In PDRY, NTP office was established in the Ministry of Health in 1970s, and this NTP office was the executive organization of NTP. WHO was the main technical and budgetary supporting organization for this NTP. In this period, all the area of PDRY was supposed to be covered by NTP.

With the unification of YAR and PDRY, 22nd of May, 1990, two NTPs have also unified and the new central office was set in the MPH, Sana'a, under the Directo-rate of Communicable Disease in the Directorate of Public Health. With the establishment of this NTP central office, the nomination of GTCs as a governorate level TB control officers have been tried. At the end of 1991, almost all the governorates have nominated GTCs. Also the training of the concerned staff have been conducted domestically and internationally.

At the end of 1992, NTP activity could reach at least the capital level of each governorate. And in some governorates NTP has reached peripheral level by involving more health centers and/or hospitals such as Taiz governorate.

4.1.1. The Role of Yemen TB Control Project by JICA

Since 1983, Yemen TB Control Project by JICA has conducted several efforts for the improvement of NTP activity in Yemen. More than ten TB control experts were dispatched from Japan and many necessary equipments were donated. Also three TB centers in Sana'a as NTI, Taiz and Hodeida were build in 1987 and 1988 through this cooperation. More than 30 Yemenites have been trained in Japan for TB control and laboratory.

4.2. Structure and Organization of the NTP

The structure of NTP will be described in three levels of NTP such as central, intermediate and peripheral in this chapter.

4.2.1 Central level of NTP

NTP office in the MPH is the central executive organization of NTP. This office is under the Directorate of Communicable Disease which is in the General Directorate of Public Health.
The director of NTP office, medical doctor, is a person-in-charge of the coordination and execution of NTP in Yemen.
The main role of this NTP office is an administrative work in the MPH and the NTI is supporting this NTP office technically such as training, supervision and researches.

4.2.2. Intermediate level of NTP (GTCs)

Governorate Tuberculosis Coordinator (GTC) nominated by the governorate health office is a person-in-charge of coordinating the TB control activity in governorate level. GTC organize the NTP activity in his governorate by coordinating and supervising the TB control activity in his governorate.

4.2.3. Peripheral level of NTP

Health facilities diagnosing and treating tuberculosis cases under NTP

activity are belonging to this level.
The health facilities of this level can be divided into two kinds such as facilities at governorate capital and at other district.

At this moment in Yemen, NTP has reach the capital of almost all governorates. Namely, all the capitals have TB diagnose and treatment facilities which is under NTP supervision, namely under the supervision by GTC. But regarding as to other district level, only few health centers and hospitals are involved in NTP activity. No district TB coordinator has been nominated.

4.3. Job description of the NTP staff

The job description of the NTP staff will be mentioned in this chapter in these three levels of NTP as above.

4.3.1. Central level

Director of NTP office is a core leader at the central level with the supervision of the Director of Public Health of MPH.

The NTP director is responsible for the followings;
- Develop an annual NTP plan to implement NTP
- Coordinate the NTP activity between the MPH and other health institutes at central level such as Central Public Health Laboratory and Health Man-Power Institute and governorate and the peripheral level.
- Cooperate other sections of MPH, particularly those under the Public Health Directorate.
- Control the supply of drugs and other equipments and materials
- Collect the monthly and quarterly reports of registered TB cases from all GTCs.
- Coordinate the supervision of TB control activities in the governorate and peripheral level with NTI and other concerned institutions.
- Coordinate the training of health care personnel involved in the TB control activities with NTI and other concerned institutions.
- Promote the unified recording and reporting system of NTP.
- Make the Annual Report of NTP.
- Coordinate the execution and evaluation of the researches and surveys concerning to the improvement and promotion of the NTP
- Coordinate with the foreign donor agencies and international organization such as JICA, WHO, UNICEF and IUATLD.

4.3.2. Governorate Level

GTC is in charge of for the implementation of NTP activity in the governorate level under the support and supervision of the director of the Governorate Health Office and NTP office of MPH.
GTC is responsible for the followings;
- Coordinate with all the concerned authorities to implement NTP activity in the governorate
- Supervise the TB control activity in the governorate
- Collect the statistical data on TB control in the governorate and report

it to NTP central office and other concerned authorities.
- Control the supply of drugs, equipments and others in the governorate level, namely request and collect the supply from central level and distribute them to the health facilities in NTP in his governorate.

4.3.3. Peripheral Level

As mentioned above, at this moment there are no specific coordinator of TB at the district level. All the doctors and others in charge of TB control activity in the health facility which is under NTP are responsible for the following activities
- Diagnose TB cases by sputum smear exams among the symptomatic TB suspects.
- Supervise the treatment of TB cases.
- Supervise the registration and report making of TB cases.
- Supervise laboratory activity for TB.
- Report the statistics of TB cases to GTC.

4.4. The Role of National Tuberculosis Institute (NTI)

NTI has two major activities concerning NTP. One is as the technical support body of NTP central office and conduct training and researches. The other is as the national central treatment facility with the national reference laboratory and practice daily clinical activity.

4.4.1. The Technical Support

As a technical support institute for NTP, NTI has below activities.
- Technical advise to NTP central office
- Conduct supervisory visit with NTP central office
- Training for the concerned staff for NTP activity
- Conduct some researches for NTP activity such as
  Initial and Secondary drug resistance survey

4.4.2. The Treatment Activity

NTI is the treatment facility not only for a Sana'a city or Capital but also for all the country. A small survey in the second quarter of 1992 shows that one-third of TB cases came from Sana'a city and the next one-third came from Sana'a governorate, outside Sana'a city, and the rest one-third came from other governorates.
The treatment activity of NTI has still not yet reached satisfactory level particularly in terms of treatment completion rate. This activity needs more strengthening.

4.5. The Manual of NTP

4.5.1 The Manual

The NTP Manual for Activities was published in 1990. This manual summarizes all the policies in reference to NTP activities and the minimum technical

instruction for NTP activities.
But as the expansion the NTP in Yemen and for the new activities, the revision of this manual is necessary in the near future.

4.5.2. TB Control Manual Series

To support the technical aspects of above manual, "TB Control Manual Series" of NTP such as "TREATMENT OF TUBERCULOSIS", "Manual of Sputum Smear Examination" and "Textbook for X-ray Technicians" were published in 1992 with the support of National TB Control Project of JICA.
Other manuals for below subjects are definitely in need for the technical support of NTP activity in Yemen in the future;

- Manual for GTC
- Manual for District TB Control
- Manual for Recording and Reporting (Manual for Registrars)
- Manual for PHC workers

5. The Objectives and Targets of the NTP

5.1. The Long-term objective of the NTP

To reduce the incidence, prevalence and mortality of TB in the Republic of Yemen to a minimum level in order that TB will not be a public health problem.

5.2. The short-term objectives of the NTP

Achievement of the long term objective will require the implementation of the NTP policy based TB control measures such as case-finding and treatment.
Case-finding is to diagnose TB case with special emphasis on the microscopic sputum smear examination of the TB suspects.
Treatment of TB cases is to apply the correct chemotherapeutic regimen based on the results of sputum smear examinations.
The most important and vital issue in treatment of TB cases is to cure the smear positive pulmonary TB cases.

Although this achievement will clearly require large efforts from all related sectors and programmes either in the Ministry of Public Health or in the other sector including the improvement of the life standards will be needed, NTP can do specific and necessary activity in order to help in achievement these objectives through the attainment of several short term objectives in addition with above implementation of two TB control measures during the coming five years such as;

- to reduce the annual risk of infection 5% or more annually.
- to strengthen the reporting system.

For the country like Yemen whose case detection rate is low, around 50%, it is strongly expected that the strengthening of reporting system will show an increase in the number of cases at the beginning and then decline when the TB control activities are effective.

The achievement of these short-term objectives could be evaluated by the extent of the achievement of below targets particularly cure rate of new smear positive pulmonary TB cases.

5.3. The targets of the NTP

The specific targets of the NTP activity to attain both long-term and short-term objectives are to detect more TB cases by microscopic sputum smear exams and treat and cure more cases by NTP chemotherapy. The first index is called case-detection rate and the second is cure rate. The improvement of these two indices is the exact way of the improvement of NTP activity and is leading to the attain-ment of short-term and long-term objectives.
Epidemiologically, the improvement of cure rate has the highest priority. It is theoretically proven that the improvement of detection rate without the improvement of cure rate will not lead positive impact on TB epidemics.

The WHO has proposed the target of these two indices by the year 2000 as cure rate more than 85% and case detection rate more than 70% at this setting of developing countries. These targets are exactly the targets of Yemen by the year 2000.
But for the next five years, considering the present cure rate and case detection rate, 50% either, and the higher priority in cure rate, it is reasonable to set the target of both indices at the end of 1996, five years later, as 70% or more in cure rate and 60% or more in case detection rate as a whole country. In the area where the special operational research based activities, see below, would be executed, the targets of these two indices would be 10% higher, namely by the end of 1996, 80% or more in cure rate and 70% or more in case detection rate. Every effort should be made to achieve these target. Again, the first priority is given to the improvement of cure rate particularly already existing treatment facilities of TB in governorate capitals and districts.
Below table shows the targets in next five years in the whole country and some special areas for operational researches and support.

	Targets	
	the end of '94	the end of '97
All the country		
Case detection rate :	50%	60%
Cure rate :	60%	70%
Operational area		
Case detection rate :	60%	70%
Cure rate :	70%	80%

6. The project activities

6.1. The process

To attain the short term objectives and targets of the NTP by implementing the TB control measures is the process to achieve the long term objectives of NTP, namely the reduction of the epidemiological burden of TB.

Based on the present situation of TB control activities in Yemen, namely the low cure rate, the first priority is given to the improvement of the treatment activities of the existing facilities within NTP.
To achieve this improvement, the specific tuberculosis control measures as mentioned below will be implemented.

The integration of tuberculosis control activities into the general health services is a future aim, but this integration will be done step by step. After achieving the first priority, namely the improvement of cure rate at the existing treatment facilities, then the expansion will be carried out in one facility in the governorate.
After achieving good TB control activities, namely more than 70% of cure rate, at this new facility, the next expansion to another facility will be conducted.

Each GTC will select one or two targetted health facilities for the new expansion sites for new year. This selection will be expressed and discussed during the second GTC meeting of each year where the annual plan of the next year would be discussed.
The concerned staff of these health facilities will be the candidates for the

NTP first-time training. After the training of all the concerned staff, the necessary drugs and equipments will be supplied for the start of the new TB control activities.
In several selected areas, to establish a well functioning model of TB control in governorate and district level setting, operational research based support will be conducted. This issue will be discussed later.

6.2. Description of tuberculosis control activities

6.2.1. Case-finding

All the activities for the identification of self-reporting TB suspects is included in this issue.
The identification of TB suspects is firstly done by identifying the patient with a cough of 4 weeks or more duration. Then, the smear positive TB cases will be diagnosed by the microscopic sputum smear examination. The diagnosis by this smear examination is to be given the first priority in diagnosis. Three sputum specimen are supposed to be examined; the spot specimen on the first visiting day, and collected sputum and spot sputum on the second visiting day.
Sputum smear negative cases are diagnosed by symptoms, signs, x-ray and the culture of sputum specimen, if available.
Extra-pulmonary tuberculosis cases are diagnosed by symptoms, signs, x-ray

and other specific examinations.
The family contact of sputum smear positive TB cases should be examined.
As sputum smear positive cases are the most dangerous source of transmission of tubercle bacilli in the community, the treatment of these cases, namely cut this transmission, is given the highest priority.

6.2.2. Treatment

Three types of chemotherapeutic treatment regimens are approved by NTP for TB cases such as Short Course (SCC), Standard (ST) and Re-treatment Chemotherapy.
SCC, 2HRZS (E) + 6TH, is applied for the smear positive pulmonary TB cases and serious smear negative pulmonary TB cases and extra-pulmonary TB cases such as meningitis and miliary TB.
ST, 2STH + 10TH, is applied for the smear negative pulmonary TB cases and extra-pulmonary TB cases.
The re-treatment regimen, 2HRZES + 1HRZE + 5HRE (or 5H3R3E3 or 5TH), is applied for the sputum smear positive relapsed cases, treatment failure cases and treatment after defaulters whose sputum smear exams on return were positive.
The details of these treatment regimens, doses of each drugs and the side-effects are mentioned in the NTP manual and Treatment Manual.

The usage of Rifampicin is still limited for cases applied SCC or Re-treatment regimen in Yemen because of the limitation of the budget for the drug procurement and the quality of diagnosis for the smear negative cases. Up to now, no data has suggested the high, or becoming higher, proportion of initial resistance particularly against Rifampicin, but to avoid any un-necessarily Rifampicin initial resistance, the usage of Rifampicin needs more supervision and education.
Also, it is strongly recommended to avoid this un-necessary Rifampicin resistance rifampicin should be purchased and used only as a combined tablet form with Isoniazid.

6.2.3. Registering the tuberculosis cases

All the cases diagnosed as TB and given treatment regimens will be given unified patient-card and treatment-card. And this patient will be registered in the unified tuberculosis register, District Tuberculosis Register, and given distinct TB number.
In this register book, all the necessary for the cases will be written and monitoring on treatment response and treatment results will also be registered.

6.2.4. Monitoring the tuberculosis cases

The objective monitoring on treatment response will be done by sputum smear examinations. After the start of the treatment, sputum smears are to be examined the end of the initial phase, the middle of continuation phase and the end of the treatment. This means at the end of 2nd month, 5th month and 8th month for SCC applied cases and the end of 3rd month, 5th month and 8th month for re-treatment regimen applied cases.
For SCC applied cases, when the sputum at the end of the 2nd month is still

positive, four drugs of the initial phase will be continued one more month. When the sputum smear at the end of 5th month or 8th month is surely positive, this case is to be recognized as a treatment failure case in the treatment result and put under the re-treatment regimen as "others" in the category of the patient.
The detail of this monitoring is described in the "Treatment Manual".

6.2.5. Laboratory activities in NTP.

Laboratory service particularly sputum smear examination has the vital role in TB control activities. By this examination, the diagnosis of sputum smear positive cases would be made and the treatment response and its result would be monitored. The improvement of the quality of this laboratory services and its maintenance is badly important for TB control. To accomplish this issue, the QC by higher institutions and constant supply of necessary equipments and reagents for smear examination would be indispensable.

6.2.5.1. Quality control of sputum smear examination

In all laboratories within the NTP, all the examined slides will be kept in slide box(es) for three months.
Every three months, GTC will collect five negative and five positive slides, totally ten slides, randomly from this stock.
These selected slides will be re-examined either during the GTC meeting, 1st and 3rd quarter of the year, or NTI, Taiz and Hodeida TB centers.
The results will be reported to each GTC and NTP office within one month.
And if the results would not be satisfactory, the corresponding technical will be the candidate of the refreshing training of the same year.

6.2.5.1.1. The annual schedule of QC programme

Though the final goal of this QC programme is the involvement of all the concerned laboratories within NTP, considering the present activities of GTCs and each laboratories, the introduction of the programme will start mainly in Sana'a, Taiz, and Hodeidah governorates, and expanded into other governorate as follows;

year	Center	Governorate
1993	NTI	Sana'a, Dhamar
	Taiz	Taiz
	Hodeidah	Hodeidah
	Aden	Aden
1994	NTI	Sana'a, Dhamar, Jawf
	Taiz	Taiz, Ibb
	Hodeidah	Hodeidah, Hajja
	Aden	Aden, Lahej, Abyan
1995	The achievements of previous two years would be reviewed and discussed for further expansion of the programme.	

6.2.5.2. Culture examination

Clinically, since the priority is given to smear positive TB cases, not to the smear negative culture positive pulmonary TB cases, culture examination for diagnosis is not taken to this service. Culture examinations can be ordered for re-treatment cases only, together with the following sensitivity tests.
Main aims of culture examination are isolate the TB strains for the drug sensitivity test to analyze the initial resistance and the quality control of smear examination.

6.2.5.2.1. QC of culture examination

Culture examination of Taiz and Hodeida TB centers will be supervised by NTI. Laboratory chief of NTI is responsible for this activities. Twice a year, the laboratory chiefs of three TB centers will meet together and review the technique and knowledge. Quality of isolated strains for sensitivity tests can show their technique of the examination.

6.2.5.3. Drug sensitivity test

Clinically, sputa of the re-treatment cases can be examined the sensitivities for SM, INH and RFP with the requests of the doctors.
Epidemiologically, for the surveillance of the initial drug resistance, a sample of isolated strains of new smear positive patients are to be examined the resistance against SM, INH, and RFP at NTI. This issue will be mentioned later in the chapter of Operational Researches again.

6.2.5.3.1. QC of drug sensitivity test

The QC of sensitivity test in NTI will be done by referring the TB strains to the Research Institute of Tuberculosis in Japan for the double check of the results and the comparison with results of the sensitivity of the standard strain.

6.2.5.4. Laboratory supplies

All the laboratory equipment and reagents for smear examination will be supplied to the peripheral laboratories from NTP store through GTC. To simplify the request process, the idea of sputum smear package for the installation and the continuation of smear examination will be introduced (see Annex 11). To insure the qualities of staining solutions such as Zeihl's carbol fuchsin, 25% sulfuric acid and 0.1% methylene blue are to be prepared at the selected laboratories, and to be provided for all local laboratories through the GTC. For the time being, NTI, Taiz and Hodeida TB centers and the central laboratory of Aden are responsible for this preparation and supplies.

6.3. Description of operational researches and supports

TB control in Yemen has still varieties in its activities. In some areas TB control has been well activated with the support of concerned staff and

organizations, but still in many areas even the vital activities for TB control have not been well established.
Under the limitation of human and monetary resources in Yemen, it is more cost and resource effective to set the operational research areas to establish and activate the vital part of TB control and then expand the experiences and know-how to other areas.
In this chapter, these operational research based activities will be described by dividing central, intermediate and peripheral levels.
Although many of these operational researches have already started previously and actually they are operational supports at this moment, these activities are described here in this chapter as operational researches.

6.3.1. The central level

Several vital issues concerning to the NTP office and NTI will be set under the operational researches to find its execution way.

6.3.1.1. Supply system

Regular and continuous supply particularly for drugs without any shortage at any level and at any moment is the very vital activities in TB control. To establish the way of this supply system in the country with difficulty in communication between central and intermediate like Yemen is the essential component with the highest priority of TB control.

6.3.1.1.1. Aims

To establish the effective supply system and channel from central to governorate to avoid any un-necessary shortage at any level is the aim of this OR. The buffer stock at the central level is set for half a year and that of the governorate level is set for three months.

6.3.1.1.2. Methods

The basic components of this OR are as follows;

- Utilize the GTC meeting held biannually as a supply opportunity.
- For the governorates with far distances from Sana'a such as Mahra, Hadramaut, Shabwa, Abyan, Aden and Lahej, the distribution will be done biannually by utilizing the GTC meeting.
- For other governorates, the distribution will be done basically every three months.
  The GTC meeting will also be utilized as the supply opportunity.
- Introduce the idea of supply package as a set of items for the same purpose
- Utilize the supervisory visit from central to governorate for an extra-supply opportunity.

Considering the difficulties in transport in Yemen, it will be more cost effective to utilize the biannual GTC meeting as a supply opportunity. The detail of GTC meeting will be described later, but before the meeting each GTC will estimate the necessary quantity of each items for distribution and during the meeting NTP office will justify the request from each GTC and then distribute the items.

To simplify the supply system both request and distribution, the concept of

package will be introduced. For example, smear examination installation package will include all the necessary equipments and reagents for the start of smear examination at any facilities. The detail of each package will be described in Annex 11, but the titles of packages are as follows.

Registration package,
Patient referring package,
Smear examination installation package.
Smear examination supplement package

Supervisory visit from central to each governorate will be conducted biannually. This visit will be utilized as an extra-opportunity for the distribution. The detail of supervisory visit will be described later.

6.3.1.1.3. Evaluation

The effectiveness of this OR will be evaluated the stock of drugs and others at the peripheral health facilities. If any deficit of any drugs or equipment at any time, this OR needs more improvement.

6.3.1.1.4. Responsible organizations

NTP office, JICA, GTCs of each governorate.

6.3.1.2. Report collection and analysis.

Submitting of a monthly and a quarterly report on TB control to the NTP office is an important job of GTCs. With these reports, NTP office can evaluate and supervise the TB control in each governorate. But at present, due to the poor communication system between central and governorate, the collecting of these vital reports has sometimes delayed.

6.3.1.2.1. Aims

This OR firstly aims to establish the effective communication system between central and governorate for report submitting. By using this system, NTP office will supervise the regularity on this report submit from GTCs and the appropriateness on the contents of these reports.
NTP office will develop central registration system, and feed-back these results to the TB control activities in governorate.

6.3.1.2.2. Methods

The basic components of this OR are as follows;

- Establish the effective communication system between central and governorate by using mail, fax and any other means.
- Supervise and check the regular and on-time submission of monthly and quarterly reports from GTCs to NTP office.
- Check the data on these reports and inquire the contents if necessary.
- Summarize the data into yearly form of monthly and quarterly reports
- Feed-back the results to each GTCs.

6.3.1.2.3. Evaluation

The activity of this OR will be evaluated by supervising the central register at NTP office. All reports should be submitted without any unnecessary delay.

6.3.1.2.4. Responsible organization

NTP office, JICA, GTCs

6.3.2. Governorate Level

The main job of GTC is to implement TB control activities into the health facilities in his governorate and supervise the activities. To establish the effective TB control in governorate setting, the field supervision is vitally important. But because of the lack of budgetary as well as technical support, this supervision actually has not always been conducted and the governorate level TB control has not been well established in Yemen.

The budget of all NTP has still not enough to support all the activities of GTC particularly the supervisory visits in all the governorates. So below governorates are selected as operational research area to search the way to establish the future model of governorate TB control by supporting the technical and budgetary assistance.

Presently, the number of involved health facilities are as follows.

	Taiz	Hodeida	Aden
HCs	5	2	5

The common character of these governorates is the existence of the central TB center or hospital with beds; Hodeida is supposed to have TB beds soon. By establishing the referring system between these central facilities and peripheral health facilities and involving more number of health facilities in Taiz and Hodeida governorates, the way of governorate TB control system will be searched.
To facilitate this activities, the meeting of the responsible person for TB control at peripheral health facilities and the other concerned staff of central TB center and others will be held twice a year for two days in each governorate.
These responsible person will be the candidate for the future District TB Coordinator in each district.

6.3.2.1. Taiz governorate

The TB control activities in Taiz governorate has been a model in Yemen. Setting TB center as a central organization, several health centers and hospitals have already been involved such as Rahida, Turba, Hagda, Bara and Mokha. The cure rate of Taiz TB center has already reached 70%.

6.3.2.1.1. Aims
To make better the present TB control in Taiz and establish Taiz TB control as a model of governorate setting particularly in terms of the development of referring system of patients between Taiz TB center and involved health facilities and also the involvement of more number of health facilities.

6.3.2.1.2. Methods
The main components of this OR are;
- Supervise the involved health centers and hospitals from Taiz TB center once a month.
- Introduce the patients referring package into all the involved

institutions and monitor the treatment response and results of the referred cases from TB center by this supervision.
- Make the monthly and quarterly reports together with the staff of involved institutions on the same day of field visit by TB center.
- Involve at least one health facilities annually after training the concerned staff.
- Held the governorate meeting for the responsible staff at peripheral health facilities and TB center twice a year.

6.3.2.1.3. Responsible organization
Taiz TB center, JICA, Involved Health Centers and Hospitals, NTP office.

6.3.2.2. Hodeida Governorate

Two health centers such as Zaydeya and Zabid have already been involved TB control activities in Hodeida governorate setting Hodeida TB center as a central institution. Based on the treatment results of Hodeida TB center (Annex), it is definitely necessary to involve more health centers and improve their activities.

6.3.2.2.1. Aims
To establish TB control activities at least three health centers such as Zaydeya, Zabid and other together with the microscopic activities, namely sputum smear examinations, to establish effective patient referring system and involve at least one health facilities a year in Hodeida is the aim of this OR.

6.3.2.2.2. Methods
The components of this OR is almost as same as those of Taiz OR.

6.3.2.2.3. Responsible organization
Hodeida TB center, involved health centers, JICA, NTP office

6.3.2.3. Aden governorate

TB control activities in Aden has long been conducted setting the republican hospital as a center and utilizing TB clinics in six polyclinics in Aden such as the OPD of the Republic Hospital, Kour-Maksar, Monsura, Boreka, Ma'ala and Crater. But the activities of these institutions have not been well coordinated particularly in terms of referring system. Also the unified recording system has not yet fully been introduced.

6.3.2.3.1. Aims
To establish the well-functioning coordinating system particularly in terms of patient referring system from the Republic Hospital and six polyclinics and introduce the unified recording system fully into these institutions.

6.3.2.3.2. Methods
The main components of this OR are ;
- supervise the TB control activities in these polyclinics twice a month by the GTC of Aden
- Introduce the unified recording and reporting system fully into these institutions. Conduct training if necessarily. Also the patient referring package system will be introduced.

- Establish the microscopic examination system in these institutions. It is the best to establish the microscopic activities in all of six polyclinics.
  But, if it is difficult the alternative system should be sought and established.
- the TB wards of the Republic Hospital will have the unified register book and for the patients who will attend one of these polyclinics after the discharge the treatment response and results after the discharge will be recorded in this register.
- Held the governorate level meeting twice a year.

6.3.2.3.3. Responsible organization

The GTC of Aden, all the institutions above, JICA, NTP office.

6.3.3. District level

District level TB control will be the key activities in the future to attain the effective TB control. But at this moment, district involvement in terms of TB control has almost been nil. This is to some extent due to the poor infrastructure of health in Yemen, namely TB control could not be integrated into the PHC without effective infrastructure of health. So in the next five years, the integration of TB control into PHC will be firstly tried at the well functioning PHC project. From this sense, below OR trial with PHC project by the government of Holland will be tried. Also the way of cooperation with other on-going PHC project will be sought.

6.3.3.1. Dhamar

Dharma Rural Health Project (DRHP) has achieved well functioning PHC activities in the involved health centers in Dhamar.

6.3.3.1.1. Aims

To establish the model of district level TB control by joining the DRHP.

6.3.3.1.2. Methods

The main components of this OR are;
- Select one health center in DRHP
- Set District TB Coordinator (DTC) as a person in charge of TB control in this district.
- establish microscopic activity in this health center.
- introduce unified recording and reporting system.
- DTC will coordinate with GTC and supervise the TB control activities in his district. Supervise health centers which are involved.

6.3.3.1.3. Responsible organization

DRHP, NTP office, GTC of Dhamar, JICA

6.3.3.2. Hodeida

Hodeida Urban PHC Project (HUPHCP) has achieved MCH activities in Hodeida city. Two health centers at this moment are under their activities. HUPHCP has also been conducting well-functioning community involvement by home visiting.

6.3.3.2.1. Aims

To cooperate HUPHCP's home-visiting activities and establish the well functioning patient follow-up system particularly for the defaulter retrieving.

6.3.3.2.2. Methods

The main component of this OR are ;

- To establish patient reporting system from Hodeida TB center to MCH centers under HUPHCP.
- Patients from HUPHCP areas particularly defaulters will be reported to HUPHCP for health education and retrieving by home-visit.
- to increase community awareness on TB by health education by home visiting.

6.3.3.2.3. Responsible organization

HUPHCP, Hodeida TB center, GTC of Hodeida, JICA

6.3.4. Tuberculin survey

The previous survey was conducted during the end of 1990 and the beginning of 1991. To verify the trend of the ARI and epidemiological magnitude of TB, the next nation-wide tuberculin survey will be conducted around 1995. The aim and method of this tuberculin survey is exactly same as the previous one.

6.3.5. Initial drug resistance

The initial drug resistance against anti-TB drugs is the epidemiological data to analyze the efficiency and efficacy of the current treatment regimen. This resistance proportion represents the treatment activities both in NTP and private sector.
For the country like yemen who has huge private sector with TB treatment activities with Rifampicin, the increment of the initial resistance against RFP is concerned. Also because of the non-sufficient cure rate in NTP, the increment of the resistance to RFP is also concerned.

6.3.5.1. Methods

The drug sensitivity test has been conducted mainly at the laboratory of NTI.
The drug sensitivity pattern of the isolated Mycobacterium tuberculosis from the routine TB patients at NTI is examined.
The method of sampling will be decided based on the capacity of this laboratory.
The isolated batches from Hodeida and Taiz TB center by culture examination will be used.
For the quality control of this sensitivity test and the re-confirmation of the results, these isolated batches will be transported to the laboratory of the Research Institute of Tuberculosis of Japan for additional drug sensitivity test.

6.3.5.2. Responsible organizations

NTI, NTP office, JICA

6.3.6. The Sociological analysis of patient behavior

The sociological analysis of the TB patients such as delay analysis or defaulter analysis has not been well conducted in Yemen. These data is necessary to search the operational intervention.

6.3.6.1. Methods

For delay and defaulter analysis, the OR will be done by interviewing the patients and defaulters, respectively.
The first step is to establish the questionnaire. And pilot study will be conducted at NTI, and then other facilities in NTP.

6.3.6.2. Responsible organizations

NTP office, NTI, JICA

6.4. Training

Training of the concerned staff is an essential supportive activity for the proper execution of TB control at all health service levels. Training for health care staff is a cornerstone of NTP implementation.

6.4.1. Objectives

The objectives of training in TB control are as follows;
- To up-grade the necessary knowledge, attitudes and skills of all health staff related to TB control activities.
- To make those health staff to be able to perform these activities as a part of their daily work.
- To motivate and communicate with the staff working for TB control.

6.4.2. Policy of the training

The training in NTP can be divided into two classes.
One is the quality control of the activities of health facilities with TB control. The training of the staff in these facilities are the on-the-job training with the supervisory visit and refreshing course as a group setting.
The other is the training of the staff in the newly involved health facilities. Whenever the TB control is expanded into new facilities, the training of the concerned categories in these facilities would be conducted prior to the start of the practice. This is the first time training.

The NTP office and the NTI are fully in charge of the administrative coordination of these training course at the central level.
GTC of each governorate has the responsibilities of the coordination of training at the governorate level.
At both level, training coordination will be made together with the Health Manpower Institutes of each level.

6.4.2.1. The selection of the trainees

It has been noticed that the selection of the trainees is a key of the

efficiency of the training. It happened not rarely that non-experienced or not suitable trainees attended the course with the experienced and suitable trainees. This kind of variety of background in trainees did really affect the efficiency of training particularly that of laboratory training.
To avoid this un-necessary affection in the training, the selection of trainees in each class mentioned above 6.4.2. will be conducted as follows;

For the refreshing course, the candidate of the trainees are;
- already attended the NTP training course previously and,
- works at the health facility where TB control has already been implemented.

The selection of these trainees will be done by GTC, NTP office and NTI. The observation of the activities through the supervisory visit will be the important data for this selection.

For the first-time training, the candidates of the trainees are;
- the staff at the facility where TB control has not been implemented.

The plan of expansion in each governorate will be discussed at the GTC meeting in July. If the cure rate of existing facilities reach more than 60%, one or two health facilities will be selected for the next sites of the expansion. The staff at these facilities will be the candidates of this first-time training.

6.4.3. Categories of the trainees

To educate and motivate all the staff involved in TB control, below categories will be trained regularly by NTP.
- medical officers
- medical assistants
- laboratory technicians.
- X-ray technicians.
- nurses
- PHC workers
- registrars

To make use the limited resources such as trainers, facilities and budgets, above categories will be grouped into below four training groups.
- Group A ; Medical officers and medical assistants
- Group B ; laboratory technicians
- Group C ; X-ray technicians
- Group D ; Nurse, PHC workers and registrars

6.4.4. Schedule of training

The duration of each groups will differ based on the history of previous training and experience as mentioned above, namely for the first-time training and refreshing training.

6.4.4.1. First-time Training

It will be expected that one or two health centers will newly be involved into NTP annually, so the number of trainees in this first-time training would be around 2 from each governorate in each group of training.

The frequency of training per year, the number of trainees in each training, site of training and the governorate of trainees are described below.
Schedule for the first time training

Group	Freq.	Duration	No of Trainees	Site	Governorate of trainees
A	1/yr	1 week	36 total (2 each)	NTI	Sa'ada, Jawf Mareb, Sana'a
				Hod.	Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar
				Aden	Aden, Lahej, Abyan
				Had.	Shabwa, Hadramout, Mahra
B	1/yr	2 weeks	36 total (2 each)	NTI	Sa'ada, Jawf Mareb, Sana'a
				Hod.	Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar
				Aden	Aden, Lahej, Abyan
					Shabwa, Hadramout, Mahra
C	1/yr	1 week	36 total (2 each)	NTI	Sa'ada, Jawf Mareb, Sana'a
				Hod.	Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar
				Aden	Aden, Lahej, Abyan
					Shabwa, Hadramout, Mahra
D	1/yr	1 week	54 total (3 each)	NTI	Sa'ada, Jawf Mareb, Sana'a
				Hod.	Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar
				Aden	Aden, Lahej, Abyan
				Had.	Shabwa, Hadramout, Mahra

Hod. : Hodeidah
Had. : Hadramout

6.4.4.2. Refreshing courses

The trainees for this course will be selected from the already-involved health facilities, so the number of candidates may not be constantly fixed. In this plan, this number is set as one from each governorate in each group. The frequency, duration and the sites of these group training courses and the number of trainees and the governorates of trainees are described below.

Group	Freq.	Duration	No of Trainees	Site	Governorate of trainees
A	1/yr	3 days	18 total (1 each)	NTI	Sa'ada, Jawf Mareb, Sana'a Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar Aden, Lahej, Abyan Shabwa, Hadramout, Mahra
B	1/yr	1 week	18 total (1 each)	NTI	Sa'ada, Jawf Mareb, Sana'a Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar Aden, Lahej, Abyan Shabwa, Hadramout, Mahra
C	1/yr	3 days	18 total (1 each)	NTI	Sa'ada, Jawf Mareb, Sana'a Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar Aden, Lahej, Abyan Shabwa, Hadramout, Mahra
D	1/yr	3 days	18 total (1 each)	NTI	Sa'ada, Jawf Mareb, Sana'a Hajja, Mahweet, Hodeida
				Taiz	Ibb, Taiz, Beida, Dhamar Aden, Lahej, Abyan Shabwa, Hadramout, Mahra

In addition with above group setting training, the individual training will be conducted when all the concerned organization such as NTP office, NTI and GTC agreed the necessity of the extra-refreshing course.
Also the in-service training during the supervisory visit will play a very important role in this refreshing course.

6.4.5. Training of GTC

GTC meeting is a kind of training for the GTCs. But for the newly nominated GTC the special training may be conducted for one week at NTI or two TB centers. This is the same system for the newly nominated DTC in the future.

6.4.6. Training programme

The NTP manuals such as General manual, treatment, laboratory and x-ray will be used as textbooks in these training. And other specific manuals or textbook for these training such as the registration manual with exercises and GTC manual are in need.
The newly developed manual by WHO HQ for the District TB Management will be modified and used in these training.

6.4.7. Training abroad

Training abroad is the good opportunity for the staff to up-grade and expand the idea not only in TB but also in general. Also this kind of training will be the good motivation for the concerned staff.

NTP office plan to dispatch its staff in NTP to below courses in next five years with the cooperation of MPH, JICA, WHO and other donating agencies.

Place	Category	Number	Contents
Japan	Doctor (GTCs)	1 / yr	Advanced course
Japan	Doctor (GTCs)	2 / yr	Group course
Japan	Laboratory	1 / yr	Laboratory
Japan	X - ray	totally 2	X - ray
Japan	Health Educat.	totally 2	Health Education
India	Doctor	1 / yr	at Bangalore
Tanzania	Dr and others	4 / yr	at Arusha
Egypt	Health educat.	1 / yr	at Alexandria

NTP office also plans to dispatch at least two staff in NTP in the next five years for the training course with degree such as Master of Public Health in Pakistan and/or Alexandria.

The selection of the candidate will be done by the Technical Advisory Committee on NTP.
And, it has been seriously taken into consideration by MPH and NTP office that some ex-trainees attended international course have already left NTP and gone to other sectors after the training.
In the next five years, NTP office together with the Technical Advisory Committee will try to process the stipulations in the face of all the candidate before attending to external training. This will be the obligation of the candidate and help to avoid the loss of these ex-trainees from NTP.

6.5. Description of supportive activities

This chapter will describe the NTP activities which support the implementation of specific TB control measures into the existing TB control services and the integration of TB control activities into the general health services.

6.5.1. Health Education on Tuberculosis

Tuberculosis is still a disease of stigma in Yemen which affects negatively the TB control activities in this country.
To avoid this stigma and raise the community awareness and understanding of TB to improve the TB control, health education has an important role.
As TB control aims firstly to detect and treat the dangerous infection source of TB in the community, namely smear positive pulmonary TB cases, earlier, health education to the public also aims this point firstly.

Also as the vital activity in TB control is to reduce the defaulters, health education to the patients and community mentioning the importance of regular and continuous drug intake will be given the high priority.

Health education to the public will be given by the media (TV, Radio, newspapers), pamphlets, posters and any other opportunities. The schedule of health education through media is as follows;

Media	Frequency
TV	2 / year
Radio	2 / year
Newspaper	4 / year

In this health education or campaign, the anti-TB association of Yemen should play an important role.

6.5.2. Supervision of the TB control

Supervision of TB control at all level is the most important activities in NTP. Through this supervisory visit the correct instruction, guidance, support and on-the-job training would be executed.

6.5.2.1. Supervisory visit by central unit

From the NTP central level, NTP office in MPH and NTI as a central unit will conduct supervisory visit to all the governorates.
This CU supervisory visit team will consists at least of below personnel;
- one medical doctor,
- one Japanese expert,
- one senior laboratory technician,
- one health education and registration specialist
- one driver

This team will regularly visit each governorate twice a year. And the visiting schedule will be made to enable this CU team to visit all the health facilities involved in NTP at least once a year together with the GTC of that governorate.

The area with special OR activities will be visited at least quarterly by some of the CU members and GTC of that governorate.

This supervisory visit will play a role of drug and equipment supply according to the need of each governorate.

6.5.2.2. Supervisory visit by GTC

GTC will visit the health facilities in his governorate at least quarterly. This visit by GTC will be integrated with the visit by CU as much as possible. The vehicles donated from the government of Japan will be used for this supervisory visit by GTC.
The team member will be selected from the nucleus hospital at each capital of governorate where usually GTC has been working.

Through this visit, GTC will introduce the specific TB control measures and establish the patient referring system. GTC will monitor the treatment response of the cases referred to this health facilities from the other facilities particularly nucleus hospital.
Also GTC will supply drugs and equipments to each health facilities by this visit. The quarterly (and monthly) report of each facilities will be made with the support and supervise of GTC.

At present, because not a many health centers at district and almost nil health units are involved into NTP, GTC will visit all the health facilities in his governorate. But in the future if many health units would be involved and DTC would be nominated, the supervision of health units level activities will be the job of DTC in that district.

6.5.2.3. Supervisory visit of external experts

It is expected that experts on TB control activities will visit Yemen through JICA, IUATLD, WHO and others. It would be more effective that these visits would be executed at the same period of regular GTC meeting. These experts will observe the activities of several governorates after attending the GTC meeting.

6.5.3. Supporting committees for NTP

To expand the idea of TB control and raise more support from the concerned sectors in health and others, committee activities is necessary. Of course, of them the committee in the MPH and the GTC meeting are of the most importance.

6.5.3.1. Technical advisory committee

At present the Steering Committee is set at the MPH. This is the national central committee in terms of TB control in Yemen. But, this committee is rather general not technical. Technical Advisory Committees (TAC) as an advisory body to this steering committee will be establish to discuss and suggest all the concerned activities to NTP office in MPH.
The establishment of this committee will be discussed in Steering Committee in 1993. The members of TAC will be;

- NTP director
- General Director of Public Health
- Director of Communicable Disease Control, MPH

- NTI director
- Directors of TB centers in Taiz and Hodeida
- GTCs of Aden and Hadramaut
- Officer from department of research in MPH
- Officer from health education department in MPH
- Chief of laboratory department of NTI
- JICA experts (observers)

This committee will be held basically tougher with the GTC meeting. The extra-meeting will be held in case of necessary.

6.5.3.2. GTC meeting

GTC meeting will be held twice a year, one in January and the other in July, excluding the Ramadan Month. The duration of each meeting will be four days. To utilize this GTC meeting as an opportunity for supply, this meeting will be held at least once a year in Sana'a. The location of the next meeting will be discussed in the GTC meeting.

Through this meeting the motivation of GTCs as well as the technical issue such as recording and the reporting and the supply as the vital component of NTP will be discussed.
District TB Registers of each nucleus hospitals will be reviewed and the cure rate will be calculated. Also the drugs and other equipments will be distributed to each GTCs according to their needs.
Together with this meeting the TAC will be held. And the external experts particularly from Japan will visit Yemen in the same period of this meeting.

6.2.5.6. Laboratory chief meeting

Twice a year, for three days, the laboratory chiefs of TB centers will meet and discuss all various aspects of the laboratory services on TB control. QC of smear examination and culture examination might be the main issues. Activities of each TB center are to be reported. Technique of culture examination and re-examination of slides would be reviewed.

6.5.3.3. Anti-Tuberculosis Association of Yemen

This non-governmental, NTP supporting association will play an important role in TB control in Yemen. This association is closer to the community and can conduct community based activities. To cooperate with this association, the governmental side will set a regular meeting with this association.

6.5.4. Planning and monitoring

The CU will prepare the annual plan with the budget proposal to the MPH before the end of the each fiscal year.
Based on this annual plan and evaluation of the activities of the year, the CU will submit the Annual Report on TB control each year.

The CU will organize and execute the GTC meeting twice a year as explained above. The GTCs well prepare the annual plan with the budget proposal and submit to the NTP office of MPH at the GTC meeting held in July.

The CU and GTC will evaluate the activities on each governorate based on both plans by the CU and GTC and describe it in the annual report on TB control. The annual plan for the OR areas will be made with all the responsible organizations, as above, involved in the OR.

JICA TB control team will support all the activities in making the annual plan and annual report on TB control.

6.5.5. Manual making

Up to present, several manuals on TB control have been published such as;
- National TB control manual
- Treatment of TB
- Smear examination
- X-ray

The National TB Control Manual was published in 1991. This small booklet is the synopsis of all the activities in TB control, but some part need revision and also detailed explanation. To solve this problems, three technical manuals as above have been published.
It is needed in the near future to prepare and publish below technical manuals as well as the revision of the National TB Control Manful.
- Manual for GTC
  Explain all the activities concerning GTC job. Detailed explanation for drug request, supervision and others will be described.
- Manual for registration and reporting
  Explain how to fill the register books and make the monthly and quarterly report with full of exercises.
- Manual for health education
  explain how to educate community and patients with easy and understandable drawings.

The recent achievement by the WHO HQ, textbook of "Management of TB control at District Level" will be modified and used in all opportunities such as GTC meeting.

6.5.6. Distribution of medical articles

To facilitate and update the activity of concerned staff in NTP particularly doctors, the NTP office will distribute the recent articles concerning TB with the cooperation of research department in MPH.
The research department will provide the summary chart in the recently published articles in the field of TB concerning all aspects recorded in the CD-Rom. NTP office will select the important articles and distribute to GTCs and other staff by utilizing the meeting and other measures.

7. Work plan of the TB control activities

Activity	Resp. Staff	Freq.	Duration
6.1. The Process			
Expansion of TB control activities into new HC	GTC	annually	cont.
6.2. Description of tuberculosis control activities			
6.2.1. Case-finding			
Identification of TB suspect	gen. health staff	daily	cont.
Refer the suspects to Sputum smear examination	gen. health staff	daily	cont.
Sputum smear examination	lab. tech.	daily	cont.
6.2.2. Treatment			
Providing anti-TB regimen	Dr, MA involved health fac.	daily	cont.
6.2.3. Registering the tuberculosis cases			
Register the TB Cases	Registrar involved health fac	daily	cont.
6.2.4. Monitoring the tuberculosis cases			
Follow-up sputum smear exam	Dr, MA involved health fac	daily	cont.
6.2.5. Laboratory activities in NTP			
6.2.5. Quality control of smear examination			
Stock of the slides in slide box	Lab tech involved health fac.	daily	cont. quarterly
Collect the slides for QC	GTC	Quart.	1 day for one HC

re-examination of the slides	NTI Taiz Hodeida	Quart.	1 month
Report the results to each health facility	GTC	Quart.	1 day one fac

6.2.5.2. Culture examination

Culture examination	NTI Taiz Hodeida (Aden,Mukhala)	daily	cont.

6.2.5.2.1.Quality control of culture examination

QC of culture exam	NTI	6 monthly	3 days

6.2.5.3. Drug sensitivity test

Drug sensitivity test	NTI	daily	cont.

6.2.5.3.1.Quality control of drug sensitivity test

QC of drug sensitivity test	RIT	Once or Twice a year	

6.3. Description of operational researches and support

6.3.1. Central leave

6.3.1.1. Supply system

Control and arrange the NTP store	NTP off	daily	cont.
Drugs ; At central level six months buffer stock and quarterly or six monthly supply to gov	NTP off	cont.	cont.
At governorate level three month buffer stock and quarterly supply to each health facilities	GTC	Cont.	cont.
Laboratory ; Supply the equipment to governorate	NTP off	cont.	cont.
Supply the reagents to governorate	NTI, Taiz Hodeidah Aden (CL)	for the time being	cont.

Procure the drugs biannually	NTP off	6 monthly	cont.

6.3.1.2. **Report collection and analysis**

Submission of monthly and quarterly report to NTP off	GTC	monthly quarterly	cont.
Collect these reports and analyze and summarize	NTP off	monthly	cont.

6.3.2. **Governorate level**

Supervise the health facilities	GTC Taiz Hodeidah Aden	 monthly monthly twice a month	 cont. cont. cont.
Make monthly and quarterly reports	Taiz Hodeida Aden	monthly quarterly	cont.
Held governorate level meeting	Taiz Hodeida Aden	twice a year	2 days
Involve new health center	Taiz Hodeida	annually	cont.

6.3.3. **District level**

Supervise the health unit	Dhamar	twice a month	cont.
Retrieve the defaulter	Hodeidah	cont.	cont.

6.3.4. **Tuberculin survey**

Tuberculin survey	NTP off	1995	6 months

6.3.5. **Initial drug resistance**

drug sensitivity test	NTI	cont.	cont.
Re-examination of the same strains in Japan	RIT	once or twice a year	

6.4. Training

6.4.4. Schedule of training

6.4.1.1. First-time training

First time training	NTP off	annual	1 week
First time training for laboratory technicians	NTP off	annual	2 weeks

6.4.1.2. Refreshing courses

Refreshing courses	NTP off	annually	3 days
Refreshing courses	NTP off	annually	1 week

6.4.7. Training abroad

Training in Japan;			
One doctor (advance course)	JICA	annually	6 weeks
Two doctors (group course)	JICA	annually	5 months
One laboratory technician	JICA	annually	5 months
One health education staff	JICA	1994 1996	6 months
One X-ray technician	JICA	1993 1995	3 months
Training at Bangalore, India			
One doctor	WHO	annually	
Training at Arusha	WHO	6 monthly	3 weeks
Two GTCs or equivalents (JICA)			
Training at Alexandria	WHO	annually	1 year
One health education staff	(JICA)		
One doctor for chest disease	WHO		2 years

6.5. Description of supportive activities

6.5.1. Health education on tuberculosis

Health educat. on TV	NTP off	6 monthly	cont.
Health educat. on radio	NTP off	6 monthly	cont.
Health educat. on newspaper	NTP off	6 monthly	cont.

6.5.2. Supervision of the TB control

6.5.2.1. Supervisory visit by central unit

Supervisory visit to all gov	NTP off	6 monthly	cont.

6.5.2.2. Supervisory visit by GTC

Supervisory visit to health facilities in NTP by GTC	GTC	quarterly	cont.

6.5.2.3. **Supervisory visit of external experts**

Japanese experts	JICA	6 monthly	14 working days

6.5.3. **Supporting committees for NTP**

6.5.3.1. **Committee in the MPH**

Technical Advisory Committee	NTP off	annually	1 day

6.5.3.2. **GTC meeting**

GTC meeting	NTP off	6 monthly	4 days

6.5.4. **Planning and monitoring**

Making annual plan before the beginning of the year	NTP off	annually	cont.
Making annual report after the end of the year	NTP off	annually	2 months

6.5.5. **Manual making**

Revise National TB Manual	NTP off	1995	6 months
Manual for GTC	NTP off	1993	3 months
Manual for recording and reporting	NTP off	1993	3 months
Manual for health education	NTP off	1994	3 months

6.5.6. **Distribution of medical articles**

Distribution of medical articles	NTP off	quarterly	cont.

8. Description of the project input

Due to the current economical inflation in this country, the calculation of annual expense in the future is problematic. To cope with this difficulty, the calculation of annual expense follows below conditions.

- For local expense particularly personnel expenditure such as per diem, the cost is to increase 10% annually.
- But the local expense which has been rather stable such as the cost of the petrol, this annual increment is not taken into consideration.
- To correspond any un-expected economical instability, the 10% of buffer budget is added particularly to the local expense.

8.1. Input for tuberculosis control activities

8.1.1. Input for supervisory visit by CU (YR)

	1993	1994	1995	1996	1997
Per diem	161,120	177,232	194,956	214,452	235,898
Transport	64,040	64,040	64,040	64,040	64,040
total	225,160	241,272	258,996	278,492	299,938
Adding 10%	248,000	266,000	285,000	307,000	330,000

8.1.2. Input for procurement of vehicles and motorcycles (US$)

	1993	1994	1995	1996	1997
Large 4WD	60000	30000	30000	60000	0
Small 4WD	27000	27000	27000	27000	27000
Motorcycle	12000	12000	12000	12000	12000
Total	99000	69000	69000	99000	39000

8.2. Input for operational researches and supports

8.2.1. Central level (YR)

For the supply control, the annual expense is YR 72,000.
Collection and analysis of the monthly and quarterly report, the annual expense is YR 72,000.

8.2.2. Governorate level (YR)

	1993	1994	1995	1996	1997
Taiz	120000	138000	156000	180000	198000
Hodeida	60000	78000	96000	120000	138000
Aden	90000	102000	108000	120000	132000
TOTAL	270000	318000	360000	420000	468000

8.2.2.1. Supervision of these areas by CU (YR)

	1993	1994	1995	1996	1997
Per diem	102,000	112,200	123,420	135,762	149,338
Transport	35,400	35,400	35,400	35,400	35,400
total	137,400	147,600	158,820	171,162	184,738
Adding 10%	151,100	162,400	174,700	188,300	203,200

8.2.3. Health facility level

8.2.3.1. The defaulter retrieving at NTI (YR)

	1993	1994	1995	1996	1997
Cost YR	36000	39600	43200	48000	52800

8.2.3.2. Health education at NTI (YR)

The annual expense is YR 7,200.

8.2.4. Research activities

8.2.4.1. Tuberculin survey (US$, YR)

This survey will be conducted in 1995. The size of the targeted areas and population are almost as same as the previous survey in 1990 and 1991.
The input for the tuberculin survey is YR 1,000,000 and US$ 34,000.

8.2.4.2. Drug sensitivity test (US$)

This survey for inial resistance will be conducted only at NTI laboratory.
The basic monthly support will be YR 600 (US$ 50).
The annual cost for this test is YR 7,200 (US$ 600).
The cost of equipment, reagents and others is shown in 8.4.3.

8.3. Input for anti-TB drugs (US$)

	1993	1994	1995	1996	1997	
drugs (US$)	343427	259118	283207	305947	329560	(G)
all (US$)	458000	346000	378000	408000	440000	(H)

(H) = (G) / 0.75

8.4. Input for equipments and other supply

8.4.1. Input for sputum smear examinations by year (US$)

	1993	1994	1995	1996	1997
No of New SP	3000	3300	3600	3900	4200
No of smear exams	120000	132000	144000	156000	168000
Cost of smear exam	32400	35640	38880	42120	45360
Cost of smear pack.	7524	7524	7524	7524	7524
Cost of Microscope	10000	10000	10000	10000	10000
Total (US$)	49924	53164	56404	59644	62884
Adding 10% as a reserve (US$)	55000	58500	62100	65700	69200

8.4.2. Input for quality control of smear examination (US$)

	1993	1994	1995	1996	1997
Cost of QC	783	412	288	288	288
Supervisory visit	2500	2500	2500	2500	2500
Total (US$)	3283	2912	2788	2788	2788
Adding 10% reserve	3600	3200	3100	3100	3100

8.4.3. Input for culture and sensitivity tests (US$)

	1993	1994	1995	1996	1997
Cost	815	654	602	643	728
Adding 10% reserve	900	720	660	710	800

8.4.4. Input for patient registration package (YR)

	1993	1994	1995	1996	1997
Treat. cards	-	-	-	450000	-
Patient cards	-	-	-	450000	-
Dist. TB Reg.	-	-	450000	-	-
Treat. Box	12000	13200	15000	16500	18000
TOTAL	12000	13200	465000	916500	18000

8.4.5. Input for patient referring system package (YR)

	1993	1994	1995	1996	1997
Ref. sheet	3000	3300	3600	3900	4200
Ref. file	3000	3300	3600	3900	4200
File divider	4800	5300	5800	6400	7000
TOTAL	10800	11900	13000	14200	15400

8.5. Input for training and meeting

8.5.1. Domestic training : First-time and re-training course (YR)

	1993	1994	1995	1996	1997
First	900000	990000	1089000	1198000	1318000
Refresh	280000	308000	339000	373000	410000
TOTAL	1180000	1298000	1428000	1572000	1728000

8.5.2. Training abroad

8.5.2.1. Training at Alexandria, Egypt

Nurse / PHC worker for health education (annual)
: 1 person a year : US$ 24,000

8.5.2.2. Training at Arusha, Tanzania

GTC and other equivalent staff (annually)
: 4 person a year : US$ 14,000.

8.5.3. Input for domestic meeting

8.5.3.1. GTC meeting (biannual) (YR)

	1993	1994	1995	1996	1997
YR	190000	209000	230000	253000	279000

8.5.3.2. The technical advisory committee (YR)

	1993	1994	1995	1996	1997
YR	10,000	11,000	12,100	13,400	14,800

8.5.3.3. Governorate level meeting in OR area (YR)

	1993	1994	1995	1996	1997
Taiz	43900	47900	51900	55800	59800
Hodeidah	32100	36000	40000	43900	47900
Aden	40000	44000	48400	53300	58600
Total	116000	127900	140300	153000	166300

8.5.3.4. Meeting abroad

8.5.3.4.1. IUATLD annual meeting (US$)

One yemeni counterpart will attend the annual meeting of IUATLD which is usually held at Paris once a year for one week.

The annual expense for this meeting will be US$ 2,800.

8.6. Others

8.6.1. Manual making

8.6.1.1. Revision of the National TB Control manual (US$)

This will be implemented in 1995.
The total cost is US$ 20,000.

8.6.1.2. Manual for GTC (and for DTC) (US$)

This will be implemented in 1993 and/or 1994.
The total cost for this manual is US$ 2,500.

8.6.1.3. **Manual for registration and reporting (US$)**

This will be implemented in 1993 and/or 1994.
The total cost for this manual is US$ 3,500.

8.6.1.4. **Manual for health education (US$)**

This will be implemented in 1994/1995.
The total cost for this manual is US$ 3,500.

8.6.1.5. **Annual report making (US$)**

The annual cost for this report making is US$ 2,000.

8.7. Equipments for x-ray activities

8.7.1. X-ray films and solutions (US$)

The annual input for x-ray films and solutions are US$ 27,000.

8.7.2. Mass chest survey x-ray machine (US$)

The present three units of mass chest survey x-ray machine were donated in 1987. The size of films of these machines is 70mm. To upgrade the radiological support to the diagnosis of TB, the new machine with the film size of 100mm is preferable. The one set of new machine costs US$ 122,400. Present three units will be replaced one by one yearly.

9. The inputs for TB control activities [Summary]

9.1. In US dollars

Input Number	1993	1994	1995	1996	1997	Total US $
8.1.2.	99000	69000	69000	99000	39000	375000
8.2.4.1.	-	-	34000	-	-	34000
8.2.4.2	600	600	600	600	600	3000
8.3.	458000	346000	378000	408000	440000	2030000
8.4.1	55000	58500	62100	65700	69200	310500
8.4.2.	3600	3500	3700	4000	4200	19000
8.4.3.	900	720	660	710	800	3790
8.5.2.2.	24000	24000	24000	24000	24000	120000
8.5.2.3.	14000	14000	14000	14000	14000	70000
8.5.3.4.1.	2800	2800	2800	2800	2800	14000
8.6.1.1.	-	-	20000	-	-	20000
8.6.1.2.	2500	-	-	-	-	2500
8.6.1.3.	3500	-	-	-	-	3500
8.6.1.4.	-	3500	-	-	-	3500
8.6.1.5.	2000	2000	2000	2000	2000	10000
8.7.1.	27000	27000	27000	27000	27000	135000
8.7.2.	-	122400	122400	122400	-	367200
Total	6929000	674020	760260	770210	623600	3520990

9.2. In Yemeni Rials

Input Number	1993	1994	1995	1996	1997	Total YR
8.1.1.	248000	266000	285000	307000	330000	1436000
8.2.1.	144000	144000	144000	144000	144000	720000
8.2.2.	270000	318000	360000	420000	468000	1836000
8.2.2.1.	151000	162400	174700	188300	203200	879700
8.2.3.1.	36000	39600	43200	48000	52800	219600
8.2.3.2.	72000	72000	72000	72000	72000	360000
8.4.4.	12000	13200	465000	916500	18000	1424700
8.4.5.	10800	11900	13000	14200	15400	65300
8.5.1.	1180000	1298000	1428000	1572000	1728000	7206000
8.5.3.1.	190000	209000	230000	253000	279000	1161000
8.5.3.2.	10000	11000	12100	13400	14800	613000
8.5.3.3.	116000	127900	140300	153000	166300	703500
Total	2439800	2673000	3367300	4101400	3491500	16073000

Annex 1

Health Sector Policies

1. Correct major geographical imbalances in :
   - . distribution of health facilities
   - . distribution of HRH
   - . referral system

2. Emphasis on :
   - . PHC
   - . MCH (All Health Centers to have MCH Services)
   - . Environmental Health
   - . Child spacing and Family Planning
   - . Integration of vertical programmes

3. Encouragement of village health improvement projects.

4. Strengthen central and governmental infrastructure to support logistics, HRH development and management including personnel management.

5. Improve quality of care.

6. Financing mechanisms.
   - . Health insurance
   - . Cost sharing
   - . Private sector expanding rate
   - . Participation of local government
   - . Eliminating waste

7. Special health projects
   eg. Health education

Source : Mid-term document plan, MPH, 1992

Annex 2

Table 1 : Estimated Population by Age Groups and Sex, 1991
(1000s)

Age groups	Total	Females	Males
0-4	2404	1187	1217
5-9	2073	1015	1058
10-14	1614	766	848
15-19	1137	542	595
20-24	817	419	398
25-29	633	353	280
30-34	576	332	244
35-39	502	286	216
40-44	424	232	192
45-49	340	181	159
50-54	296	154	142
55-59	249	124	125
60-64	181	92	89
65-69	137	71	66
70-74	87	44	43
75+	142	75	67
Total	11,612	5873	5739

Source : Statistical Yearbook, 1991

Table 2. Population and number of districts by Governorate

Governorate	Population (1990)	No of District
Sana'a city & Sana'a gov.	1,894,954	38
Aden	436,500	4
Taiz	1,648,815	20
Lahej	531,743	5
Ibb	1,425,283	20
Abyan	352,972	4
Hodeidah	1,172,498	22
Shabwa	225,643	5
Hajjah	807,950	33
Hadramout	677,398	8
Dhamar	771,551	9
Al-Mahra	99,719	4
Al-Beida	338,329	12
Al-Mahweet	290,976	8
Sa'ada	353,656	14
Maareb	108,084	12
Al-Jawf	47,020	9
TOTAL	11,183,091	227

Annex 3

Forecast real growth of economy and state expenditure
For Republic of Yemen
1992 - 1995

(YR. Billion)

	Market price				Forecast at 1992 price		
	1989	1990	1991	1992	1993	1994	1995
1. GDP	61.4	77.2	104.9	159.5	178.7	200.2	234.3
2. GNP	62.9	78.8	106.5	161.9	181.7	203.8	228.7
3. State Expend. (Recurrent)	21.7	31.8	39.9	42.0	45.6	54.4	69.4
4. (3. / 2.)	34.0	40.0	37.0	25.0	25.0	27.7	30.3

Assumptions :

1. 1990/91 real growth of -6.0% plus inflation at 40%.
2. 1991/92 real growth of +6.0% plus inflation at 46%.
3. 1990/91 factor incomes from abroad decline 700 million, but no change in 1991/92. GNP increases 0.2% points more than GDP from 1993/5.
4. GDP increases in real terms 12.0 p.a. 1993/5
5. State recurrent expenditure declines as a % of GNP to 25% in 1992 and gradually rises t 30% by 1995.

Annex 4

Estimated state and health recurrent expenditure
1989-92 and forecast to 1995 for the Republic of Yemen

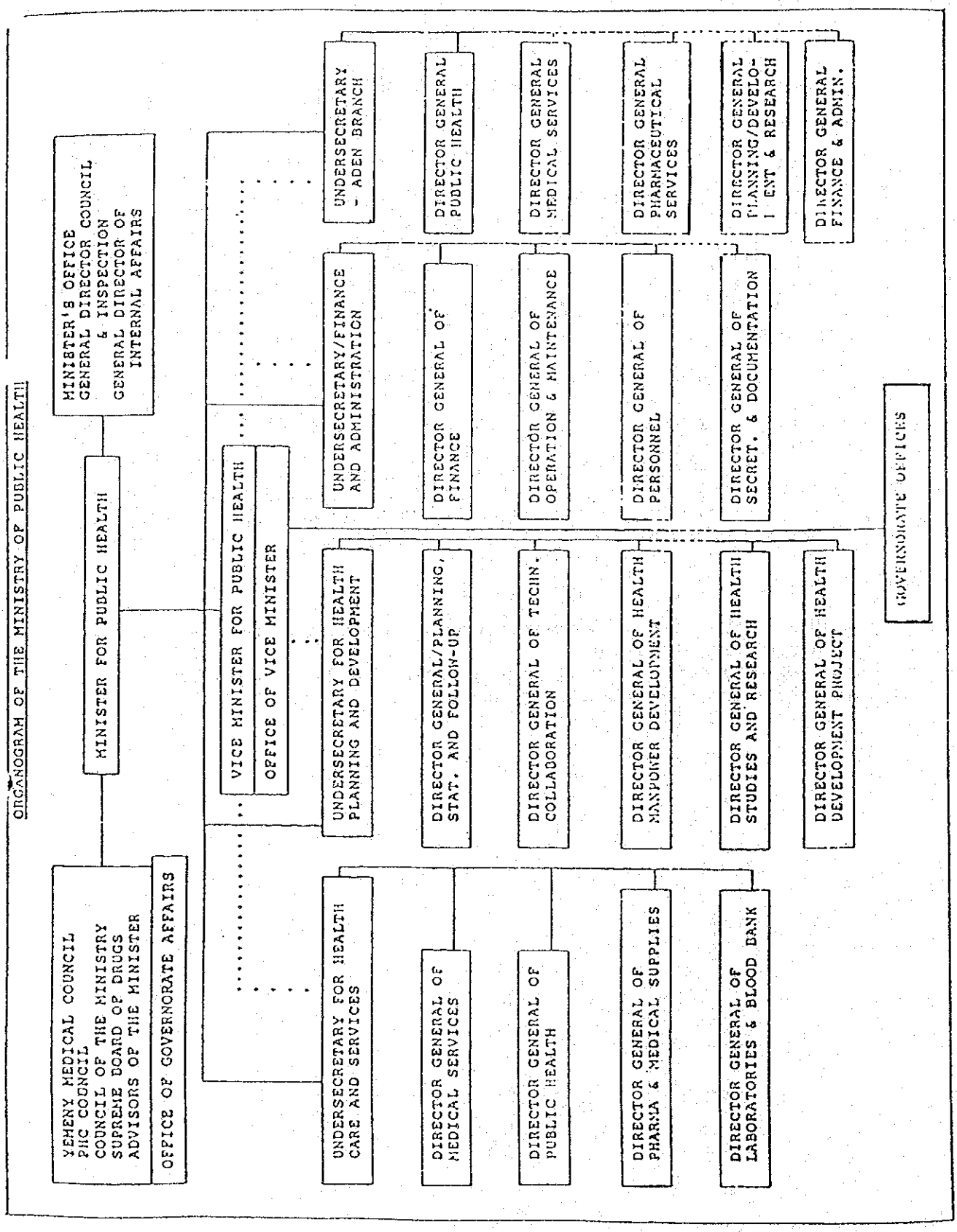
(YR. Billion)

	Market price				Forecast at 1992 price		
	1989	1990	1991	1992	1993	1994	1995
1.State expend.	21.7	31.8	39.9	42.0	45.6	56.4	69.4
2.MPH recurrent budget	1.2	1.2	1.7	2.1	2.3	2.8	3.5
3.Extra budget. resources	0.3	0.3	0.3	0.4	0.5	0.6	0.8
4.Total MPH recurrent	1.5	1.5	2.0	2.5	2.8	3.4	4.3
(2. / 1.)	5.5	3.8	4.3	5.0	5.0	5.0	5.0
(3. / 4.)	20.0	20.0	15.0	16.0	17.9	17.6	18.6

Assumption

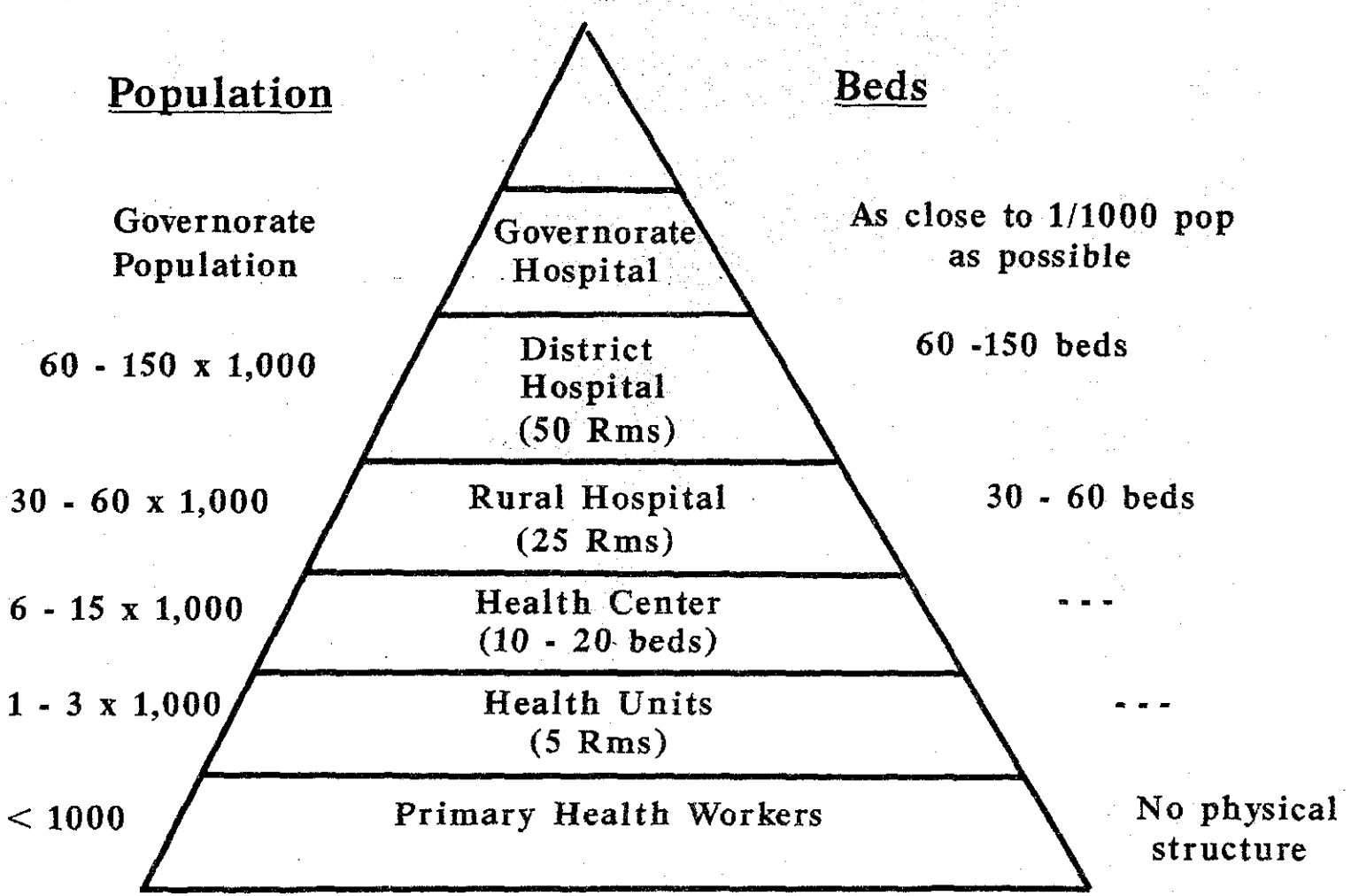
1. From 1992 - 1995, the MPH recurrent expenditure will be 5% of the total state recurrent expenditure.
2. Extra budgetary resources will grow as shown. Partly from aid increases, but mainly from local government and fees.

Annex 5



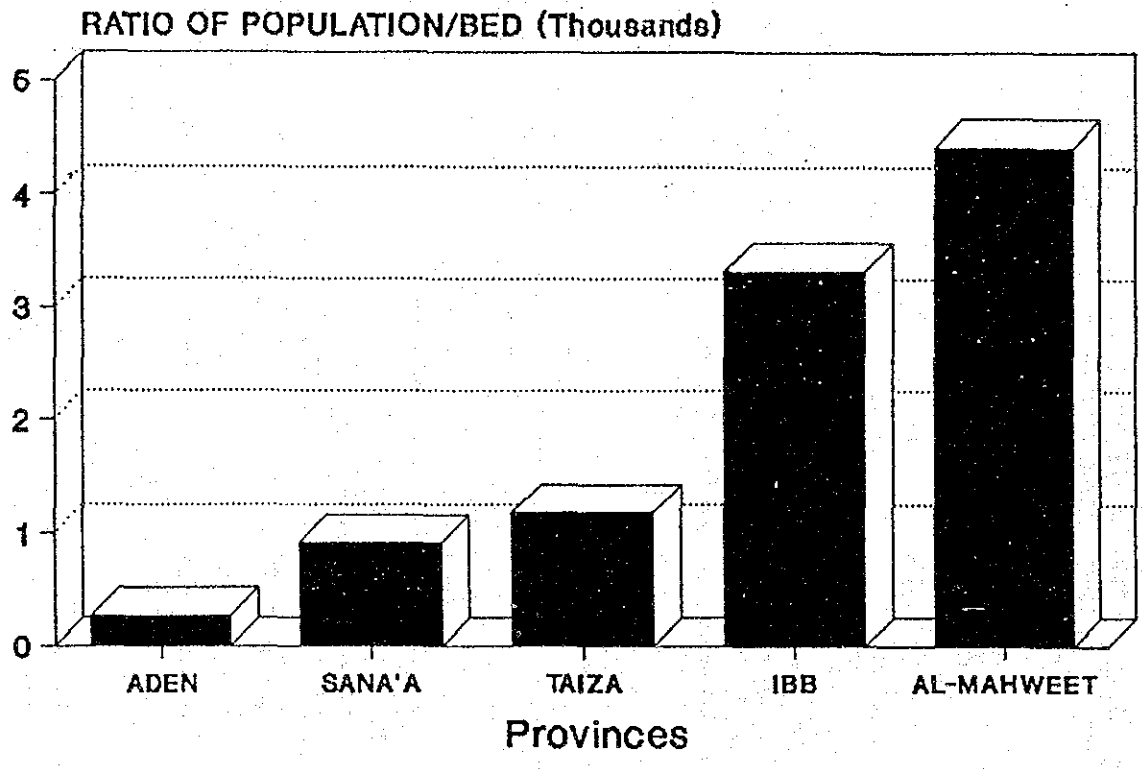
* Under revision and approval

Recommended Standards for Health Facilities at various level



Annex 7

FIG.(1) RATIO OF HSPITAL BED TO POPULATION IN SOME PROVINCES, YEMEN,1991



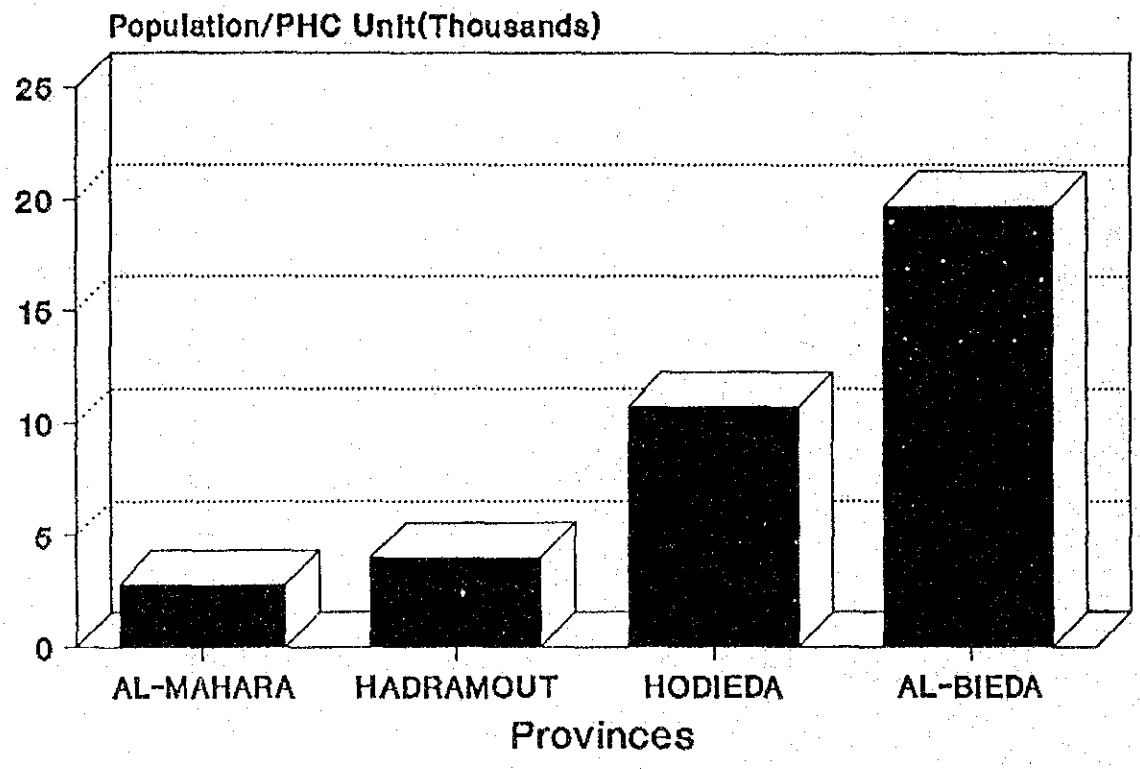
Annex 8

Health establishments by type and Governorate
Republic of Yemen, 1991

Governorate	Type of establishment: Hospital No	Hospital Beds	Health centers* No	Health centers* Beds	Health centers No	PHC units No
Sana'a	7	1755	-	-	68	152
Aden	6	1466	2	34	-	11
Lahej	8	635	6	180	-	112
Taiz	9	1206	5	120	75	64
Abyan	6	433	2	55	-	77
Ibb	6	378	8	160	30	31
Shabwa	4	225	2	50	-	77
Hodeida	4	904	4	220	30	110
Hadramout	7	605	9	190	-	98
Hajja	3	116	13	203	20	90
Al-Mahra	1	88	3	70	-	17
Dhamar	1	150	7	140	18	54
Sa'ada	3	117	4	92	9	53
Al-Beida	2	85	1	20	11	35
Al-Mahweet	1	35	4	40	8	10
Mareb	3	95	3	37	17	53
Al-Jawf	-	-	3	52	17	10
Total	74	8395	94	1919	296	1035

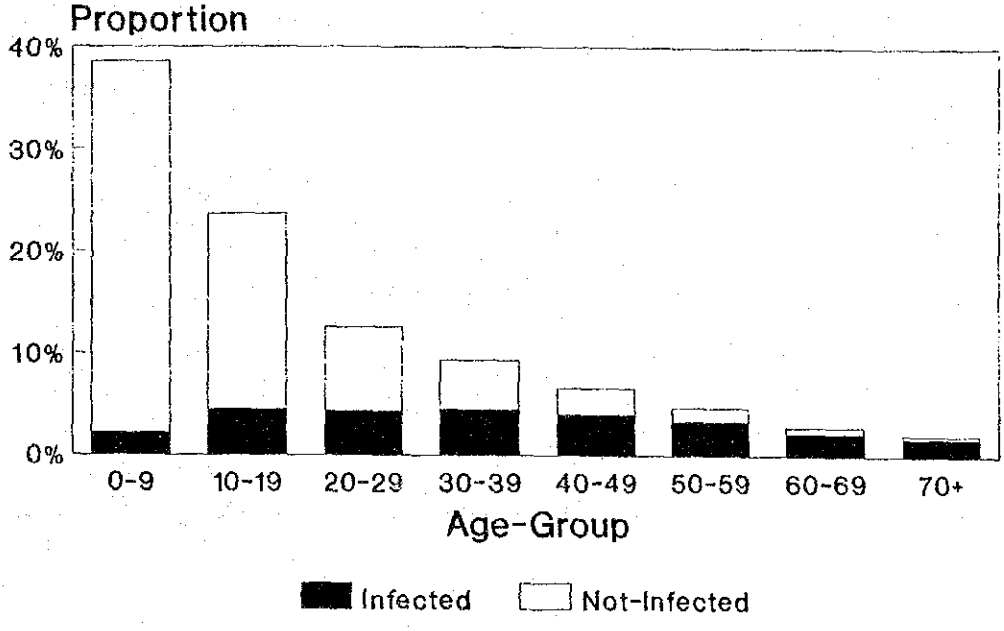
Annex 8

FIG.(2) RATIO OF PHC UNIT TO POPULATION IN SOME PROVINCES, YEMEN, 1991.



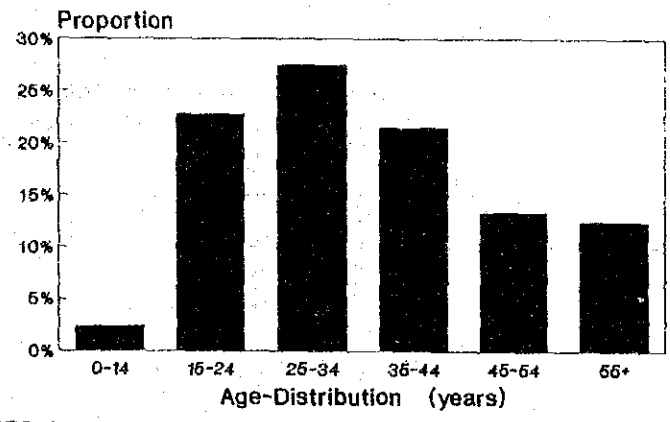
Annex 9

Prevalence of Infection by Age-Group Yemen, 1991



Annex 10

Age-Distribution of New Smear Positive Pulmonary Cases, 1991



NTP, Yemen

Annex 11

The packages in supply system

To simplify the task in supply activities by combining the items for the same purpose as a package and distribute these items as a whole particularly to the newly involved health facility, below package system is introduced.

1. **Registration package** : items for patient registration
   - . District TB Register : 1 volume
   - . Treatment cards : 300 copies
   - . Patient cards : 300 copies
   - . Treatment card box : 1 box

2. **Patient referring package** : items for patient referring activities
   - . Referring sheet : 100 copies
   - . Referring sheet file : 1 file
   - . File divider : 1 set (10 dividers)

3. **Smear examination installation package**

: items for the installation of sputum smear examination at the newly involved health facility

- . Nichrome wire 2.5mm : 1 piece
- . Wireloop holder : 1 piece
- . Diamond pen : 1 piece
- . Slide glass : 500 pieces
- . Slide glass box : 1 box
- . Spirit lamp : 1 piece
- . Forceps : 1 pair
- . Washing bottle : 3 pieces
- . Immersion oil 50ml : 1 bottle
- . Lens paper 50pcs : 1 set
- . Staining jar : 1 piece
- . Sputum cup : 500 pieces

4. **Smear examination continuation package**

: items for the continuation of the smear examination activities at already involved facilities. The quantity referred below is for making another 100 slides.

- . Ziehl's carbol Fuchsin solution
  - Phenol : 25g
  - Ethanol : 50ml
  - Fuchsin : 1.5g
- . 25% Sulfuric acid solution
  - Sulfuric acid : 250ml
- . Methlene blue solution
  - Methelene blue : 0.5g
- . Xylol : 100mg

. Sputum cup : 100 pieces
. Slide glass : 100 pieces
. Immersion oil : 10ml
. Lens paper : 10 pieces

Annex 12 Additional explanation on the input for the NTP activities

1. Input for Tuberculosis control activities

1.1. Input for supervisory visit by CU (YR)

The supervisory visit by CU is to be conducted at least twice a year to each governorate. This visiting team is consisted of one medical officer, one lab. technician, one staff for registration and health education and one driver.

The per diem for each category in Yemen Rials is shown in below table.

Category	Per diem (YR)*
Director of NTP office	450
Director of NTI	450
Doctor	420
Senior technician and nurse	420
Technician and nurse	350
Driver	230

* Two more days are added for each visit.
Namely, for one day visit, 3 days per diem will be given.

So the one team with Director, senior technician, senior nurse and driver will cost YR 1,520 in terms of per diem.
Considering the distance between the capitals of each governorate and Sana'a (A) shown in Annex 13, the total cost for transport to all the governorates is as follows.
Petrol (B) is calculated by dividing (A) by 4. Petrol (C) is calculated by adding 50% of reserve to petrol (B). The fee for petrol (D) is calculated by multiplying the petrol (C) and YR 6.

1. One day trip

	Km (RT) (A)	Petrol (B)	Petrol (C)	Fee YR. (D)
Dhamar	220	60	90	540
Mareb	350	90	140	840
Mahweet	250	70	110	660
Jawf	350	90	140	840
Hajja	280	80	120	720
Sana'a C	50	20	40	240
Sana'a G	100	30	50	300
			TOTAL	4140

2. One night (two days) trip

	Km (RT) (A)	Petrol (B)	Petrol (C)	Fee (D)
Sa'ada	500	140	210	1260
Hodeida	470	130	200	1200
Beida	550	150	220	1320
		TOTAL 3780		

3. Two nights (three days) trip

	Km (RT) (A)	Petrol (B)	Petrol (C)	Fee (D)
Taiz/Ibb	650	180	270	1620
		TOTAL 1620		

4. Five nights (six days)

	Km (RT) (A)	Petrol (B)	Petrol (C)	Fee (D)
Aden/ Lahej/Abyen/Shabwa	1800	450	680	4080

5. Four nights (five days)

For this visit, air-flight will be used.

	Flight	Fee (RT)
Hadramaut/ Mahara	Sana'a - Riyan	3500
	Riyan - Ghaida	1100
	TOTAL 4600	

The total cost for the transportation of the supervisory visit to the capital of each governorate will be YR 18,220.

The total cost of supervisory visit to each capital of governorate is calculated as follows.

One day visit : 1520 x 3 x 7 + 4140 = 36060
Two days visit : 1520 x 4 x 3 + 3780 = 22020
Three days visit : 1520 x 5 x 1 + 1620 = 9220
Six days visit : 1520 x 8 x 1 + 4080 = 16240
Five days visit : 1520 x 7 x 1 + 4600 x 4 = 29040

The total cost is YR 112,580.

As these supervisory visits will be conducted twice a year, the total cost of supervisory visits for one year is YR 225,160.
Adding 10% for reserve, totally YR 248,000 is needed for the supervisory visits in one year.

Adding 10% for annual increment, the cost for supervisory visit by CU is calculated as follows;

	1993	1994	1995	1996	1997
Cost YR	248,000	272,800	300,100	330,100	363,100

1.1.1. Input for the procurement of vehicles and motorcycles (US$)

The unit price of the vehicles and motorcycle is as follows.
- . large 4WD : US$ 30,000
- . small 4WD : US$ 9,000
- . motorcycle : US$ 4,000

The number of procurement in each year is shown in below table.

	1993	1994	1995	1996	1997
large 4WD	2	1	1	2	0
small 4WD	3	3	3	3	3
motorcycle	3	3	3	3	3

Large vehicles are to be used for Japanese experts, two in 1993, NTP and NTI and new TB center in Aden and Hadramout.
Small vehicles and motorcylces are used mainly the operational research areas such as Taiz, Hodeida, Aden and NTI to support field visit by district level person in charge, DTC in future.

The annual expense of these items is as follows.

	1993	1994	1995	1996	1997
large 4WD	60000	30000	30000	60000	0
small 4WD	27000	27000	27000	27000	27000
motorcycle	12000	12000	12000	12000	12000
Total	99000	69000	69000	99000	39000

2. Input for operational research and support

2.1. Governorate level (YR)

For the support of supervisory visit, the per diem for each visit will be calculated as follows;
- Doctor : YR 235
- Technician : YR 150
- Driver : YR 100

So one supervisory visit costs YR 485 in terms of per diem.
Also the transport and other cost for each visit will be set at YR 1000 for each health facility to visit except Aden governorate.

2.1.2. Taiz governorate (YR)

	1993	1994	1995	1996	1997
No of HC	6	7	8	9	10
Per diem	34920	40740	46560	52380	58200
Transport	72000	84000	96000	108000	120000
total	106920	124740	142560	160380	178200
Adding 10% reserve	120000	138000	156000	180000	198000
Monthly	10000	11500	13000	15000	16500

2.1.3. Hodeidah Governorate (YR)

	1993	1994	1995	1996	1997
No of HC	3	4	5	6	7
Per diem	17460	23280	29100	34920	40740
Transport	36000	48000	60000	72000	84000
total	53460	71280	89100	106920	124740
Adding 10% reserve	60000	78000	96000	120000	138000
Monthly	5000	6500	8000	10000	11500

2.1.4. Aden governorate (YR)

The total number of polyclinic is five. The GTC of Aden and other staff is supposed to supervise all the polyclinics twice a month. The per diem for the staff is same, but because of the limited size of Aden governorate, the total cost for the transport is YR 2000 per month.
So the annual cost for the supervisory visit is calculated as YR 82,200.
Adding the 10% of reserve, the basic annual budget for the supervisory visit in Aden is YR 90,480.

	1993	1994	1995	1996	1997
Total	90000	102000	108000	120000	132000
Monthly	7500	8500	9000	10000	11000

2.1.5. Supervisory visit by CU (YR)

The supervisory team for these OR areas will consist of one doctor, one laboratory technician and one driver. Yemini side provide one driver and one staff either doctor or laboratory technician. This team will visit each OR areas monthly. So annually 10 times special visits will be conducted to each areas. The rest two supervisory visits will be combined with the ordinary supervisory visits.
Two Yemeni will join the team such as one driver and one doctor or laboratory technician. The per diem is calculated in the same way as above.
The transport is also calculated in the same way.
The expenses for each areas is as follows.

	duration	Per diem	Transport	Total
Hodeidah	three days	3400	1200	4600
Dhamar	one day	2040	540	2580
Aden/Taiz	five days	4760	1800	6560
Total		10200	3540	13740

So the basic annual expense for Yemeni staff is YR 13,740.

2.2. Health facility level

2.2.1. Defaulter retrieving at NTI (YR)

This is the operational support for the home or field visiting to retrieve the defaulters. This visiting is executed once a week. The per diem for one visit is as follows;

Supervisor	:	YR 235
Nurse and others	:	YR 200
Driver	:	YR 100

The cost of petrol and the maintenance for the vehicle for one visit is YR 150. So the monthly expenditure for the visit is YR 2740, and adding 10% of buffer, the basic monthly expense is YR 3,000. So the basic annual expenditure is YR 36,000. Adding annual increment, the annual expense is as follows.

	1993	1994	1995	1996	1997
Cost YR	36000	39600	43200	48000	52800
One month	3000	3300	3600	4000	4400

2.3. Tuberculin survey (YR and US$)

A tuberculin survey will be conducted in 1995. The target area and the population will be as same as the previous survey from 1990 to 1991.
So, the number of surveyed school will be 60, and the target number of

students will be around 30,000.

Before the the survey, three weeks training will be held for around 10 tuberculin testers. The cost of this training courses will be as follows.

Per diem	:	YR 300 x 21 days x 10 psn	= YR 63,000
Facilitator	:	YR 700 x 21 days x 3 psn	= YR 44,100
Lecturer	:	YR 125 x 4 hours x 7 days	= YR 3,500
Servicemen	:	YR 300 x 21 days x 2 psn	= YR 12,600
Miscellaneous	:	YR 6000 x 1	= YR 6,000
Petrol for field training	:	YR 5000	= YR 5,000
Maintenance for the vehicles	:	YR 5000	= YR 5,000
		Subtotal = YR 139,200	

The duration of the tuberculin survey by targeted governorates is as follows.

Aden	:	6 days (1 week)
Hadramout	:	13 days (2 weeks)
Hajjah	:	13 days (2 weeks)
Dhamar	:	13 days (2 weeks)
Hodeidah	:	20 days (3 weeks)
Taiz	:	20 days (3 weeks)
Sana'a	:	20 days (3 weeks)
Total	:	105 days (16 weeks)

The member and the per diem for the field work is as follows.

Team leader	: YR 450 / day
Supervisor	: YR 420 / day
Tuberculin tester	: YR 350 / day
Clerical officers	: YR 350 / day
Driver	: YR 230 / day

One team consists of one team leader, one supervisor, two tuberculin testers, two clerical officers and one driver.
So the basic summation of the per diem for one team for one day is YR 2500.
The cost for 119 days (two extra days to each governorate) work of this team will be YR 297,500.
The per diem of one Japanese expert for 105 days work is US$ 9,758.
The other expenses for this survey is as follows. These expenses are based on the expenditures during the previous survey in 1990 and 1991.

Tuberculin Solution 20ml x 350pcs	:	US$ 7,500
Syringe and needles 50,000pcs	:	US$ 7,500
Air Freight for these equipments	:	US$ 5,500
Transport for Japanese expert	:	US$ 500
Petrol for survey	:	YR 80,000
Stationary	:	YR 150,000
Maintenance for vehicles	:	YR 10,000
Data analysis	:	YR 90,000
Meeting and conference	:	YR 10,000
Other transport	:	YR 50,000
Printing	:	YR 50,000
Miscellaneous	:	YR 40,000

The subtotal of above expenses are YR 916,000 and US$ 30,758.
Adding 10% reserve to each, the grand total is YR 1,000,000 and US$ 34,000.

3. The input for anti-TB drugs (US$)

The estimated input of anti-TB drugs depend on the estimated number of smear positive pulmonary cases for SCC and smear negative pulmonary and extra-pulmonary cases for ST.
The present case-finding rate in this country is around 40%, and the target of this is 50% by the end of 1995 and 70% by the end of 1997. Adding 10 point to each figure, the estimated case-finding rate for drug procurement in each year is shown in row (A) in table
Setting the population as 13 million and using the estimated average ARI as 0.9%, the estimated number of smear positive pulmonary cases diagnose and treat in NTP in each year is shown in row (B). The number of smear negative pulmonary and extra-pulmonary cases in each year is estimated as "others" in row (C) by multiplying respective figure in row (B) by 2.2.
The number for SCC in 1993 is estimated by adding 50% of this figure in row (B) for the central reserve stock, namely for half a year, 25% of them for the governorate reserve stock, namely for three months, and 25% of them for the district reserve stock, namely for three months as shown in row (D).
The number for ST in 1993 is also estimated as shown in row (E). The number for SCC and ST in 1994 to 1997 is estimated as shown in row (D) and (E) by adding 20% of reserve stock in total.
The number of cases for re-treatment regimen is estimated in row (F) as 10% of that for SCC, row (D).
Using these figures in row (D), (E) and (F), the cost for drug procurement is estimated as shown in row (G).
Usually around 25% of the total budget for drug procurement is taken for other charges such as freight charge, handling charge, insurance and others, so the total amount of budget for drug procurement is estimated as in row (H).

	1993	1994	1995	1996	1997	
case-finding	50%	55%	60%	65%	70%	(A)
Smear positive	3000	3300	3600	3900	4200	(B)
others	6600	7260	7920	8580	9240	(C)
SCC	5250*	3960**	4320**	4680**	5040**	(D)
ST	11550*	8712**	9504**	10296**	11088**	(E)
Re-Tx (C)x0.1	525	396	432	468	504	(F)
drugs (US$)	343427	259118	283207	305947	329560	(G)
all (US$)	458000	346000	378000	408000	440000	(H)

N.B. * : (D) = (B) x 1.75, (E) = (C) x 1.75
** : (D) = (B) x 1.2, (E) = (C) x 1.2
: (H) = (G) / 0.75

4. Input for equipment and other supply

4.1. Input for laboratory services

4.1.1. Input for sputum smear examinations by year (US$)

	1993	1994	1995	1996	1997
No of New SP	3000	3300	3600	3900	4200
No of smear exams	120000	132000	144000	156000	168000
Cost of smear exam	32400	35640	38880	42120	45360
Cost of smear pack.	7524	7524	7524	7524	7524
Cost of Microscope	10000	10000	10000	10000	10000
Total	49924	53164	56404	59644	62884
Adding 10% as a reserve	55000	58500	62100	65700	69200

4.1.2. Cost for 100 sputum smear examination (US$)

This cost is calculated based on the price listed Wako, 1990.
All the cost is expressed in Japanese Yen.

Item	Unit Price		for 100 slides	
Basic Fuchsin	25g	2500	1.5g	168
Methylene blue	25g	2100	0.5g	42
Ethanol	3 L	5300	50ml	88
Phenol	500g	1100	25g	55
Sulfuric acid	500ml	600	250ml	300
Xylol	500ml	620	100ml	62
	subtotal 715			
Sputum cup	1000pcs	14000	100pcs	1400
Slide glass	1000pcs	6300	100pcs	630
Immersion oil	50ml	2300	10ml	460
Lens paper	25x25pcs	5270	10pcs	84
	subtotal 2574			
	TOTAL JPY 3289			
	TOTAL US$ 27			

4.1.3. Sputum smear package (US$) (for a newly involved laboratory)

The subtotal cost of the essential items for the installation of the sputum smear examination, sputum smear package, except one microscope is as follows.
All the cost is shown in Japanese Yen.

Item		Cost (JPY)
Nichrome wire	2.5mm	2800
Wireloop holder		280
Diamond pen		5600
Slide glass	500pcs	3150
Slide glass box		1300
Spirit lamp		690
Forceps		850
Washing bottle	3pcs	540
Immersion oil	50ml	2300
Lens paper	50pcs	420
Staining jar		1250
Sputum cup	500pcs	7000

Subtotal JPY 26,180

This subtotal is corresponding to US$ 209.

The cost of microscope, Olympus Binocular Microscope CHT, is JPY 250,000, which is corresponding US$ 2,000.

So, the total cost of the sputum smear package with one microscope and equipment and reagent for 500 sputum slide examination is as follows;

US$ 6 x 5 + US$ 209 + US$ 2000 = US$ 2,239

And the total cost of the sputum smear package with equipment and reagent for 500 sputum slide examination without a microscope is as follows;

US$ 6 x 5 + US$ 209 = US$ 239

4.1.4 Cost of Quality control of sputum smear examination (US$)

The cost of QC is calculated following the plan in chapter . In addition with this, the cost of 50 times supervisory visit a year, namely YR 600 x 50 = YR 30000 (which is corresponding to US$ 2500) is added.

	1993	1994	1995	1996	1997
Cost of QC	783	412	288	288	288
Supervisory visit	2500	2750	3025	3328	3660
TOTAL	3284	3162	3313	3616	3948

4.2. Input for patient registration package (YR)

The present stock of each item of patient registration package is as follows:

Treatment cards : enough for three years
Patient cards : enough for three years
District TB Register : enough for two years
Treatment card box : no stock

The unit cost and the necessary quantity of each item is as follows:

Treatment cards	: YR 15	:	30000 copies in 1996
Patient cards	: YR 15	:	30000 copies in 1996
District TB Register	: YR 500	:	90 copies in 1995
Treatment card box	: YR 400	:	30 boxes annually

The annual expense for this package is as follows;

	1993	1994	1995	1996	1997
Treat. cards	-	-	-	450000	-
Patient cards	-	-	-	450000	-
Dist. TB Reg.	-	-	450000	-	-
Treat. Box	12000	13200	15000	16500	18000
TOTAL	12000	13200	465000	916500	18000

6.2.2. Input for patient referring system package (YR)

The unit cost for each item is as follows.

Referring sheet	: YR 1	:	3000 copies annually
Referring sheet file	: YR 100	:	30 files annually
file divider	: YR 80	:	60 dividers annually

The annual expense for this package is as follows;

	1993	1994	1995	1996	1997
Ref. sheet	3000	3300	3600	3900	4200
Ref. file	3000	3300	3600	3900	4200
File divider	4800	5300	5800	6400	7000
TOTAL	10800	11900	13000	14200	15400

5. Input for training

5.1. First time training (YR)

The input for the first-time training by each category is as follows;

Group	A	B	C	D
Duration (week)	1	2	1	1
Participants				
Inside	10	8	8	15
Outside	26	28	28	39
Per diem				
Inside	21000	33600	16800	31500
Outside	110400	237600	120000	165000
Lecturer	3000	6000	3000	3000
Service men	2100	4200	2100	2100
Facilitator	4900	9800	4900	4900
Miscellaneous	3000	3000	3000	3000
Air-flight fee	2160	6960	6960	2160
Total	146560	301160	156760	211660
Adding 10% as reserve	162000	332000	173000	233000

So, the basic annual cost for the first time training courses is YR 900,000.

5.2. Refreshing courses (YR)

The input for the refreshing courses is as follows;

Group	A	B	C	D
Duration (days)	3	6	3	3
Participants				
Inside	2	6	2	2
Outside	16	16	16	16
Per diem				
Inside	2400	4200	2400	2400
Outside	39600	68400	39600	39600
Lecturer	1500	3000	1500	1500
Service men	1200	2100	1200	1200
Facilitator	2800	4900	2800	2800
Miscellaneous	3000	3000	3000	3000
Air-flight fee	3480	3480	3480	3480
Total	53980	89080	53980	53980
Adding 10% as reserve	60000	100000	60000	60000

The basic annual cost for refreshing training courses is YR 280,000.

6. Input for the meeting

6.1. GTC meeting (YR)

GTC meeting will be held twice a year at Sana'a and other city.
This training will be in four morning sessions and one afternoon session.

The breakdown of the budget as below is the meeting at Sana'a capital.

Per diem : YR 71,960
- Out-side city : YR 600/day
  - YR 3,600 : Sa'ada, Hajja, Mahweet, Mareb Jawf, Hodeida, Dhamar, Beida Ibb, Taiz
  - YR 4,200 : Lahej, Aden, Abyen
  - YR 5,100 : Shabwa (YR 3600 + YR 1500)
  - YR 7,100 : Hadramaut (YR 3600 + YR 3500)
  - YR 7,560 : Mahara (YR 3600 + YR 3960)
- In-side city : YR 300/day
  - YR 1,800 : Sana'a city, Sana'a governorate

Facilitator : YR 8,400 [YR 700/day (2 person)]
Serviceman : YR 1,800 [YR 300/day]
Miscellaneous YR 3,000

So, the summation of above expenditure is YR 85,760.
Adding 10% for reserve, the grand total is YR 95,000 for one meeting.
This meeting will be held twice a year, so the basic annual expenditure of GTC meeting is YR 190,000.

6.2. Technical Advisory Committee (YR)

This meeting will be held for one day at least once a year together with the GTC meeting held at Sana'a.
The breakdown of expenditure is as follows.

Per diem : YR 8,400
- In-side ; YR 3600 (YR 300 x 2 x 6)
  - Director of Public Health,
  - Director of Communicable Disease Control
  - NTI director
  - Officer from the Department of Research, MPH
  - Officer from the Health Education, MPH
  - Chief of laboratory department, NTI
- Out-side ; YR 4800 (YR 600 x 2 x 4)
  - Director of Taiz TB Center
  - Director of Hodeida TB Center
  - GTC of Aden
  - GTC of Hadramaut
- Facilitator : YR 1,400 (Director of NTP)
- Miscellaneous : YR 1,200

So the total amount of expenditure is YR 11,000

6.3. Governorate level meeting

6.3.1. Taiz governorate (YR)

	1993	1994	1995	1996	1997
No of HC	6	7	8	9	10
Per diem	21600	25200	28800	32400	36000
Facilit.	4200	4200	4200	4200	4200
Lecturer	2000	2000	2000	2000	2000
Miscella.	4000	4000	4000	4000	8000
Service	900	900	900	900	900
CU staff	7200	7200	7200	7200	7200
total	39900	43500	47100	50700	54300
Adding 10% reserve	43900	47900	51900	55800	59800

6.3.2. Hodeidah governorate (YR)

	1993	1994	1995	1996	1997
No of HC	3	4	5	6	7
Per diem	10800	14400	18000	21600	25200
Facilit.	4200	4200	4200	4200	4200
Lecturer	2000	2000	2000	2000	2000
Miscella.	4000	4000	4000	4000	8000
Service	900	900	900	900	900
CU staff	7200	7200	7200	7200	7200
total	29100	32700	36300	39900	43500
Adding 10% reserve	32100	36000	40000	43900	47900

6.3.3. Aden governorate (YR)

The total number of polyclinic is five. So the cost for this meeting will be basically YR 36,300. Adding 10% of reserve it will be YR 40,000.
Considering the annual increment, 10%, the annual cost will be as follows.

	1993	1994	1995	1996	1997
Total	40000	44000	48400	53300	58600

6.4. Equipment for radiological activities

6.4.1. Films and solutions (US$)

Item	Type	Unit cost	Quantity	Cost
Roll film	70mm x 30.5m	50	100	5000
	100mm x 30.5m	50		
Large film	35cm x 35cm	125	50	6250
	30cm x 40xm	110	50	5500
	25.4cm x 30.5cm	80	50	4000
Fixer solution	10 L	10	50	500
Developer solution	10 L	10	50	500
Supplement solution	10 L	20	100	2000
For Automatic Developing Machines				
Fixer solution	19 L	51	30	1530
Developer solution	19 L	51	30	1530
Starter solution	1 L	11	15	165

جدول المسافات بالكيلومترات بين اهم المدن في الجمهورية اليمنية

Table of distances in Km between the major cities of the Republic of Yemen

VIA- DHĀMAR-AL-BAYDA △ عن طريق ذمار- البيضاء
VIA-HARIB – MĀRIB • عن طريق حريب – مارب
VIA- SANA'A • عن طريق صنعاء
VIA-AL-ḤABILAYN ▲ عن طريق الحبلين

البقع AL BUQ.	409	299	702	552	482	575	1681	555	493	650	140	1462	840	783	573	1159	638	728	382
حجة HAJJAH	169	447	292	227	320	•1425	300	238	395	269	•1225	•652	528	164	•903	383	473	127	
حرض HARAD	595	598	454	517	△1720	594	210	622	159	△1520	△879	676	199	1198	454	621	425		
لحج LAHJ	490	220	204	1211	494	432	162	562	1011	390	81	413	689	141	26	320			
الجوف AL JAWF	270	363	•1260	134	281	438	412	•1060	•419	571	396	•758	426	516	170				
ذمار DHAMAR	93	1198	273	211	168	342	998	425	301	255	676	156	246	100					
اب IBB	△1291	366	304	261	435	△1091	△518	285	335	△769	63	230	193						
الغيضة AL GHAYDAH	1126	1400	1030	1541	821	841	1130	1444	522	1291	1185	•1299							
مارب MARIB	284	441	•415	926	285	575	399	604	429	520	173								
المهويت AL MAHWIT	379	353	1200	•559	512	160	•878	367	458	111									
البيضاء AL BAYDA'	510	830	257	162	△423	508	▲261	217	268										
صعدة SA'DAH	•1322	•700	643	433	•1019	498	588	242											
سيؤن SAY'UN	641	930	△1244	322	1091	985	1099												
عتق 'ATAQ	309	△671	319	518	364	•458													
زنجبار ZINJUBAR	494	608	222	55	401														
الحديدة AL HUDAYDAH	△922	272	439	226															
المكلا AL MUKALLA	769	663	•777																
تعز TA'IZZ	167	256																	
عدن 'ADEN	346																		
صنعاء SANA'A																			

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Annex 14 Laboratory activities

Laboratory service particularly sputum smear examination has the vital role in TB control activities. By this examination, the diagnosis of sputum smear positive cases would be made and the treatment response and its result would be monitored. The improvement of the quality of this laboratory services and its maintenance is badly important for TB control. To accomplish this issue, the QC by higher institutions and constant supply of necessary equipments and reagents for smear examination would be indispensable.

1. Role of laboratories in each level

1.1. National Tuberculosis Institute

NTI is a national reference laboratory in NTP of Yemen and also the national training laboratory for TB control.
The role of NTI from this aspect will be described as follows;

- Examinations and research on TB bacteriology.
- The QC of sputum smear examination of all involved laboratories.
- The QC of culture examination in two TB centers.
- Reference for culture and sensitivity tests.
- Surveillance of the national initial resistance.
- Training.
- Supply of the solution for sputum smear examination.
- Supervision of peripheral laboratories.

1.2. Taiz and Hodeida TB center

The laboratories of these centers are the reference laboratories of each governorate and its surrounding governorates (see fig.1). From this aspect, these laboratories will play a role in;

- Smear examination.
- Culture examination for sensitivity test.
- The QC of sputum smear examination of the hospitals and health centers in Taiz and Hodeidah and each surrounding governorates.
- Culture examination for sensitivity test.
- Forwarding isolated strains for sensitivity tests to NTI.
- Training.
- Supply of the solutions for sputum smear examination.
- Supervision of peripheral laboratories in each governorates and the nucleus laboratories in the surrounding governorates.

1.3. Role of nucleus hospital in each governorate

The laboratories of these nucleus hospitals are the reference laboratory in each governorate, where the GTCs are acting.
The role of these laboratories would be;

- Sputum smear examination.
- Storing slides for the QC of sputum smear examination.
- Forwarding sputum for culture and sensitivity tests to NTI and TB centers.
- Supervision of the peripheral laboratories.

1.4. Role of the peripheral health centers and hospitals

The laboratories of these institutions would provide the first line services, namely sputum smear examination, to the patients.

- Sputum smear examination.
- Storing slides for QC of sputum smear examination.
- Forwarding sputum for culture and sensitivity tests to NTI and TB centers.

2. Quality control of smear examination

As sputum smear examination plays the very vital role in the diagnosis of TB, the quality control of this examination is very essential for the establishment of effective NTP.

- **Microscope**
  The precision of the microscope is the very essential for the QC. Binocular microscope should be used and regular maintenance should be done.

- **Staining solution**
  To use the appropriate solution is the first step of QC.
  Every newly prepared solutions must be examined with a positive and a negative control slide to check the quality. These solutions must be stored in dark and cool place to avoid decay.

- **The programme of QC**
  Along with below steps, the QC of smear exams will be executed.

- **The storing of the examined slides.**
  In all laboratories within the NTP, all examined slides will be kept for three months. The specimen numbers and the results of examination must be written with a diamond pen on each slide. These slides must be arranged in order and kept in the slide glass boxes.
  Immersion oil must be removed with xylol before storing.

- **The selection of the examined slides.**
  Once every quarter, the GTC collects five negative and five positive slides among these three months' stock. The other slides must be kept until the result of re-examination is informed.

- **The submit of these slides**
  These selected slides will be submitted to TB centers as below schedule.
  1st quarter (Jan - Mar) ; to NTI, Taiz and Hodeida TB centers
  2nd quarter (Apr - Jun) ; to NTI (GTC meeting)
  3rd quarter (Jul - Sep) ; to NTI, Taiz and Hodeida TB centers
  4th quarter (Oct - Dec) ; to NTI (GTC meeting)
  The selected slides of the 1st and 3rd quarter will be submitted at GTC meeting, and those of 2nd and 4th quarter will be submitted with dispatch sheets.

- **The re-examination of slides**
  Not only the agreement of the results, but also the technique such as sampling, smearing and staining are carefully examined at NTI, Taiz and Hodeida TB centers.

- **The re-examination of slides from three TB centers**
  All positive slides and every 20th negative slides are stored for a month. And five positive and five negative slides from these monthly stock will be selected and at the time of bi-annual laboratory chief meeting, these slides will be re-examined among the laboratory chiefs.

- **The reporting of the results**
  The results will be reported to each GTC and NTP office within one month. The GTC must inform the results to the laboratories immediately.

- **The measurement of the improvement**
  When the performance of the laboratory is evaluated below standard, in-service training during the supervisory visit by senior laboratory technician and/or re-training at NTI or Taiz TB center will be discussed among the GTC, NTP office and the director of this facility.

2.1. The annual schedule of QC programme

Though the final goal of this QC programme is the involvement of all the concerned laboratories within NTP, considering the present activities of GTCs and each laboratories, the introduction of the programme will start mainly in Sana'a, Taiz, and Hodeidah governorates, and expanded into other governorate as follows;

Year	Center	Governorate
1993	NTI	Sana'a, Dhamar
	Taiz	Taiz
	Hodeidah	Hodeidah
	Aden	Aden
1994	NTI	Sana'a, Dhamar, Jawf
	Taiz	Taiz, Ibb
	Hodeidah	Hodeidah, Hajja
	Aden	Aden, Lahej, Abyan
1995	The achievements of previous two years would be reviewed and discussed for further expansion of the programme.	

3. Culture examinations and sensitivity tests

3.1. Annual plan of culture and sensitivity tests

The culture examinations have been conducted at NTI and Taiz and Hodeidah TB Centers. The culture examinations of NTI is for the further sensitivity tests

at NTI. Taiz and Hodeidah TB center conduct only culture examination. The some proportion of the isolated strains from Taiz and Hodeidah TB Center will be transferred to NTI for further sensitivity tests. Aden is planned to start culture examination from the year 1994.

The number of culture examiniations and sensitivity tests of each center by year is shown in below table.
The number of culture examinations at NTI is 15 per month and additional 40 per year considering the 20 % of total will be the smear positive and culture negative cases. All of these 165 strains will be examined their drug sensitivity pattern.
Annually 15 isolated strains in 1993 and 30 strains after 1994 will be transferred from other centers for further sensitivity tests.

	1993	1994	1995	1996	1997
NTI					
Culture	165	165	165	225	225
Reserve (S+C-)	40	40	40	60	60
Sensitivity	165	165	165	225	225
Sens. (Taiz)	15	30	30	30	30
Sens. (Hodeidah)	15	30	30	30	30
Sens. (Aden)	0	0	0	15	15
Taiz					
Culture	110	110	150	150	150
Hodeidah					
Culture	110	110	150	150	150
Aden					
Culture	0	50	110	110	110
Total					
Culture	425	475	615	695	795
Sensitivity	195	225	225	300	300

3.2. QC of culture examination

Culture examination of Taiz and Hodeida TB centers will be supervised by NTI. Laboratory chief of NTI is responsible for this activities. Twice a year, the laboratory chiefs of three TB centers will meet together and review the technique and knowledge. Quality of isolated strains for sensitivity tests can show their technique of the examination.

3.3. QC of sensitivity test

The QC of sensitivity test in NTI will be done by referring the TB strains to the Research Institute of Tuberculosis in Japan for the double check of the results and the comparison with results of the sensitivity of the standard strain.

Annex 15 Cost estimation of culture and sensitivity test

1. Unit price of the reagents for culture and sensitivity test (JPY)

	Unit	Price (JPY)
Sodium Hydroxide	500g	600
Potassium Phosphate Monobasic	500g	950
Sodium Glutamate	500g	1800
Glycerol	500ml	1200
Malachite green	25g	1700
Eggs	1 pack	25
Aniline	500g	1000
Ethanol	3000ml	5300
Cyanogen Bromide	5g	1200
Streptomycin	10g	1000
Isoniazid	25g	4500
Rifampicin	100 cap	9500
Propylene Glycol	500ml	1000

2. Annual cost of culture and sensitivity test

2.1. 1993

	No. of unit supply				Total	
	NTI	Taiz	Hod	Aden	No.	Cost(JPY)
Sodium Hydroxide	4	2	2	0	8	4800
Potassium Phosphate Monobasic	2	2	2	0	6	5700
Sodium Glutamate	2	2	2	0	6	10800
Glycerol	3	2	2	0	7	8400
Malachite green	4	2	2	0	8	13600
Eggs	200	40	40	0	280	7000
Aniline	2	2	2	0	6	6000
Ethanol	1	1	1	0	3	15900
Cyanogen Bromide	2	2	2	0	6	7200
Streptomycin	2	0	0	0	2	2000
Isoniazid	2	0	0	0	2	9000
Rifampicin	1	0	0	0	1	9500
Propylene Glycol	2	0	0	0	2	2000
				Total (JPY)		101900
				Total (US$)		815

2.2. 1994

	No. of unit supply				Total	
	NTI	Taiz	Hod	Aden	No.	Cost(JPY)
Sodium Hydroxide	3	1	1	2	7	4200
Potassium Phosphate Monobasic	1	1	1	2	5	4750
Sodium Glutamate	1	1	1	2	5	9000
Glycerol	2	1	1	2	6	7200
Malachite green	2	1	1	2	6	10200
Eggs	210	40	40	20	310	7750
Aniline	1	1	1	2	5	5000
Ethanol	1	1	1	1	4	21200
Cyanogen Bromide	1	1	1	2	5	6000
Streptomycin	1	0	0	0	1	1000
Isoniazid	1	0	0	0	1	4500
Rifampicin	0	0	0	0	0	0
Propylene Glycol	1	0	0	0	1	1000
				Total (JPY)		81800
				Total (US$)		654

2.3. 1995

	No. of unit supply				Total	
	NTI	Taiz	Hod	Aden	No.	Cost(JPY)
Sodium Hydroxide	3	1	1	1	6	3600
Potassium Phosphate Monobasic	1	1	1	1	4	3800
Sodium Glutamate	1	1	1	1	4	7200
Glycerol	2	1	1	1	5	6000
Malachite green	2	1	1	1	5	8500
Eggs	210	50	50	40	350	8750
Aniline	1	1	1	1	4	4000
Ethanol	1	1	1	1	4	21200
Cyanogen Bromide	1	1	1	1	4	4800
Streptomycin	2	0	0	0	2	2000
Isoniazid	1	0	0	0	1	4500
Rifampicin	0	0	0	0	0	0
Propylene Glycol	1	0	0	0	1	1000
				Total (JPY)		75350
				Total (US$)		602

2.4. 1996

	No. of unit supply				Total	
	NTI	Taiz	Hod	Aden	No.	Cost(JPY)
Sodium Hydroxide	4	1	1	1	7	4200
Potassium Phosphate Monobasic	1	1	1	1	4	3800
Sodium Glutamate	1	1	1	1	4	7200
Glycerol	2	1	1	1	5	6000
Malachite green	3	1	1	1	6	10200
Eggs	280	50	50	40	420	10500
Aniline	1	1	1	1	4	4000
Ethanol	1	1	1	1	4	21200
Cyanogen Bromide	1	1	1	1	4	4800
Streptomycin	3	0	0	0	3	3000
Isoniazid	1	0	0	0	1	4500
Rifampicin	0	0	0	0	0	0
Propylene Glycol	1	0	0	0	1	1000
				Total (JPY)		80400
				Total (US$)		643

2.5. 1997

	No. of unit supply				Total	
	NTI	Taiz	Hod	Aden	No.	Cost(JPY)
Sodium Hydroxide	4	2	2	1	9	5400
Potassium Phosphate Monobasic	1	1	1	1	4	3800
Sodium Glutamate	1	1	1	1	4	7200
Glycerol	2	1	1	1	5	6000
Malachite green	3	1	1	1	6	10200
Eggs	280	50	50	40	420	10500
Aniline	1	1	1	1	4	4000
Ethanol	1	1	1	1	4	21200
Cyanogen Bromide	1	1	1	1	4	4800
Streptomycin	3	0	0	0	3	3000
Isoniazid	1	0	0	0	1	4500
Rifampicin	1	0	0	0	0	9500
Propylene Glycol	1	0	0	0	1	1000
				Total (JPY)		91100
				Total (US$)		728

Annex 16 Drug procurement

1. Price list of anti-tuberculosis drugs

Drugs	Pack size	Price (French Francs)
Rifampicin 150mg + Isoniazid 100mg	1000	254.74
Pyrazinamide 400mg	1000	204.66
Streptomycin 1g	50	17.71
Ethambutol 400mg	1000	109.13
Thiacetazone 150mg + Isoniazid 300mg	1000	54.81
Thiacetazone 50mg + Isoniazid 100mg	1000	24.93
Ethambutol 400mg + Isoniazid 150mg	1000	166.97
Isoniazid 100mg	1000	19.87
Isoniazid 300mg	1000	43.10
Water for injection	100	14.32

N.B. The price is as of December 4, 1992.
The exchange rate is as follows;
DM 1 = 3.411 FF
DFl 1 = 3.033 FF
US$ 1 = 5.359 FF.

2. The calculation method for the drug requirement

2.1. Short course chemotherapy [2HRZE (E) + 6HT]

The calculation for the required amount of drugs followed some conditions.
- 80% of cases use SM for initial phase and the rest 20% use EB.
- 90% of cases use T150+H300, and the rest 10% use T50+H100.
- Additional 20% of cases use E400+H150 instead of T.

Initial Phase
RFP 150mg + INH 100mg : 4 caps/day x 60 days
Pyrazinamide 400mg : 4 tabs/day x 60 days
Streptomycin 1g : 1 vial/day x 60 days (80% of cases)
Ethambutol 400mg : 3 tabs/day x 60 days (20% of cases)

Continuation Phase
T 150mg + INH 300mg : 1 tab /day x 180 days (90% of cases)
T 50mg + INH 100mg : 2 tabs/day x 180 days (10% of cases)
EB 400mg+ INH 150mg : 2 tabs/cay x 180 days (20% of cases)

2.2. Standard chemotherapy [2SHT + 10HT]

Initial phase
T 150mg + INH 300mg : 1 tab /day x 60 days (90% of cases)

T 50mg + INH 100mg : 2 tabs/day x 60 days (10% of cases)
Streptomycin 1g : 1 vial/day x 60 days

Continuation Phase
T 150mg + INH 300mg : 1 tab /day x 300 days (90% of cases)
T 50mg + INH 100mg : 2 tabs/day x 300 days (10% of cases)
EB 400mg+ INH 150mg : 2 tabs/cay x 300 days (20% of cases)

2.3 **Re-Treatment chemotherapy** [2HRZES + 1HEZE + 5HRE]

Initial Phase
RFP 150mg + INH 100mg : 4 caps/day x 90 days
Pyrazinamide 400mg : 4 tabs/day x 90 days
Streptomycin 1g : 1 vial/day x 60 days
Ethambutol 400mg : 3 tabs/day x 90 days

Continuation Phase
RFP 150mg + INH 100mg : 4 caps/day x 150 days
Ethambutol 400mg : 3 tabs/day x 150 days

3. The required quantity of each drug by year

The required quantity of each drug by year was calculated based on the below number of cases by year with above (**2.3.**) method. Also annually 100,000 tablets of Isoniazid 100mg is added for additional reserve.

Number of cases on SCC, ST and Re-Tx by year

	1993	1994	1995	1996	1997	
case-finding	50%	55%	60%	65%	70%	(A)
Smear positive	3000	3300	3600	3900	4200	(B)
others	6600	7260	7920	8580	9240	(C)
SCC	5250*	3960**	4320**	4680**	5040**	(D)
ST	11550*	8712**	9504**	10296**	11088**	(E)
Re-Tx (C)x0.1	525	396	432	468	504	(F)

Quantity of each drugs by year

Drug	1993	1994	1995	1996	1997
R150mg + H100mg	1510000	1140000	1250000	1350000	1450000
PZA 400mg	1450000	1090000	1190000	1290000	1390000
SM 1g	980000	740000	810000	870000	940000
EB 400mg	490000	370000	400000	440000	470000
T150mg + H300mg	4180000	3150000	3440000	3720000	4010000
T50mg + H100mg	1860000	1400000	1530000	1650000	1780000
EB400mg +H150mg	2040000	1540000	1680000	1820000	1960000
Water	980000	740000	810000	870000	940000
INH 100mg	100000	100000	100000	100000	100000

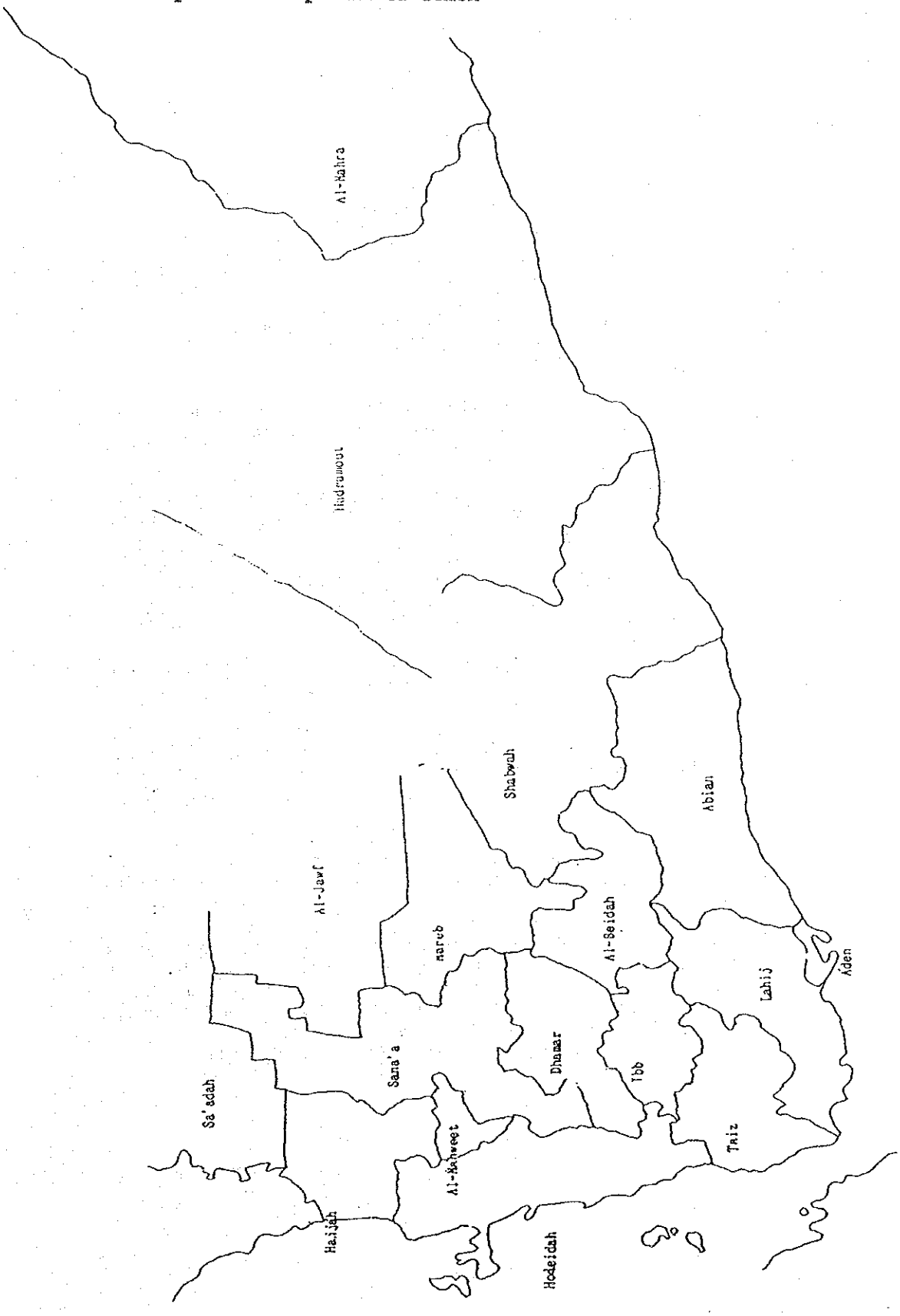
4. The cost of each drug by year (US$)

The cost of each drug by year is calculated with above tables in 1. and 3.. The total cost of drug procurement is calculated by considering the pure cost for drug shares 75% of the total budget.

Cost of each drug by year (US$)

Drug	1993	1994	1995	1996	1997
R150mg + H100mg	71778	54190	59419	64173	68926
PZA 400mg	55376	41628	45447	49266	53085
SM 1g	64773	48910	53537	57502	62129
EB 400mg	9979	7535	8146	8961	9572
T150mg + H300mg	42752	32217	35184	38047	41013
T50mg + H100mg	8653	6513	7118	7676	8281
EB400mg +H150mg	63560	47982	52344	56706	61068
Water	26187	19774	21645	23247	25119
INH 100mg	371	371	371	371	371
	343427	259118	283206	305947	329560
Total	458000	346000	378000	408000	440000

Annex 17 Map of the Republic of Yemen



Supply

1. Drugs

The main suppliers of anti-tuberculosis drugs to National Tuberculosis Control Programme (NTP) during the year 1992 were as follows;
- .The Ministry of Public Health (MPH) of Yemen,
- .The Government of Saudi Arabia through International Union against Tuberculosis and Lung Disease (IUATLD),
- .Japan International Cooperation Agency (JICA), and
- .World Health Organization (WHO)

The timing of supply of each drugs and the supplier's name is shown in Table 1. Also the supplied quantity of each drugs by supplier is summarized in Table 2.

During the year 1992, NTP office has suffered from the shortage of drugs. Table 3 shows the stock of each anti-TB drugs at NTP storage in MPH at the end of each month.
The year 1992 started with the limited stock of anti-TB drugs. This situation continued up to April when the supply from the Government of Saudi Arabia through IUATLD was executed. The total amount of these drugs are only for 1200 treatments with short course regimen (SCC) and 4400 treatments with standard regimen (ST).
The annual number of sputum smear positive cases for SCC is around 3,000 and the number of sputum negative pulmonary and extra-pulmonary cases are around 7,000.
To manage this limited quantity of drugs, NTP office developed the distribution plan (table 4) of these drugs to each governorate based on their number of regis-tered TB cases in 1991. This plan set the quantity of supply to each governorate for three months activities and also set some reserve stock at central.
In August, the supplies from WHO and JICA have arrived. These drugs were also supplied to each governorate under the same principle of this plan.
With extra supply from the MPH, NTP storage could manage the supply to governorate up to the end of 1992.

Drug supply has still been one of the biggest subject for the NTP. To improve the TB control activities, the secured drug supply is indispensable. But last two years, NTP office has never had enough reserve stock in its storage.
IN 1993, it is expected that JICA will donate enough amount of ant-TB drugs to Yemen. It is strongly expected that NTP office will utilize this supply effectively to secure the drug supply to Governorates and districts.

Table 1. The Quantity of Supplied Drug to NTP, 1992

Date	R300+ H150	R150+ H100	H100	H300+ T150	Z500	E400	S1g	R300	R150	Resource
5/Feb	19600	312600								MPH
2/Mar							13500			Military Hp
9/Mar		249000								IUATLD*
27/Apr		290000								IUATLD*
3/May					430000					IUATLD*
26/May				1800000		200000	270000			IUATLD*
11/Aug	72000									JICA
19/Aug				550000			140000		55000	WHO
22/Aug			40000	358000		60000	60000			JICA
12/Nov	30000		154000			229000	447000	81000	215000	MPH
Total	121600	851600	194000	2708000	430000	489000	930500	81000	270000	

Table 2. The Quantity of Supplied Drugs to NTP by Resource

	Total	Resource				
		MPH	IUATLD*	JICA	WHO	Other
RFP300+INH150	121600	49600	0	72000	0	0
RFP150+INH100	570260	31260	539000	0	0	0
INH100	194000	154000	0	40000	0	0
INH300+T150	2708000	0	1800000	358000	550000	0
PZA500	430000	0	430000	0	0	0
EB400	847000	447000	200000	60000	140000	0
SM1g	343500	0	270000	60000	0	13500
RFP300	81000	81000	0	0	0	0
RFP150	270000	215000	0	0	55000	0

N.B. IUATLD* : Saudi Arabian Budget

Table 3. The central stock of anti-TB drugs at the end of each month, 1992

Month (end)	R300+ H150	R150+ H100	H100	H300+ T150	H100+ T50	Z500	E400	S1g	R300	R150
Jan	0	31260	27000	0	15000	500800	0	98650	0	0
Feb	14600	26260	27000	0	10000	480800	0	0	0	0
Mar	0	225000	0	0	5000	480800	0	0	0	0
Apr	0	290000	0	0	5000	480800	0	0	0	0
May	0	244000	0	1773000	0	732800	180000	250600	0	0
Jun	0	110000	0	954000	0	626800	41000	133800	0	0
Jul	0	55000	0	743000	0	570800	16000	108800	0	0
Aug	24000	12000	21000	1293000	0	379800	123000	90800	0	39000
Sep	10000	10500	16000	1281000	0	368800	108500	88800	0	39000
Oct	4500	0	9000	1269000	0	364800	74500	69800	0	29000
Nov	34500	0	81000	1027000	0	211800	406500	25800	38000	130500
Dec	13500	0	8000	924000	0	140800	305100	5100	12000	51500

2. Equipment, laboratory and X-ray reagents

Table 5 shows the JICA donated items and their quantity. Table 5 shows the WHO donated items and their quantity.
Because of these supplies, the NTP office and NTI could have enough reserve stock of the laboratory equipments and reagents and x-ray reagents.

3. The Grant Aid of the Government of Japan

Thirteen items as shown below were donated to MPH from the Government of Japan through its Grant Aid.

Items		Quantity
Microscope		106
Auto X-ray film Processor		2
Water softener		2
First Aid Box		102
Resuscitator		19
Ambulance		4
4-WD vehicles		18
Personal Computer		2
Copy Machine	small size	13
	medium size	5
White board		18
Type writer	electric	5
	Manual	13
Facsimile machine		18
Suction pump		4

These items were distributed to each governorate according to the basic distribution plan. These items are expected to facilitate the NTP activities at governorate level.

Table 5. The equipment donated by JICA

No	Item	Maker	Quantity
1	Reagents for film slide maker	Olympus	
	Developing solution KV-51TK		10
	Fixing solution KV15XE		10
	Cleaning solution KV-10cs		10
	Color slide films		5
2	Basic Fuchsin 25g bottle	Wako	40
3	Methylene blue 25g bottle	Wako	40
4	Malachite green 25g bottle	Wako	40
5	Aniline 100ml bottle	Wako	50
6	Propylene glycol 500ml	Wako	10
7	Drugs for sensitivity tests		
	Streptomycin 1g		10
	Isoniazid		10
	Rifampicin		10
8	Refrigerator for Film keeping	General	1
	EF-141F, DL804N-5		
9	IBM Personal Computer	IBM	2
	PS/2 55SX-X31 system unit		
	Color graphic display		
	4019E Laser printer		
10	Slide Projector	Braun	4
	Paximat International		
11	Toyota Coaster 26 seats	Toyota	2
12	Roll film for radiography	Konica	60
	GS 70mm x 30.5m		
13	X-ray film	Konica	
	35cm x 35cm (50/box)		40
	30cm x 40cm (50/box)		40
	25.4cm x 30.5 cm (50/box)		50
14	X-ray film fixing solution 10l	Konica	300
15	Erlenmeyer flask	Ikemoto	15
16	Polyethylene bottle for solution	Konica	10
17	Binocular microscope CHT-213E	Olympus	20
18	Electrical Balance PM-100	Ikemoto	6
19	Test tube with lip	Ikemoto	
	diameter 15mm		2000
	diameter 20mm		2000
20	Cap for test tube	Eiken	10000
21	Dispenser 10ml	Ikemoto	6
22	Diamond pen for slide glass	Ikemoto	100
23	Staining jar	Ikemoto	50
24	Nichrom wire 0.8mm x 2.5m	Ikemoto	40
25	Wire loop holder	Ikemoto	100
26	Lump for dark room	Konica	3
27	Radiograph developer	Konica	3
28	Timer for developing	Chiyoda	3
29	Thermometer with dish	Chiyoda	6
30	Film developing tank	Konica	1
	with temperature control		

Case finding and treatment result

1. Case finding

<Summary> The number of cases detected in 1992 by Governorates is shown in Table 1. As we discussed in the annual report 1991, about 5600 new smear positive cases are thought to occur every year. So, our proportion of the number of cases detected to that of real cases is still under 50%. But as shown in Table 2, the number of smear positive cases detected has been increasing. This would be due to the improving coverage of case detection. <Reporting system> According to the present registration system, each GTC must report the number of cases every month. But in some Governorates, the reports are not satisfactory, and in some Governorates the numbers are a little different from those which are calculated from the registration books. In this annual report, the numbers of cases derived from the calculation of register books in some Governorates (Al Jawf, Hajja, Mahweet, Dhamar, Ibb, Lahj, Aden, Abyen, Shabwa and Hadramaut), and in others (Sa'ada, Hodeida, Sana'a, Taiz) derive from the data of monthly report. At the GTC meeting in January 1993, training has been done about recording and reporting of case registration and treatment result. So, this training will be useful to bridge the gaps. <Smear examination> The proportion of smear positive pulmonary cases is % on the average and the proportion of each Governorates is shown in Figure 1. In some Governorates with many cases, Figure 2 shows the time trend of smear positivity. It has been almost stable. Because our first target group is smear positive cases and our case detection of smear positive cases is not yet satisfactory, we should first concentrate our efforts to smear positive cases, and then smear negative X ray active cases. So at this stage of tuberculosis control, smear positivity should be higher. <Age distribution of smear positive cases> The age distribution of smear positive cases is shown in Table 3 and Figure3. (Unfortunately we could not get the data of Taiz) Of cause, the reliability of the age may leave some points to be discussed, this shows that the proportion of cases of productive ages is still high. And as for the proportion of the number of cases detected among specific age group to the population of that age group, this proportion is highest among the age group of about 30 years old, and this pattern shows that the TB epidemic is still in the early stage in this country. <Detailed data> Detailed data of each Governorate is shown in Table 5 (After the items of Treatment Result).

2. Treatment result

<Summary> The most important criterion of tuberculosis control activities is the cure rate of smear positive cases. The treatment result of the cases detected in 1991 is shown in Table 4. The cure rate and case detection rate can be calculated from the treatment result (Cure rate can be calculated as follows; the number of cured cases divided by (the number of total cases minus the number of transferred out cases)) and the data are shown in Fig 4. As in Fig 5, the cure rate is almost stable for 4 years in some areas. The WHO goal of cure rate is 85% and our result is far from it. This may be partly due to lack of drugs from 1991 to 1992, but improvement of case holding would be the first target of our tuberculosis control. <Recording and Reporting> In order to calculate the cure rate, we must do cohort analysis.

But in some Governorates, the recording of follow up is unsatisfactory and treatment result of each case is unknown. In these Governorates, the cohort analysis cannot be done. In some other Governorates, recording of follow up is well made, but treatment result is not recorded. That is why the treatment results are shown only in some Governorates at this annual report 1992. At the GTC meeting in January 1993, training of recording and reporting was done and it is expected that each Governorate can do cohort analysis of his area hereafter.

Table 1 Number of Registered New Tuberculosis Cases
by Type of Disease and Governorate,1992

Govemate	Pulmonary			Extra–	Total	Name of Medical Facility
	Smear+	Smear–	all	Pulm.		and Remarks
Sa'ada	72	121	193	94	287	Assalam Hospital, Repuglican Hospital
*Jawf	31	11	42	1	43	Al Hasum center
Mareb						
*Hajja	136	66	202	24	226	Republic Hospital
*Mahweet	36	5	41	1	42	
Hodeida	736	502	1238	111	1349	Hodeida TB center
Sana'a G	70	23	93	20	113	Amran Hp,Khamer Hp
Sana'a C	704	1773	2477	1105	3582	National TB Institute
*Dhamar	66	411	477	102	579	
Beida	42	293	335	24	359	Al–Thowra Hp
Ibb	51	147	198	49	247	MCH center
Taiz	524	826	1350	245	1595	Taiz TB Center, HCs(Hagdah,Al Mocha,Al Barh),Rahida Dist,Khalifa Hp)
Lahj	53	110	163	11	174	Abbass HP,Al Hawtta PC,Al Wahat PC
*Aden	162	457	619	52	671	Khor Macser PC,Boraika PC,Mansora PC,Moela PC
Abian	16	44	60	13	73	Nagi PC
Shabwa	54	80	134	1	135	Ataq Hp,Azan Hp
Hadramaut	86	144	230	49	279	Mukala HC
Mahra		82	82	3	85	
Total	2839	5095	7934	1905	9839	

*;From registration book

Table 2 Trend of the number of new detected cases

	Pulmonary			Extra–	Total
	Smear+	Smear–	total	pul.	
1988	1065	1457	2522	779	3301
1989	1487	2275	3762	965	4727
1990	1544	2111	3655	802	4457
1991	2159	3194	5353	1290	6643
1992	2839	5095	7934	1905	9839

Fig 1, Smear positivity among Registered New Cases
by Governorate, 1992

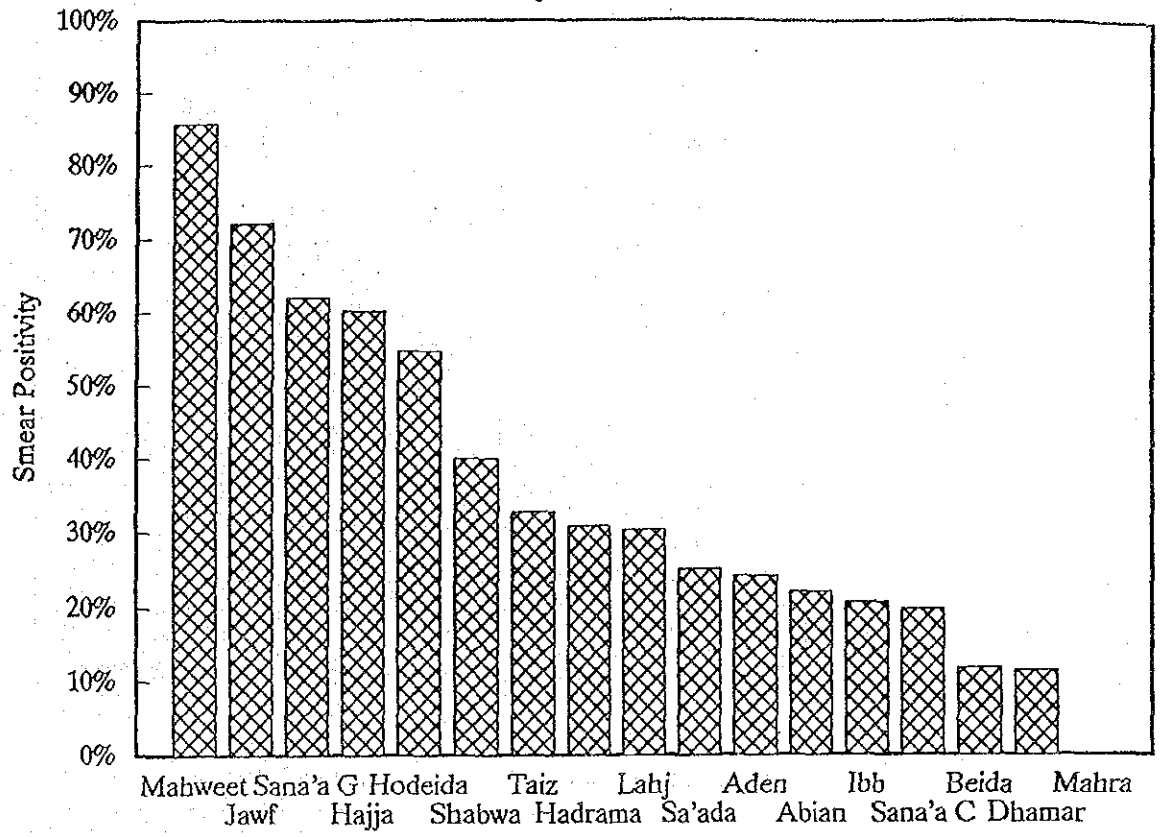


Fig 2, Time trend of Smear positivity among Registered New Cases
by Governorate, 1992

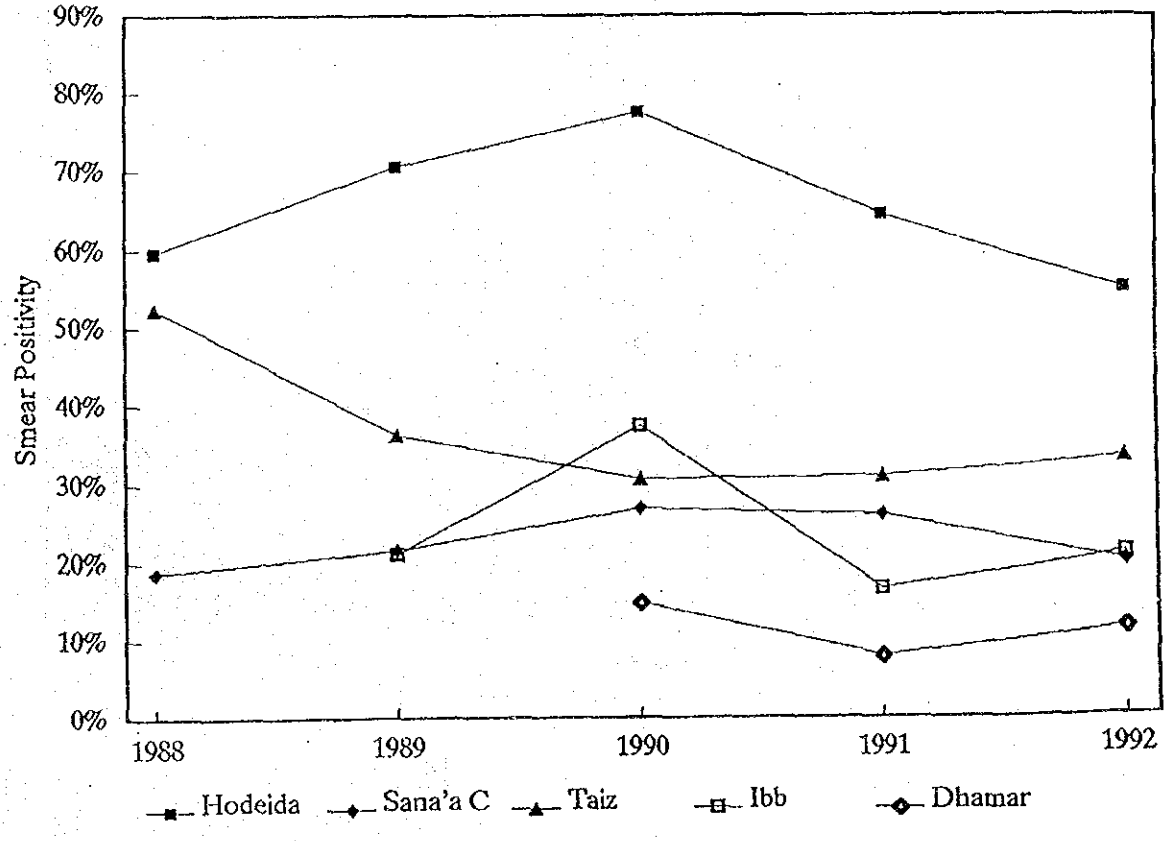


Table 3 Age Distribution of Smear Positive New Cases

by Governorate, 1992

*:From register book

	Age Group(years)						Total	Health Facilities
	0–14	15–24	25–34	35–44	45–54	55–		
Sa'ada	1	21	23	15	6	5	71	Assalam HP,Republican HP
*Jawf	2	4	5	6	3	9	29	
Mareb								
*Hajja	6	17	50	18	16	20	127	
*Mahweet	7	5	8	8	2	6	36	
Hodeida	24	190	212	143	97	66	732	TB center
Sana'a G	3	7	11	6	8	8	43	Amran HP
*Sana'a C	34	196	233	137	51	52	703	NTI
*Dhamar	12	12	31	19	9	10	93	
*Beida	3	4	4	1	2	0	14	
*Ibb	3	17	19	8	4	1	52	MCH center
Taiz	10	141	160	105	48	39	503	TB center
*Lahj	1	11	12	12	4	5	45	Abbass HP
*Aden	0	28	42	24	12	20	126	PCs(K.Maksur, Boreka, Monsura)
*Abian	0	6	5	0	0	5	16	
*Shabwa	0	0	1	0	0	0	1	Ataq HC
*Hadramaut	6	18	17	8	7	25	81	Mukala HC
Mahra								
Total	112	677	833	510	269	271	2672	
proportion	0.042	0.253	0.312	0.191	0.101	0.101		

Fig 3, Age Distribution of Smear Positive New Cases,1992

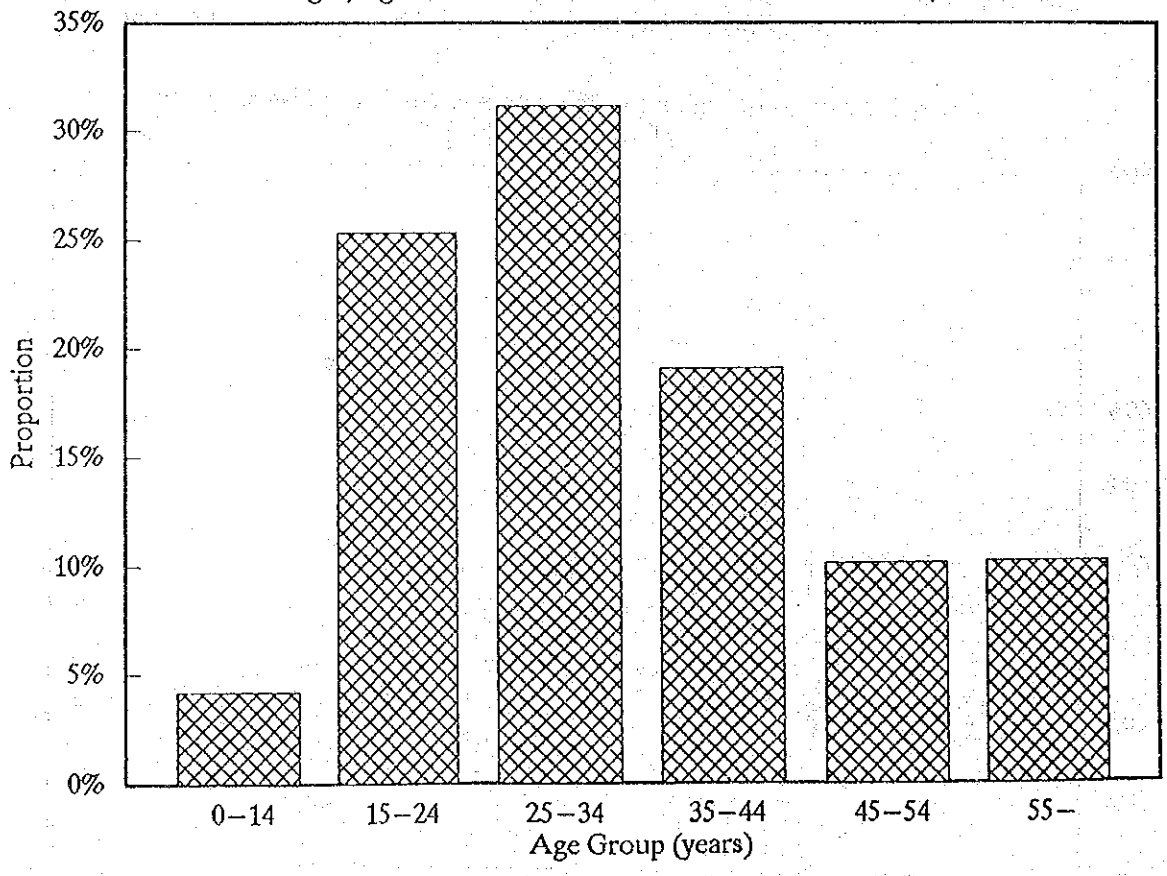


Table 4, Treatment Result of Smear Positive Pulmonary New Cases
by Governorate, 1991

Governate	Cured	Treatment completed	Died	Bacter. Positive	Defaulted	Transfer Out	unknown	Total	
Sa'ada	21	28	0	3	8	1		61	Republican HP,Assalam HP
Jawf									
Mareb									
Hajja									
Mahweet									
Hodeida	285	36	3	12	292	2	3	633	TB center
*Sana'a C	128	166	2	15	229	59	57	656	NTI
Sana'a G									
Dhamar									
*Beida	8	0	0	0	0	0	13	21	
*Ibb	21	10	0	0	21	3	0	55	MCH center
Taiz	187	57	12	1	89	101	0	447	TB center,Rahida Dis.,Khalifa Hp, Al Barh HC
Lahj									
Aden									
Abian									
Shabwa									
*Hadramaut	0	7	1	0	3	0	3	14	Mukalla HC (4th Quarter)
Mahra									
Total	650	304	18	31	642	166	76	1887	

*:From register book

Fig 4, Cure ratio and Treatment Completion ratio

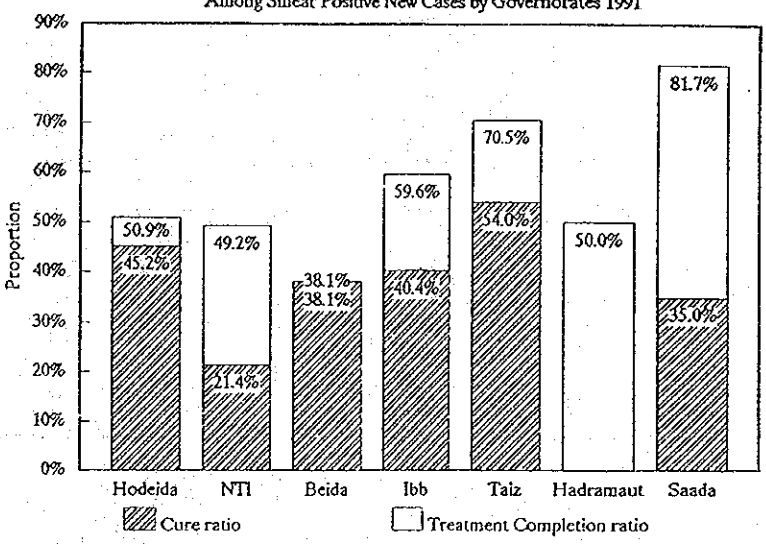


Fig 5. Time trend of Cure Ratio among

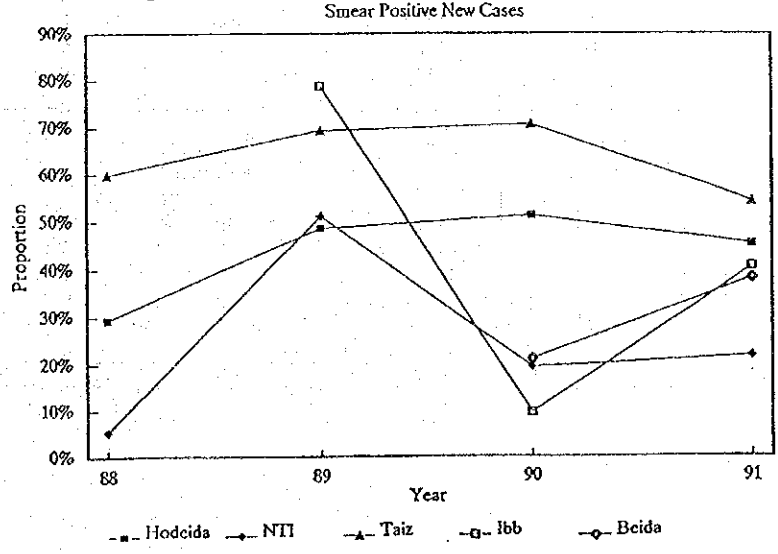


Table 5 Details of the number of cases detected in each health facilities

Sa'ada Governorate(Assalam Hospital)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	49	64	113	65	178
Relapse	2	11	13	3	16
T/I	0	0	0	1	1
after Default	2	8	10	8	18
Others	12	16	28	11	39
unknown	0	0	0	0	0
Total	65	99	164	88	252

Sa'ada Governorate(Republican Hospital)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	23	57	80	29	109
Relapse	3	0	3	0	3
T/I	0	0	0	0	0
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	26	57	83	29	112

* Hajja Governorate(Republican)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	136	66	202	24	226
Relapse	6	1	7	2	9
T/I	7	18	25	1	26
after Default	9	0	9	2	11
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	158	85	243	29	272

* Al Jawf Governorate(Al Hasam)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	31	11	42	1	43
Relapse	2	0	2	0	2
T/I	2	7	9	1	10
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	1	1	2	0	2
Total	36	19	55	2	57

Hodelda TB Center

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	736	502	1238	111	1349
Relapse	39	2	41	1	42
T/I	42	7	49	13	62
after Default	19	6	25	1	26
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	836	517	1353	126	1479

* Mahweet Governorate

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	36	5	41	1	42
Relapse	5	0	5	0	5
T/I	6	2	8	0	8
after Default	0	1	1	0	1
Others	0	0	0	0	0
unknown	1	0	1	0	1
Total	48	8	56	1	57

Sana'a Governorate(Amran)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	57	8	65	20	85
Relapse	45	23	68	25	93
T/I	12	0	12	4	16
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	114	31	145	49	194

NTI

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	704	1773	2477	1105	3582
Relapse	5	8	13	8	21
T/I	18	37	55	53	108
after Default	12	20	32	17	49
Others	2	0	2	2	4
unknown	0	0	0	0	0
Total	741	1838	2579	1185	3764

* Dhamar Governorate

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	31	203	234	39	273
Relapse	0	11	11	2	13
T/I	5	33	38	5	43
after Default	2	2	4	0	4
Others	0	0	0	0	0
unknown	35	208	243	63	306
Total	73	457	530	109	639

Sana'a Governorate(Assala)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	6	15	21	0	21
Relapse	2	0	2	0	2
T/I	0	0	0	0	0
after Default	0	0	0	0	0
Others	0	0	0	4	4
unknown	0	0	0	0	0
Total	8	15	23	4	27

* Ibb Governorate (MCH center)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	52	144	196	49	245
Relapse	1	3	4	0	4
T/I	17	34	51	9	60
after Default	6	18	24	5	29
Others	0	1	1	0	1
unknown	0	1	1	0	1
Total	76	201	277	63	340

Belda Governorate(Al Thowra Hp)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	42	293	335	24	359
Relapse	0	21	21	2	23
T/I	1	25	26	1	27
after Default	0	60	60	13	73
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	43	399	442	40	482

Table 5 Details of the number of cases detected in each health facilities

Taiz TB center

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	473	723	1196	243	1439
Relapse	19	0	19	1	20
T/I	11	14	25	11	36
after Default	2	0	2	0	2
Others	0	4	4	2	6
unknown	0	0	0	0	0
Total	505	741	1246	257	1503

Taiz Governorate(Rahida Hp)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	3	23	26	0	26
Relapse	0	0	0	0	0
T/I	0	0	0	0	0
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	3	23	26	0	26

Taiz Governorate(Khalifa Hp)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	3	18	21	0	21
Relapse	0	0	0	0	0
T/I	0	2	2	0	2
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	3	20	23	0	23

Taiz Governorate(Hagdah Hc)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	11	16	27	2	29
Relapse	0	0	0	0	0
T/I	0	0	0	0	0
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	11	16	27	2	29

Taiz Governorate(Al Mocha HC)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	14	11	25	0	25
Relapse	0	0	0	0	0
T/I	0	0	0	0	0
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	14	11	25	0	25

Taiz Governorate(Al Barh Hc)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	20	35	55	0	55
Relapse	0	0	0	0	0
T/I	0	0	0	0	0
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	20	35	55	0	55

* Lahej Governorate (Abbass Hp)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	45	35	80	3	83
Relapse	1	4	5	0	5
T/I	29	30	59	4	63
after Default	3	14	17	0	17
Others	0	0	0	0	0
unknown	1	0	1	1	2
Total	79	83	162	8	170

Lahej Governorate (Al Hawtta HC,Al Wahat HC)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	3	79	82	5	87
Relapse	0	0	0	0	0
T/I	0	0	0	0	0
after Default	0	0	0	0	0
Others	0	0	0	0	0
unknown	0	0	0	0	0
Total	3	79	82	5	87

* Aden Governorate (Kohr-Moksur)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	79	123	202	10	212
Relapse	3	5	8	1	9
T/I			0		0
after Default			0		0
Others			0		0
unknown			0		0
Total	82	128	210	11	221

* Aden Governorate (Boreka)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	32	47	79	5	84
Relapse	2	0	2	0	2
T/I			0		0
after Default			0		0
Others			0		0
unknown			0		0
Total	34	47	81	5	86

* Aden Governate (Monsura)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New	51	195	246	37	283
Relapse	2	5	7	0	7
T/I			0		0
after Default			0		0
Others			0		0
unknown			0		0
Total	53	200	253	37	290

* Aden Governorate (Mina)

	Pulmonary			EP	Total
	S-P	S-N	Total		
New		92	92		92
Relapse			0		0
T/I			0		0
after Default			0		0
Others			0		0
unknown			0		0
Total	0	92	92	0	92