programme (NTP), which was worked out by former North Yemen, has been continued after unification and also expanded nationwide by designating the largest-scale health center in each of 18 places to promote primary health care activities as regional central health centers and by stationing Governmental Tuberculosis Coordinators (GTCs) in these centers. (The directors of NTI, Hodeida and Taiz Subcenters also hold the posts of the regional GTC.)

In the project, equipment to be provided is designed to be useful in supporting GTC's activities.

In the nationwide development of measures against tuberculosis, the equipment whose procurement is required most urgently at present is classified by item as follows:

- ① Supplementary medical equipment.
- ② Office equipment for analyzing research and survey activities.
- ③ Office communication equipment for nationwide development of measures against tuberculosis.
- ④ Ambulances to transport all types of emergency and seriously-ill patients to hospitals.
- ⑤ 4WD vehicles for visits to the health care units (HCUs) in mountainous areas.

3-2 Examination of the Request

(1) Suitability and Necessity of the Project

In the fight against tuberculosis, early detection is most important, along with education on tuberculosis prevention. Every province however, now lacks the X-ray machines needed for examination and diagnosis, as well as microscopes. This means the first requirement is the provision of relatively inexpensive microscopes with low maintenance costs as well. In proceeding with the nationwide development of tuberculosis countermeasures, GTCs who were appointed in 18 regions need personal computers, copiers, typewriters, and other equipment for collecting, analyzing and examining data. A facsimile is now almost essential as a means of communication. There is also a lack of ambulances as a means of admitting emergency and seriously-ill patients with hemoptysis, dyspnea, etc., to hospital. Furthermore, as visits to Primary Health Care Units (PHC units) in mountainous areas are required, there is a need for more 4WD vehicles in the project.

On the grounds described in subpara. 2.2 (4) above, it would be desirable to install water softeners in the NTI, and both water softeners and automatic X-ray film development machines in each of the Taiz and Hodeida Subcenters.

Meanwhile, containers used to bring in equipment and materials during construction of the NTI are now being used temporarily to store medicines, spare parts, and foodstuffs (used to improve the nutritional diet of outpatients) such as wheat flour. This is due to inadequate storage space for such items in the NTI.

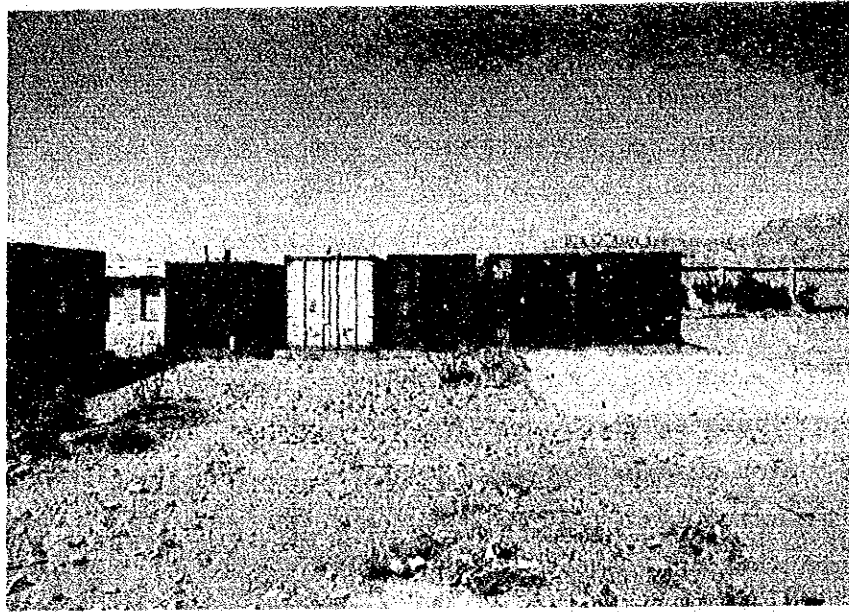


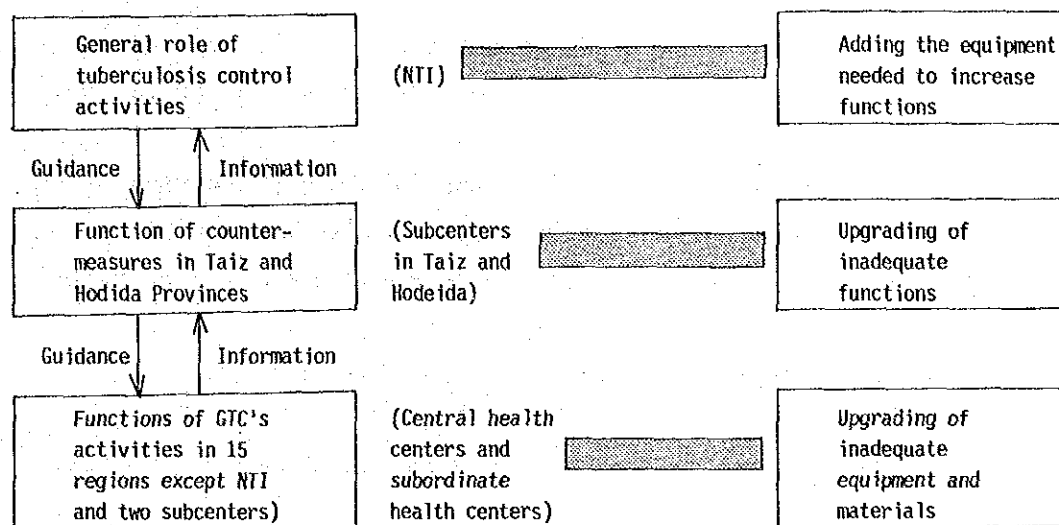
Photo 4 Continuous use of construction containers
store materials and machinery

The need to maintain a constant temperature for medicines and wheat flour, etc., causes some problems in control, so any improvement would be welcome.

As discussed in subpara. 2-4 "Details and Contents of the Request" above, the slopes at the Taiz subcenter site are now stable as a result of the emergency measures taken, but with future rain further erosion is certain. Permanent measures, therefore, need to be taken to alleviate the problem of the slopes and buildings affected at the earliest possible time.

(2) Composition of the Plan

The project will be divided into the following sections as shown on the following page.



(3) Implementation and Operation Plan

NTI is now managed by a staff of 45, basically satisfying the requirement (46 persons) estimated at the time of construction in 1986.

In both the Hodeida and Taiz Subcenters, established in 1987, they are staffed by 36 people, 4 more than had been planned at that time. Sufficient staff therefore has been secured at the present stage. If 15 GTC's are stationed throughout the country, excluding the 3 GTC's (concurrently serving as the directors of NTI and the two subcenters), nationwide tuberculosis control will be carried out more effectively.

The Ministry of Health's departments responsible for supporting those activities have been reorganized more systematically after the unification of the country; for example, the Primary Health Care Department was raised to the status of Primary Health Care Bureau, and has been improved with respect to personnel and organization.

The medical equipment and materials used often operate without any trouble and are well maintained under the guidance of