

**BASIC DESIGN STUDY REPORT  
ON  
IMPROVEMENT PROJECT OF MEDICAL EQUIPMENT  
FOR UPAZILA HEALTH COMPLEXES  
AND DISTRICT HOSPITALS**

**THE PEOPLE'S REPUBLIC OF BANGLADESH**

**OCTOBER, 1984**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

**G R B**

**CR(2)**

**84-95**



JICA LIBRARY

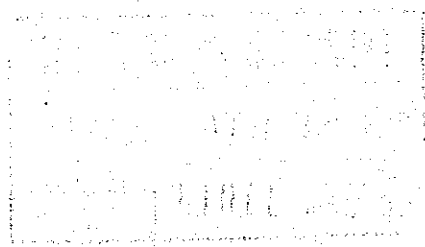


1033951[3]



**BASIC DESIGN STUDY REPORT  
ON  
IMPROVEMENT PROJECT OF MEDICAL EQUIPMENT  
FOR UPAZILA HEALTH COMPLEXES  
AND DISTRICT HOSPITALS**

**THE PEOPLE'S REPUBLIC OF BANGLADESH**



**OCTOBER, 1984**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

国際協力事業団	
受入 月日 '85. 1. 16	101
登録No. 11013	92.8
	GRB

## PREFACE

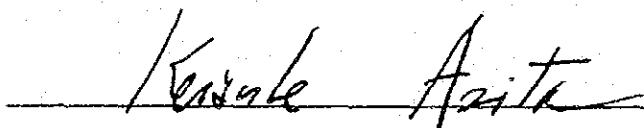
In response to the request of the Government of the People's Republic of Bangladesh, the Government of Japan decided to conduct a basic design study on medical equipment improvement. Project and entrusted the study to the Japan International Cooperation Agency. The JICA sent to Bangladesh a study team headed by Dr. Masaaki Fukushima, Professor, Fukushima Medical University from 26th July to 13th August, 1984.

The team had discussions with the officials concerned of the Government of Bangladesh and conducted a field study at hospitals concerned in rural areas. After the team returned to Japan, further studies were made and the present report has been prepared.

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

I wish to express my deep appreciation to the officials concerned of the Government of the People's Republic of Bangladesh for their close cooperation extended to the team.

October, 1984

A handwritten signature in dark ink, appearing to read 'Keisuke Arita', is written over a horizontal line.

Keisuke Arita  
President  
Japan International Cooperation Agency





## SUMMARY

In order to improve its outdated health and medical treatment services, The Government of the People's Republic of Bangladesh has incorporated a uniform medical care policy as an important factor in its annual planning ever since the nation's inception. In its second five-year plan, which is currently being implemented, Bangladesh has put special emphasis on the improvement of regional medical services. Plans are for construction of 68 Districts Hospitals, over 460 Upazila Health Complexes, and about 1,500 Union Health & Family Welfare Centers, etc., and already 58 District Hospital, 373 Upazila Health Complexes and 1,200 Union Health & Family Welfare centers have been either fully completed or completed in part and are currently in operation.

In the framework of this background, the Government of Bangladesh has drawn up a medical equipment augmentation project for medical equipment at 34 District Hospitals located throughout the nation and for X-ray Equipment at 300 Upazila Health Complexes, and has requested Japan Grant Aid for implementation of the project.

In response to this request, the Japanese Government has decided to conduct an investigation not only to confirm the details of the request, but also to consider the project's feasibility, planning details, its implementation network and so forth. Through Japan International Cooperation Agency it dispatched a basic design study team to conduct investigations over a 19-day period from July 26 to August 13, 1984.

As a result of discussion with the Bangladesh side, it was agreed as a required condition for medical equipment installation that the relevant medical facilities would have the required amount of space and rooms, that adequate electric and plumbing facilities would be maintained, and that the required number of physicians and medical technicians would be maintained. Determination of supplies and selection of equipment

materials, moreover, would be conducted on the basis of the results of local investigation of each medical facility by the survey team.

In selecting specific medical facilities for on-site investigation, seven District Hospitals were selected on the assumption that even though the number of people served by these facilities is large, there are no other substitute facilities available. 29 Upazila Health Complexes were selected from over as wide a range of the nation as possible.

Although results of the on-site investigations pointed to a number of specific problems with each of the medical facilities, all of these problems are amenable to solution, and it was concluded that at each of the sites investigated, the medical equipment augmentation project would be feasible and its implementation possible.

A summary of the medical equipment selected for provision as a result of the basic design survey is given as follows:

District Hospitals (same for all 7 facilities)

- Surgical equipment (operating table, astral lamp, etc.)
- X-ray equipment (500 mA X-ray machine, etc.)
- Blood bank equipment (cold storage box for blood, etc.)
- Clinical examination equipment (microscope, etc.)
- Dental equipment (diagnosis/treatment unit)

Upazila Health Complex (same for all 29 facilities)

- Regular medical equipment (regular diagnosis/treatment set, etc.)
- X-ray equipment (100 mA X-ray machine, etc.)

There are great differences in the levels of technical competency among medical personnel in Bangladesh at different locations. At present, only a limited number of physicians and medical technicians can be stationed at the District Hospitals and Upazila Health Complexes investigated by the study team. Consequently, only basic equipment should be selected for provision and every effort should be made to avoid the inclusion of electronic apparatus. From the standpoint of maintenance

after installation, moreover, the sturdiest equipment which is hardest to damage will be chosen. Another consideration is whether equipment parts and expendables can be provided locally. In executing the project, the Japanese side will carry out construction work related to electricity and water facilities within each medical facility in order to guarantee thorough equipment installation. The Japanese side will also install the equipment and provide instructions on how to operate equipment after installation. Concerning protection against radiation from X-ray equipment, W.H.O. standards will be followed.

In implementing the project, 4 months will be required for detailed designing, 3.5 months for equipment manufacture, and 5 months for transportation and installation, for a total period of 12.5 months.



## CONTENTS

Preface .....	1
Summary .....	1
Chapter 1 Introduction .....	1
Chapter 2 Background of the Project .....	3
I. Situation of Regular Medical Care and Improvement Project .....	3
I-1 Situation of Regular Medical Care .....	3
I-2 Medical Care Organization .....	8
I-2-1 Administration .....	8
I-2-2 Medical Personnel and Corresponding Educational Organization .....	11
I-2-3 Medical Equipment Supply Network .....	15
I-3 Medical Care Improvement Program .....	17
I-3-1 Expansion and Augmentation of Facilities .....	17
I-3-2 Education of Medical Personnel .....	17
I-3-3 Improvement of Local Health Care .....	18
II. Present Situation of Upazila Health Complexes and District Hospitals .....	23
II-1 Upazila Health Complexes .....	23
II-1-1 Administration .....	23
II-1-2 Facilities .....	23
II-1-3 Treatment and Medical Equipment .....	24
II-2 Present Situation of District Hospitals .....	30
II-2-1 Administration .....	30
II-2-2 Facilities .....	30
II-2-3 Treatment and Medical Equipment .....	30

Chapter 3	Program .....	37
I.	Program Details .....	37
I--1	Program Objective .....	37
I--2	Basic Policy .....	38
II.	Basic Design .....	41
II-1-1	Medical Equipment Plan of Upazila Health Complex .....	41
II-1-2	Medical Equipment List of Upazila Health Complex .....	42
II-1-3	Installation Conditions of Upazila Health Complex .....	43
II-2-1	Medical Equipment Plan of District Hospital .....	49
II-2-2	Medical Equipment List of District Hospital .....	50
II-2-3	Installation Conditions of District Hospital .....	53
III.	Estimated Budget .....	59
Chapter 4	Implementation Program .....	61
I.	Implementation Outline .....	61
I-1	Implementation Policy .....	61
I-2	Implementation Scope .....	63
II.	Maintenance Control Program .....	66
II-1	Administration .....	66
II-2	Maintenance Costs Covering Major Equipment .....	67
III.	Evalution of Operation .....	68
	Conclusion, Proposal .....	69

Appendix .....	71
----------------	----

1. Facilities Reference Diagram .....	73
. Upazila Health Complex new standard design .....	73
. Upazila Health Complex old standard design .....	77
. Union Health & Family Welfare Centre .....	79
. District Hospital standard design .....	81
. Sivil Surgeon .....	85
2. X-ray Protection Standards : W.H.O. Index .....	87
3. Bangladesh local meterological data .....	91
4. Water quality analysis .....	94
5. List of Upazila and District administrative units .....	95
6. study record .....	99





## **Chapter 1 Introduction**



## Chapter 1 Introduction

On the basis of its second five-year plan (1980 - 1985), the People's Republic of Bangladesh has placed special emphasis on the establishment of regional medical care. At present, she has drawn up a medical equipment maintenance plan for various regions which has long been pending and has requested Japan's Grant Aid.

Based on the request, the Government of Japan has sent, through Japan International Cooperation Agency, a team headed by Dr. Masaaki FUKUSHIMA, Professor, Department of Public Health, Fukushima Medical University to carry out the Basic Design Study on the Improvement Project of Medical Equipments for Upazila (formerly Thana) Health Complexes and District (formerly sub-divisional) Hospitals for 19 days from 26th July to 13th August, 1984.

In conjunction with the survey, the Government of Bangladesh has requested that a large number of locations be covered under the program, including 300 Upazila Health Complexes and 34 District Hospitals. In view of administrative problems after implementation of the program and the present status of regional medical care in the nation, however, because of other factors such as the limit in the number of places which could be covered under the current survey, the following points were agreed upon after discussions with relevant personnel in the Government of Bangladesh:

- 1) The Project consist of two components; (1) to provide X-ray machines to Upazila Health Complexes and (2) to improve medical equipments for District Hospitals. The Project aims at upgrading and expanding the health services for the vast majority of the rural people.
- 2) Both parties have agreed that the team will carry out the necessary study on 29 Upazila Health Complexes and 7 District Hospitals as listed in Annex 1.
- 3) The basic equipments proposed by the Bangladesh side for each of the District Hospitals are shown in Annex III. Equipments will be selected by the team based on the request by the Bangladesh side and the result of the study.

The above points were mutually confirmed as comprising the minutes of discussions.

(Appendix, Minutes of Discussion)

Based on the confirmed points listed above, an on-site investigation was conducted for the following objectives:

- To investigate details surrounding the project and consider whether or not implementation of the project through grant aid would be effective.
- To determine whether or not a network for receiving equipment through financial aid exists at the local level.

On the basis of an on-sight survey and an analysis of survey results, the following report gives background information on the project and considers the feasibility of the project and of basic designing.

## **Chapter 2 Background of the Project**



## Chapter 2 Background of the Project

### I. Situation of Regular Medical Care and the Improvement Project

#### I-1 Situation of Regular Medical Care

Bangladesh has a population of about 90 million, which is increasing at an annual rate of 2.6%. The land area of the nation is equivalent to about  $\frac{1}{2}$ .5 that of Japan and almost none of this territory is more than 10 meters above sea level. It is an alluvial zone on a low ground base.

The nation has a tropical monsoon climate with a rainy season that extends from March to October which produces excess water that results in flooding of the entire low lying area. This unhealthy condition, combined with high temperatures and high humidity, results in the propagation of contagious disease-carrying bacteria and parasitic vermin. A number of illnesses also plague daily life in the nation because of poverty and inadequate sanitation or health care.

Among major types of illnesses are epidemic diseases such as dysentery, typhus, cholera and tuberculosis; chronic malnutrition; skin diseases and others caused by parasites. (See Table 2-1.)

Among causes of death there is a conspicuous incidence of tetanus followed by respiratory tract diseases such as tuberculosis and pneumonia, as well as cholera, dysentery, typhus, and others. A breakdown of death rates by age reveals that aside from the elderly, there is an unusually high death rate among infants and young children. (See Table 2-2.)

Meanwhile, although progress continues to be made in the improvement of the medical care system over a wide range of facets, results have still not been satisfying, and there is still a considerable amount to be done before a satisfactory medical organization emerges. Table 2-3 gives a breakdown of the present

status of medical care in Bangladesh in comparison with that of various other countries. To cite a familiar example, the number of doctors and beds in Bangladesh per population is only about 1/10 the corresponding numbers in Japan.



Table 2-1 Composition of Disease at Upazilla Health Complexes

Group Cause	Percentage of 1002 patients
(i) Attempted suicide, homicidal injuries, injuries purposely inflicted by others; other accidents, burns, fractures; road transport accidents	20.76
(ii) Anaemias; Protein-Caloric malnutrition, kwashiorkor, marasmus; avitaminosis and other nutritional disorders	12.47
(iii) Dyspepsia, gastritis, epigastric pain, peptic ulcer	11.18
(iv) Intestinal worms; dysentery, enteritis and other diarrhoeal diseases; typhoid, paratyphoid fever	10.48
The above four group-causes constitute about 55% of the 1,002 patients.	

Leading Group/Single Causes having more or less common causation	No. of cases 1st & 2nd visits	% of total (1198)
(i) Intestinal worms; diarrhoea, enteritis, dysentery, typhoid and paratyphoid fevers	228	19.03
(ii) Scabies with or without secondary infection	151	12.60
(iii) Diseases of respiratory tract (excluding tuberculosis) i.e. sore throat, tonsillitis, etc. bronchitis, bronchial asthma, etc. pneumonia, other diseases of respiratory tract	149	12.43
(iv) Dyspepsia, gastritis, epg. pains, peptic ulcer	142	11.85
(v) Anaemia, protein-caloric malnutrition, avitaminosis, Goitre, etc.	98	8.18
Total	768	64.09

(Source: Bangladesh Health Profile 1977)

Table 2-2 Table Breakdown of Deaths by Cause

Deaths by cause, age and sex, 1981

Cause	Male															
	Age at death (years)															
	All ages	Under 1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
All causes	1165	391	202	31	20	9	14	11	12	17	12	32	32	59	50	273
Small pox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	35	8	26	-	-	-	-	-	-	-	-	-	-	-	-	1
Tetanus*	186	174	8	2	-	-	-	1	-	-	-	1	-	-	-	-
Drowning	42	2	28	6	2	1	1	-	-	-	-	-	1	-	-	1
Murder	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Suicide	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diarrhoea acute	30	6	7	1	1	1	1	1	-	-	-	-	-	1	2	-
Diarrhoea chronic	11	-	9	1	1	-	-	-	-	-	-	-	-	-	-	4
Dysentery acute	25	4	9	1	-	-	-	-	-	-	-	-	-	-	-	1
Dysentery chronic	54	3	14	2	-	-	-	1	-	-	-	1	1	-	-	8
Childbirth	-	-	-	-	-	-	-	-	-	-	-	2	1	4	6	22
Jaundice	14	1	2	-	2	1	1	-	1	-	1	-	-	1	1	3
Other	273	117	25	5	5	2	2	3	2	7	4	9	7	20	8	53
Disease of G.I.**	42	-	1	2	2	2	2	1	1	-	-	4	5	5	4	13
Respiratory***	162	49	20	1	1	-	-	2	2	7	1	5	8	7	13	46
Heart disease	15	-	-	1	-	-	-	-	1	-	1	1	1	3	2	5
Liver disease	23	4	1	-	2	-	-	-	1	-	1	3	1	3	1	6
Veneral disease	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Skin disease	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-
E.N.T. disease	8	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Cholera (proved)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2
Dropsy	82	3	22	2	2	-	-	-	4	2	2	4	3	5	2	31
Rheumatism	59	9	2	-	-	-	2	1	-	-	1	2	3	5	6	28
Accident	4	-	1	-	2	1	-	-	-	-	-	-	-	-	-	-
Old age	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fever (all forms)	66	9	22	7	-	-	1	1	-	1	1	-	1	4	3	33
Unknown	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-

\* Tuberculosis, evil spirit.

\*\* Other than cholera.

\*\*\* Cold, fever, cough, T.B. and asthma, etc.

Deaths by cause, age and sex, 1981

Causes	Female															
	Age at death (years)															
	All ages	Under 1	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
All causes	1235	397	327	50	13	22	20	18	13	12	17	17	27	37	41	224
Small pox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Measles	56	6	39	11	-	-	-	-	-	-	-	-	-	-	-	-
Tetanus*	183	166	12	-	-	-	1	1	-	3	-	-	-	-	-	-
Drowning	30	1	25	2	-	1	-	1	-	-	-	-	-	-	-	-
Murder	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suicide	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Diarrhoea acute	24	11	5	2	-	1	-	-	1	-	-	-	-	-	1	3
Diarrhoea chronic	22	2	15	2	-	-	-	-	-	-	-	-	-	-	-	3
Dysentery acute	35	4	25	2	-	-	-	-	-	-	1	-	-	-	-	3
Dysentery chronic	70	1	38	3	2	-	-	-	2	-	-	-	1	4	4	15
Childbirth	16	-	-	-	-	4	2	5	5	-	-	-	-	-	-	-
Jaundice	17	1	4	1	-	3	2	2	-	-	-	-	1	2	-	1
Other	294	126	56	4	4	8	4	6	2	-	3	7	7	10	11	46
Disease of G.I.**	25	-	1	1	-	1	-	-	-	2	3	-	1	3	6	7
Respiratory***	141	54	34	7	3	1	2	1	1	2	3	1	5	6	1	20
Heart disease	6	1	1	-	-	-	-	-	-	-	-	-	-	2	-	2
Liver disease	19	1	5	-	-	-	2	-	1	1	2	1	3	-	-	3
Veneral disease	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Skin disease	8	3	3	-	-	-	-	-	-	-	-	-	-	-	-	2
E.N.T. disease	8	1	2	4	-	-	1	-	-	-	-	-	-	-	-	-
Cholera (proved)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dropsy	109	2	32	1	1	1	2	-	3	1	1	8	3	1	9	44
Rheumatism	43	5	3	2	-	-	1	1	-	-	2	-	4	2	4	19
Accident	4	-	1	1	-	-	-	-	-	-	-	-	-	2	-	-
Old age	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fever (all forms)	76	10	26	7	2	2	3	1	-	-	1	-	2	5	3	41
Unknown	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1

\* Tuberculosis, evil spirit.

\*\* Other than cholera.

\*\*\* Cold, fever, cough, T.B. and asthma, etc.

Table 2-3 WORLD MEDICAL SITUATION

Name of Country	Doctors*	Beds*	Hospitals*
AFRICA			
LIBYA	111.3	510.2	2.28
EGYPT	91.6	203.9	4.00
SUDAN	11.5	99.9	0.88
ZAIRE	6.2	284.0	15.80
UGANDA	3.6	148.0	3.40
CENTRAL AFRICA	3.5	99.4	2.00
CHAD	2.4	84.7	0.78
ETHIOPIA	1.4	30.2	0.29
ASIA			
JAPAN	118.3	1,070.0	7.50
KOREA	47.9	145.0	15.20
CHINA	38.4	199.0	6.90
INDIA	27.4	72.8	0.94
BANGLADESH	11.9	18.0	0.68
EUROPE			
WEST GERMANY	204.0	1,177.5	5.60
SWITZERLAND	201.0	1,144.9	7.50
EAST GERMANY	189.5	1,065.0	3.40
SPAIN	179.6	534.8	3.50
SWEDEN	177.5	1,490.0	8.70
FRANCE	163.2	1,055.0	6.70
ENGLAND	151.7	785.4	4.60

\* Number per 100,000 population

(Source: WHO Annual Report, 1980, but values are as of 1977)

## I-2 Medical Care Organization

### I-2-1 Administration

Almost all diagnostic and treatment facilities in Bangladesh are categorized according to administrative boundaries. The medical care system is divided up by regional grade and classified in four categories, beginning with local primary health care and extending on up to highly specialized health care centered mainly in Dhaka.

Primary health care is provided at regional medical centers and encompasses a broad range of basic preventive medicine and initial diagnosis and treatment. It is carried out under the jurisdiction of the Upazila, an administrative division that consists of a population of 150,000 to 300,000 people. In one Upazila, primary health care is provided at one Upazila Health Complex, and at a plural number of Union Health & Family Welfare Centers, Union Health Centers and Rural Health Centers. There are a total of 460 Upazila throughout the nation.

Secondary health care consists of intermediate medical treatment following primary health care and is provided at District Hospitals. Secondary health care refers to district level health care. There are a total of 68 districts in Bangladesh and there are between 5 and 10 Upazilla under the jurisdiction of one district.

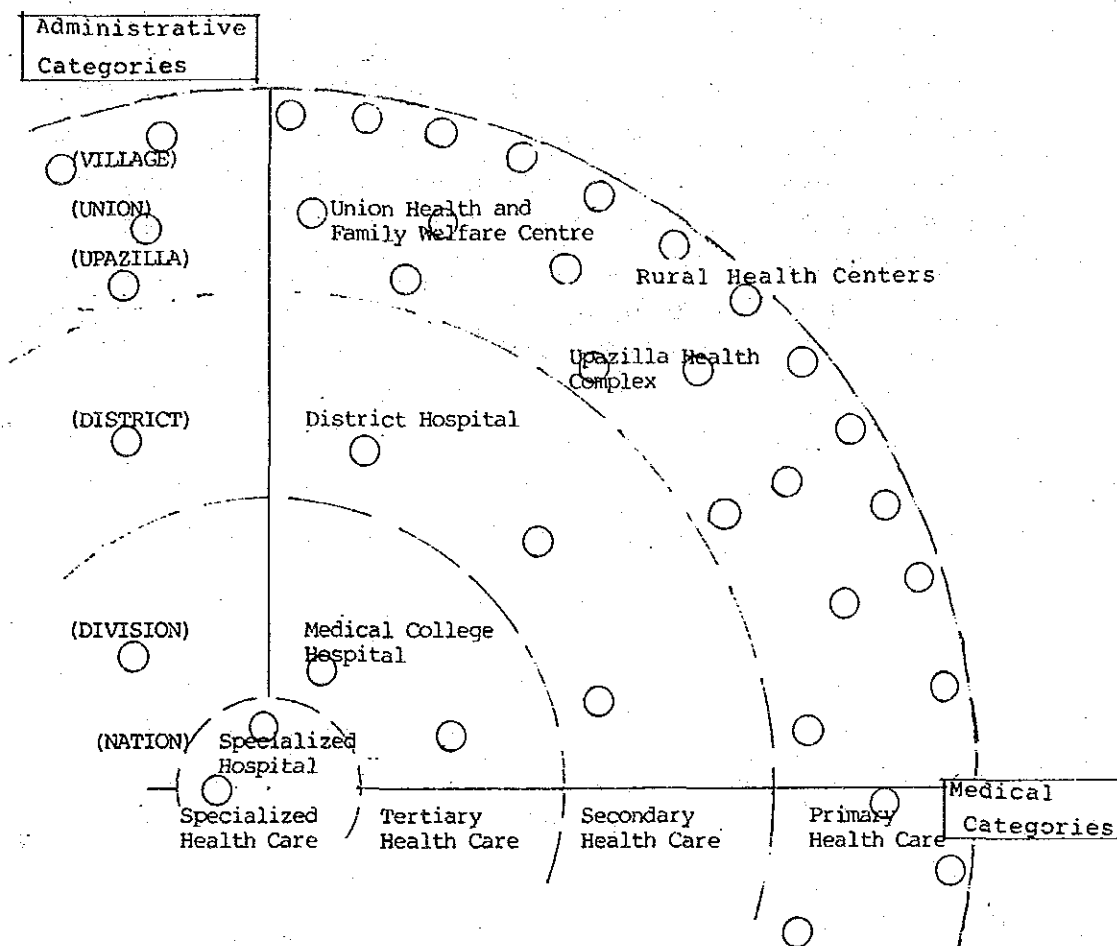
Tertiary health care refers to medical treatment in specialized areas provided at specialized hospitals or at hospitals attached to medical colleges at the division level. Bangladesh has been divided up into four divisions.

Specialized health care refers to very highly specialized treatment provided at universities or research centers in Dhaka, the capital, or at hospitals attached to government organizations. A breakdown of the above health-care categories is given in Table 2-4.

(Note: Over a period of one year beginning from November 1982, revisions were made in the administrative organization. The former district and sub-divisional administrative blocks were combined as districts only and the designation "Thana" was changed to "Upazila.")

In principle, the charge to the individual for medical treatment under any of the above four categories is free, but as one receives treatment at higher levels, he must bear the costs of a special portion thereof. Almost all primary health care can be obtained free of charge, but as one progresses to secondary and tertiary health care, the portion which he must actually pay increases.

Table 2-4 Graphic Display of Medical and Administrative Organization



## I-2-2 Medical Personnel and Corresponding Educational Organization

### (Situation of Medical Personnel)

As shown in Table 2-3, the number of physicians and beds in Bangladesh is considerably low in comparison to numbers in other nations. Moreover, among the small number of medical personnel in the nation, there is an even smaller number of medical technicians, nurses and other intermediate medical personnel. (See Table 2-5)

Bangladesh plans to expand its medical education facilities over the next several years on the basis of annual planning. Amid this effort, the number of young medical personnel has been steadily increasing but at the same time the number of experienced personnel regional medical centers and elsewhere remains scarce. The recent trend in Bangladesh has been towards excessive dependence upon younger personnel.

### (Situation of Medical Education Organization)

The educational system in Bangladesh comprises five years of primary education, seven years of junior and senior high school and another four to seven years of specialized school or university training.

Table 2-6 gives a breakdown of the numbers of medical personnel who have completed training at specialist schools or universities and thus earned various specific qualifications. In contrast to an annual output of about 1,800 physicians in 1982, there was a very small number of intermediate medical personnel — only about 200 medical technicians and about 300 nurses.

As an example of the regional education organization, the curriculum of a medical training center attached to a Upazila Health Complex is given below.

At present, there are medical training centers attached to 130 different Upazila Health Complexes where village doctors extend training to junior nurses and family planning personnel. Normally, there are 50 trainees lodging at a center and they receive intensive training over a half-month period.

What follows is a brief outline of the paramedical specialists school in Dhaka which was made available for observation under the present study.

#### PARA MEDICAL INSTITUTE, MOHAKHALT DHAKA

Entrance requirement: Men and women up to 20 years of age who have completed high school education.

#### Training period:

First term	6 months	Basic Medical Science
Middle term	6 months	Basic General Science
Last term	1 year	Practical Training in Each h Specialty
<hr/>		
(Total) 2 years		

#### Specialty/No. of Graduates:

Dental Technician	40 pupils
Health Technician	40 "
X-ray Technician	40 "
Radiological Therapy Tech.	40 "
Laboratory Technician	40 "

Curriculum: The curriculum is mainly the same as that of Great Britain



No. of Graduates:

(1963 to 1982 20 years)

Pharmacists	258 pupils
S.I.T.	443 "
Laboratory	301 "
Radiography (D)	130 "
Radiography (T)	20 "
Dental Tech.	79 "

Places of Employment: District Hospitals, Upazila Health  
Complex, City Hospitals

Irrespective of its X-ray facilities, Bangladesh, in comparison with other nations, has a very scarce supply of practical training facilities. The ability of graduates to perform actual duties satisfactorily is seriously open to question.

Table 2-5 Medical and Health Personnel

BANGLADESH, 1981		(89 655)	ABSOLUTE NUMBERS
PHYSICIANS - MEDECINS			10 086
MEDICAL ASSISTANTS - ASSISTANTS MEDICAUX			1 993
MULTIPURPOSE HEALTH AUXILIARIES AUXILIAIRES SANITAIRES POLYVALENTS			1 351
DENTISTS - DENTISTES			248 G
DENTAL TECHNICIANS - TECHNICIENS DENTAIRE			76
"DISPENSERS", "COMPOUNDERS" AND "DRESSERS"			4 367
MIDWIVES - SAGES-FEMMES			131 +
NURSE-MIDWIVES - INFIRMIERES-SAGES-FEMMES			2 108 +
NURSES - INFIRMIERES			3 736 +
STUDENT NURSES AND NURSING AUXILIARIES ELEVES-INFIRMIERES ET AIDES			33 G+
NURSING AUXILIARIES AIDES DU PERSONNEL SOIGNANT			904 G
PHYSIOTHERAPISTS - PHYSIOTHERAPEUTES			7
MEDICAL LABORATORY TECHNICIANS TECHNICIENS DE LABORATOIRE MEDICAL OU LABORAN- TINS			300
MEDICAL LABORATORY ASSISTANTS TECHNICIENS AUXILIAIRES DE LABORATOIRE			657 G
RADIOGRAPHERS - TECHNICIENS DE RADIOLOGIE			139
X-RAY TECHNICIANS MANIPULATEURS DE RADIOLOGIE			68 G
MEDICAL RADIOLOGICAL TECHNICIANS (THERAPY) TECHNICIENS D'ELECTRO-RADIOLOGIE (THERAPIE)			23
SANITARY INSPECTORS INSPECTEURS OU AGENTS SANITAIRES			550 G
HEALTH INSPECTORS INSPECTEURS OU AGENTS D'HYGIENE			744 G
ASSISTANT HEALTH INSPECTORS INSPECTEURS SANITAIRES AUXILIAIRES			2 233 G
HEALTH ASSISTANTS - ASSISTANTS SANITAIRES			13 500 G

Source : W.H.O. 1981

Table 2-6

Outturn of doctors, medical assistants, nurses, midwives and lady health visitors.

Year	Post-graduate doctors	M. B. B. S. doctors	B. D. S. (dentists)	Medical assistant	Post-graduate nurses	Nurses	Midwives	Lady health visitors
1975	49	638	9	—	31	145	171	56
1976	77	779	13	—	79	226	87	22
1977	60	882	5	—	11	303	164	285 (a)
1978	53	751	13	309	23	467	205	454 (a)
1979	33	858	27	169	n.a.	565	386	372 (a)
1980	43	1047	39	430	24	558	190	8 (a)
1981	60	1031	68	443	56	479	600	508 (a)
1982	126	1692	30	211	27	296	233	273

Notes: Annual figures are not obviously progressive totals but only numbers passed in the relevant years.

(a) Family welfare visitors.

Source: Director General of Health Services (Health Information Unit), Ministry of Health and Population Control.

### I-2-3 Medical Equipment Supply Network

Supply of medical equipment to regional facilities in Bangladesh is done through the Central Medical Store Depot (CMSD) .

- Central Medical Store Depot (CMSD)

The CMSD is an arm of the Ministry of Health (M.O.H.) which controls the circulation of all government pharmaceutical products and medical equipment. These items are supplied through imports, local purchases, etc. and are distributed to medical facilities throughout the nation via District Stores (DRS) in the 21 districts (former) of Bangladesh. Supply is carried out over three-month or six-month periods.

(Major supply products)

- |                                      |   |
|--------------------------------------|---|
| • X-ray film:                        | Stored in cold room at 19°C<br>8 x 6 inch/12 x 15 inch (made in East Germany)     |
| • X-ray machine                      | 100 mA made by Siemens Ltd. of West Germany<br>Mobile type made in Czechoslovakia |
| • Medical gas                        | Oxygen, nitrous oxide, nitrogen   |
| • Hospital beds                      | Products supplied locally   |
| • Small medical, surgical equipments |   |
| • Linen                              |   |
| • Pharmaceuticals                    | Imports and products supplied locally (Stored in cold storage)                    |

- District Reserve Store (DRS)

These stores function to distribute pharmaceutical products and medical equipment received from the CMSD to District Hospitals and Upazila Health Complexes.

In terms of organization, the DRS comes under the Directorate General of Health Service (DGHS) and it oversees the district. It comes under the Civil Surgeon and it carries out the distribution of equipment based on public health administration. (Photograph No. 3 shows the office of the Civil Surgeon)

The Bangladesh Ministry of Health is currently planning to expand the DRS facilities in order to foster improvement of the supply system of pharmaceutical products and medical equipment.

### I-3 Medical Care Improvement Project

One of the most important policies set up by Bangladesh since its inception has been to work to realize an improvement in health care for its citizens. On the basis of slogans such as "Minimum Medical Care to All" and "Health for All by the Year 2000", the nation is carrying out its second five-year plan (1980 to 1985) after having completed its first five-year plan (1973 to 1978) and a two-year plan (1978 to 1980). The basic framework of its third five-year plan is also being drawn up.

#### I-3-1 Expansion and Augmentation of Medical Facilities

In order to improve regional health care, priority should be given first to the expansion and augmentation facilities. Under the nation's first five-year plan, however, targets were not reached as expected and there was great diversity among results. Table 2-8 gives the rate of achievement in number of beds. Provision of the shortage of beds has been allotted under the second five-year plan. The nation at present is concentrating on reaching targets in the construction of medical facilities. (See Table 2-9 for details.) Emphasis will be placed on expanding and augmenting facilities at the Union level under the third five-year plan.

#### I-3-2 Education of Medical Personnel

Given the shortage in absolute terms of the number of medical personnel as indicated in Section 2-2 of Chapter 2, Bangladesh will progress with education of personnel through its second five-year plan. As can be seen in Table 2-11, the rate of success in achieving the target for personnel education set for 1985 has been remarkable.

### 3-3 Improvement of Local Health Care

In its effort to implement primary health care, Bangladesh has treated the eradication of contagious diseases as an urgent necessity. Health improvement targets under the second five-year plan are given in Table 2-10.

Under the third five-year plan the following three additional themes will also be pursued:

- Health protection for mother and child;
- Establishment of a drinking water supply network; and
- Nutritional education and strengthening of public health.

Table 2-8 Hospital Beds : Targets and Achievement of  
The First Five Years and The Two Years Plan

Sl. No.	Category of hospital	Bench mark 1972-73	Plan Target	Achievement (as of June 1978)	Position June 1980 (Expected)	Achievement in percentage
1	Thana Health Complex	900	11036	2400	3800	34
2	Sub-divisional Hospital	1086	3800	1845	2200	58
3	District Hospital	1118	1465	1208	1558	106
4	Teaching Hospital (excluding T.B. Beds)	3670	5000	5015	5200	104
5	Specialised Hospital					
	(a) T.B. & Chest	966	1200	1030	1030	86
	(b) Leprosy	60	120	130	130	108
	(c) Infectious	180	500	180	180	36
	(d) Mental	400	600	430	430	72
	(e) Dental			20	20	
	(f) Cancer		100	40	40	40
	(g) Children		400	250	300	75
	(h) Casualty		150	150	150	100
	(i) Orthopaedic			275	325	
	(j) Cardiovascular				100	
	(k) Eye				30	
Total (1-5)		8380	24371	12973	15483	63

Source : The Second Five Years Plan 1980 - 85

Table 2-9 Hospital and Clinics  
Targets for Physical Facilities and Beds by 1985

Category of Hospital	Physical structure		Beds	
	Position by 1980	Position by 1985	Position by 1980	Position by 1985
Hospitals and Clinics:				
1. Teaching hospital	11	18	5200	6700
2. Sadar hospital	13	14	1550	1875
3. Sub-divisional hospital	35	42	2200	2825
4. Specialised hospital				
(a) T.B. Control	5+(8	6+(7	1030	1546
	Segregation)	Segregation)		
(b) Leprosy	3	3	130	130
(c) Mental	1	1	430	430
(d) Children	2	4	300	500
(e) Cancer		1	40	140
(f) Eye	1	1	30	100
(g) Orthopaedic	1	1	325	325
(h) T.B. Clinics	44	54		
(i) Cardiovascular	1	1	100	100
(j) Infectious diseases	5	5	180	180
(k) Dental	1	4	20	20
(l) Homeopathic system of medicine		4		100
(m) Indigenous system of medicine	1	5		100
(n) Casualty	1	1	150	150
5. Thana Health Complex	290	356	3800	11036
6. Family Welfare Centre	1773	4500		
Total			15485	26257

Source : The Second Five Years Plan 1980 - 85



Table 2-10 Disease Pattern and Target Setting  
(Ref. : Country Health Programming 1977)

Problems	Index	Level 1980	Target, 1980-85
1. Smallpox	Incidence		
2. Cholera	Mortality rate	3.5/1000	Reduction by 50%
3. Diarrhoea/ dysentery	Prevalence rate	16.5/100	Reduction by 15%
4. Tuberculosis	Prevalence rate (10 years age)	7/1000	(a) 100% Immunization (b) Case detection and treatment of 100,000 cases
5. Malaria	Annual Parasite incidence		Reduction to 0.1
6. Measles	Mortality rate Incidence rate		Reduction by 25%, 30% case detection and treatment
7. Worm infestation	Prevalence	80% of children under 15 years.	Deworming of children under 15 years every 6 months.
8. Tetanus	Incidence 1 Mortality 5	271/1000 3.6/1000	
9. Diphtheria	Mortality rate	0.4/1000	
10. Pertussis	Incidence	18.2/1000	
11. Polionyelitis	Prevalence	0.8/1000	
12. Leprosy	Prevalence	2.6/1000	10-40% case treatment
13. Pneumonia	Mortality rate 5 years	5.3/1000	50% reduction
14. Scabies	Prevalence	5.95/1000	Do.

Source : The Second Five Years Plan 1980 - 85

Table 2-11 Manpower Development : Targets and Achievement  
of the First Five Years Plan and Two Years Plan  
Target Set for 1985

S1. No.	Category	Bench- mark 1972- 1973	Target 1980	Achieve- ment by June 1978	Expected position in June 1980	Percentage of Col. 6 against 4	Target for 1985
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
1	Graduate Doctor	2000	11268	9600	11000 (1:8400) Population	98	1700(1:6300) Population
2	Post-Graduate Doctor	259	672	560	631	98	1580(Details in next page)
3	Dental Graduate	310	470	407	457	97	582
4	Basic Nurse	700	3982	1800	1500	38	4184
5	Post-basic Nurse	.	290	190	280	97	540
6	Junior Nurse						4080
7	Nursing Attendant	1200		1200	1200		1200
8	Medical Assistant		600	192	450	75	5500
9	Medical Technologist (Laboratory)						40
10	Medical Technologist (Equipment)						40
11	Occupational Physiotherapist						40
12	Sanitary Inspector	980	1223	1125	1210	99	1600
13	Health Inspector			1192	1192		No increase is envisaged in view of integration
14	Assistant Health Inspector			3475	3475		
15	Pharmacists/ Compounder	1500	2333	2050	2300	99	6300
16	Laboratory Technicians	270	760	660	740	97	1630
17	Radiographer/X-ray	130	225	160	190	84	555
18	Radiotherapy Technicians	10	260	68	68	26	128
19	Physiotherapy Technicians	20	75	70	45	60	100
20	Blood Bank Technicians	20	67	38	40	60	300
21	Dental Technicians	20	130	58	80	61	500
22	General Health Workers		20300	11000	13500	67	No increase is envisaged in view of proposed integration
23	Paill-Chikiubox		5000		5000	100	

Source : The Second Five Years Plan 1980 - 85

II. Present Situation of Upazila Health Complex and District Hospitals  
II-1 Upazila Health Complexes  
II-1-1 Administration

There are 460 Upazila throughout Bangladesh and 373 Upazila Health Complexes were prepared out of them. These complexes provide primary health care throughout each Upazila. The complex infirmary accommodates 31 inpatients and takes care of about 150 outpatients. The health complex functions as the central Upazila medical treatment facility in that it also administers and oversees the activities of the Rural Health Centers, Union Health Centers, and Union Health & Family Welfare Centers, the smallest units in the Upazila. (See Fig. 5)

Table 3-1 gives breakdown of the Upazila medical care administrative staff. Normally, the Upazila Health Complex is administered by 15 doctors and nurses together with another 15 people, for a total of 30 personnel.

II-1-2 Facilities

Almost all Upazila Health Complexes are built according to one of two standard designs. The first is the older design established when the nation was under Pakistan, and the second is a new design established after the nation's independence. (See Fig. 1-4.) The general infirmary consists of a large room for male and another large room for female patients with 25 beds, plus another 6 beds for birth control functions, for a total of 31 beds, which usually are almost all occupied. In addition to a treatment room for outpatients, an emergency room, a dental room, a family-planning room, an operating room, and an Laboratory the Upazila Health Complex is equipped with a X-ray room and a dark room (which is often also used as a warehouse). The entire Upazila Health Complex is built according to W.H.O. standards.

Building structure:	Two stories built of brick layers
Building size:	First floor - about 700 M <sup>2</sup> (7,530 ft <sup>2</sup> )
	Second floor - about 430 M <sup>2</sup> (4,620 ft <sup>2</sup> )
	Combined floor space about 1,130 M <sup>2</sup> (12,150 ft <sup>2</sup> )

### II-1-3 Treatment and Medical Equipment

All the Upazila Health Complexes have a general shortage of medical equipment. The following list depicts the facilities available in the average case.

X-ray room:	No machinery
Outpatient clinic:	Sphygmomanometer, stethoscope (personal belonging of physician)
Laboratory:	Old microscope, blood sedimentation plate, manual centrifuge
Operating room:	Wooden bed, sterilizer, autoclave, small-size suction
Emergency room:	Examination table, stretcher
Family planning:	Family planning medical equipment, human anatomy model, model skeleton, sex education model, weight scale height scale

The Upazila Health Complex plays a very important role the health and daily activities of local residents by serving as the Upazila central organ for the extension mainly of primary health care, which consists essentially of initial treatment and disease prevention. In addition to primary health care, its activities include supervision and education for Upazilla local residents prevention, first aid, family planning, improved nutrition, vaccinations, prevention of contagious disease,

prevention of parasitic worm, dental health, environmental sanitation, health education and other activities.

As an example, the major diagnostic and treatment activities carried out by the Ghafargaon Upazaila Health Complex over a one month period are outlined below.

T.B. prevention :      Tuberculin reaction test conducted annually. At present, patients must go to district hospitals for X-rays Diagnosis since there are no X-ray Equipments at the complex.

First Aid Center:      Patients are carried in a renovated rickshaw or a regular rickshaw.

• Injuries:	80 cases
• Acute abdomen:	30 cases
• Bone fractures:	4 cases
• Snake bite:	2 cases

The complex has no medical equipment for treating these problems.

• General first aid equipment:	None
• Medical gases:	None

Family planning:      All of the Upazila Complexes have basic equipment due to assistance from UNICEF. Facilities include family planning medical equipment, human anatomical torso model, model human skeleton, model of male reproductive system, model of female reproductive system, model of pregnant woman, etc. Instructions are given daily by a physician specialist (usually female) in a special room and birth-control devices, including pills, etc. are given free of charge as necessary.

Education for improved nutrition, sanitation and contagious disease prevention:

Education is provided through textbooks the same as for family planning and it covers methods of obtaining a balanced diet, use of boiled water only (never tap water) as drinking water, and basic knowledge of environmental sanitation aimed at preventing contagious diseases, etc.

**Surgery:**

The Upazila Health Complexes each have a special operating room. As the following list indicates, they have considerably small amount of equipment.

• Operating table:	Wooden bed
• Operating lamp:	None
• Instrument sterilizer:	None
• Autoclave:	Simple type (heated by kerosene)
• Suction machine:	Small foot-pedal type
• Surgical equipment:	Birth-control equipment for family planning
• Handwash equipment:	Washbasin

**Examples of Surgery Performed**

• Tubectomy:	84 cases
• Vasectomy:	24 cases
• Drainage:	15 cases
• Cyst removal:	5 cases

**Medical laboratory:**

Medical laboratory is regarded as an important department within the Upazila Health Complex but the scope of this activity is very limited

because of a lack of examination equipment.

- Tuberculin test: 20 cases
- Urine test: 15 cases
- Stool test: 20 cases
- Sputum test: 5 cases
- Blood & Hb test: 20 cases
- Malaria test: 5 cases

The scope of test is limited, of course, because test equipped consists mainly of old microscopes only.

Dental health: Efforts are being made to raise concern among citizens about dental health, but not even primary dental treatment is given at present because of a lack of essential equipment.

(Postscript)

There is a portable 25 mA X-ray machine operated at the Gauripur Upazaila Health Complex; details are as follows:

- X-ray machine (portable type) 25 mA: 1
- Bucky table horizontal mode: 1
- Bucky table vertical mode: 1
- Film illuminator: 1
- X-ray operating panel: 1
- Film development set: 1

The X-ray room is divided in two by a brick wall (30 cm thickness) for protection against radiation. One section serves as both a waiting room and a treatment room while the other section is used for taking X-rays.

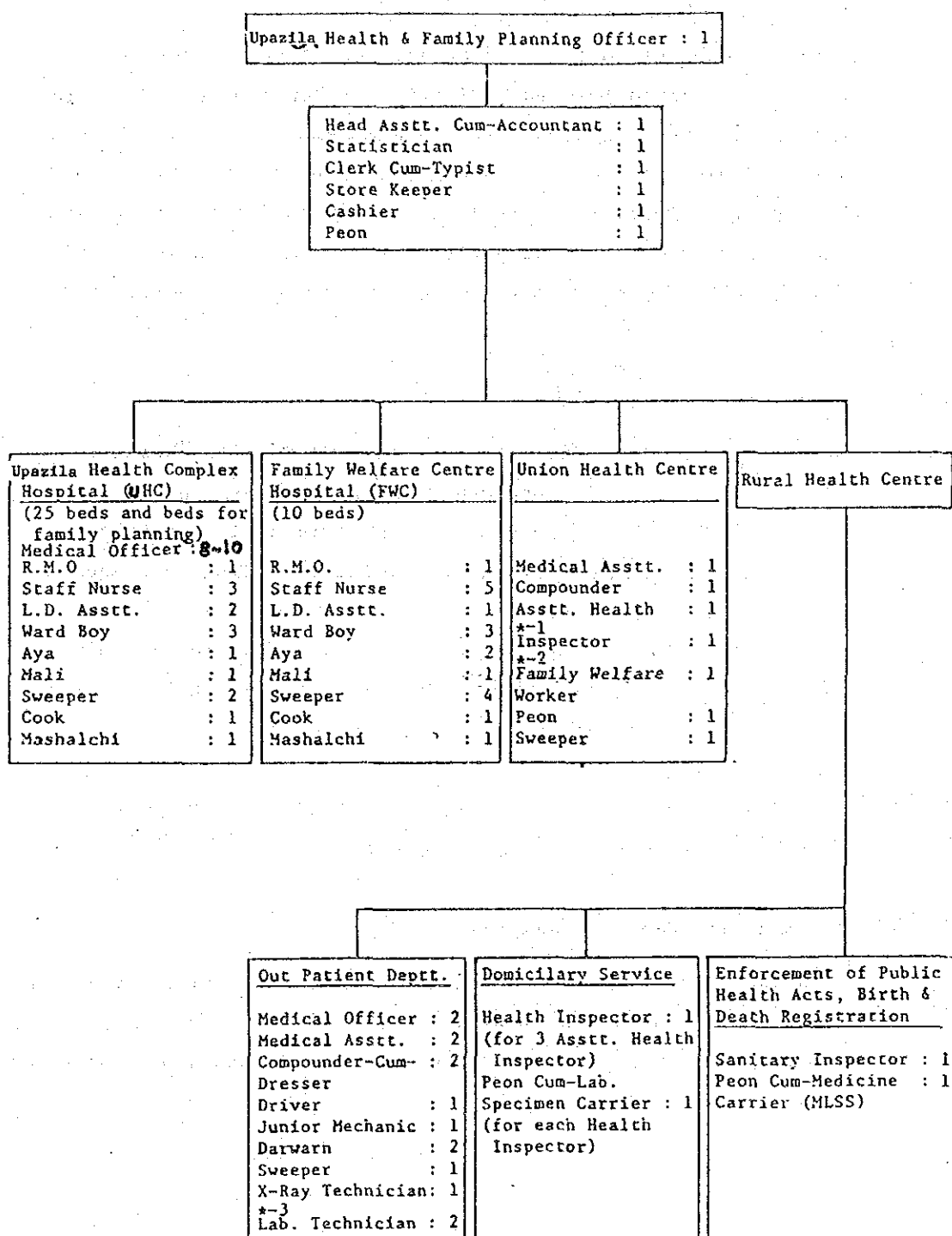
Although the X-ray equipment is a small-capacity, portable 25mA, its functional merits have been adequately studied and are being fully used.

One of the study team members had an X-ray taken at the complex which was then brought back to Japan for examination by a Japanese X-ray specialist. It was confirmed that the technician at the complex was adequately skilled and that he would be able to fully operate a 100 mA machine provided under the current project after only a short period of training.

In the past, Bangladesh has used a lot of X-ray equipment manufactured in Europe and the United States, primarily products by Siemens Ltd. of West Germany and General Electric of the United States, but in recent years the excellence and good maintenance features of equipment manufactured in Japan has come to be recognized and Japanese equipment is starting to be imported.



Table 3-1 Medical Organization at The Upazila Level



\*-1 : 1 Inspector for 5-Family Welfare Workers  
 \*-2 : 1 Family Welfare Worker for 4,000 population  
 \*-3 : 1 Lab. Technician for 100,000 population

Source : M.O.H., the Government of Bangladesh

## II-2 Present Situation of District Hospitals

### II-2-1 Administration

District hospitals provide secondary health care (intermediate stage treatment) in each district of Bangladesh as a continuation of primary health care given at each Upazila. The old type subdivisional hospital accommodates up to 50 patients and the old type district hospital, up to 100 patients. They also handle between 250 and 350 outpatients per day. Table 3-2 gives a break down of the organization of the medical administrative staff at the district level.

### II-2-2 Facilities

Many of the old type district hospitals were built during the British colonial period and others when Bangladesh was part of Pakistan. Almost all the old type subdivisional hospitals, on the other hand, are new structures built according to standard design. (See Figs. 6 and 7.) In addition to large male and female wards, these hospitals each have an outpatient clinic, treatment room, emergency room, dental room, maternity and surgical room, laboratory, X-ray room, and so forth.

(Standard design):

Building size: total area of 2,600 M<sup>2</sup> (28,000 ft<sup>2</sup>)

Building structure: two-storey brick

### II-2-3 Treatment and Medical Equipment

As in the case of Upazila Health Complexes, there is a scarcity of medical equipment at the district hospitals. The following list of equipment indicates what most district hospitals have on average.

• Outpatient:	Examination table, sphygmo- manometer, stethoscope (physician's personal belonging)
• Ear, nose & throat:	No equipment
• Ophthalmology:	No equipment
• Dental:	Plain chairs
• Urology	No equipment
• X-ray:	100 mA X-ray Equipment manual developer
• Ward:	Beds, mattresses (local makes)
• Nurse's station:	No equipment
• Emergency:	Stretcher, oxygen cylinder
• Isolation:	Simple bed
• Surgery:	Operating table, stand lamp, plain surgical apparatus, dressing drum, respirator, instrument table
• Sterilizer room:	Instrument sterilizer (kerosene heated), autoclave (Schimmelbusch type)
• Obstetrics:	No equipment
• Laboratory:	Microscope, blood sedimentation plate, counter, centrifuge, slide staining set

Among the equipment mentioned above, major items such as operating tables, autoclaves, microscopes, etc. have been received in large part as aid from UNICEF and the World Bank. This type of equipment is being used fully but other equipment can be seen which has been set aside for reasons such as breakdowns.

To illustrate, the medical equipment and treatment provided at the Comilla District Hospital are listed below.

(General Outpatient Department)

- Ophthalmology
- Ear, nose & throat
- Urology
- Dental

This department has no medical equipment.

(X-ray Equipment)

Many hospitals have one old model 100 mA X-ray Equipment made by Siemens Ltd. of West Germany in operation, while others have an X-ray Equipment in storage but cannot use it because of missing parts.

The X-ray Equipment is used approximately 1,200 to 1,300 times per month, and a breakdown of parts X-rayed is as follows: chest 40%; fracturers 50%; other 10%. The dimensions of film used per month is as follows:

- |                |                  |
|----------------|------------------|
| • 15 x 12 inch | about 300 sheets |
| • 14 x 14 inch | about 250 sheets |
| • 10 x 12 inch | about 350 sheets |
| • 8 x 10 inch  | about 400 sheets |

Since the capacity of the X-ray machine is 100 mA, it is used mainly for photographing the chest and the arms and legs, but is not used for the digestive tract, lumbar vertebrae, head, etc. The film is supplied by the CMSD and at present a large percentage of it is made by ORWD of East Germany.

X-ray accessory equipment consists mainly of old model items including film driers, radiation protective shields, dark-room apparatus, etc., but most of these items are found out of order or otherwise unusable.

(Surgical equipment)

Although the operating room is a central room of the hospital, its facilities are considerably old and many pieces of equipment are found out of order or maintained unsatisfactorily causing its overall condition to be unsatisfactory.

General surgery is conducted on a very old model operating table, provided as assistance by UNICEF for gynecology use. The operating lamp was installed ten years ago but it is not used since the lamp is burnt out and there is no filter; instead a side light or bare light bulb is used. A fan is also operated from the ceiling, which spreads contaminated air and perpetuates an unsanitary condition.

The anesthetic apparatus is a regular model manufactured by the BOS company of Great Britain but it is not used at present because it has been out of order. It should be handled with great care, however, since it can be instrumental in saving human life.

The Suction Unit, a regular model supplied by the CMSD several years ago, is the only equipment piece that has not broken down and is working in good order.

(Small surgical apparatus - scalpels, scissors, forceps)

The hospital's supply of small surgical apparatus made of steel is extremely limited. Most of the items in general use at present are products made in Pakistan. There are also a small number of pieces made by European and/or U.S. firms, however.

(Medical laboratory equipment)

Almost none of the medical laboratory equipment at the hospital appears to be regular machinery except the microscopes. The microscopes, moreover, were obtained ten years

ago as assistance from UNICEF, and they are a mixture of makes from various countries including Poland, the United States, and Japan. Another oddity is the fact that one microscope contains an eyepiece lens made by the AO company of the U.S., a 10 x objective lens from the POZ company of Poland, a 40 x lens by BL of the U.S., and a 100 x lens by Olympus Co. of Japan. This happening is seen widely among district hospitals and Upazila Health Complexes.

With this state of affairs, even if there is equipment it cannot be put to valuable use because the equipment is incomplete and variations in the design focus of lenses made in different countries prevent objects from being focused properly.

Labo. glass ware and ceramic or porcelain items such as mortar and crucibles are mostly made in China.

(Other equipment)

Basic medical equipment such as stethoscopes and sphygmomanometer are mainly produced in Japan or Western Europe.

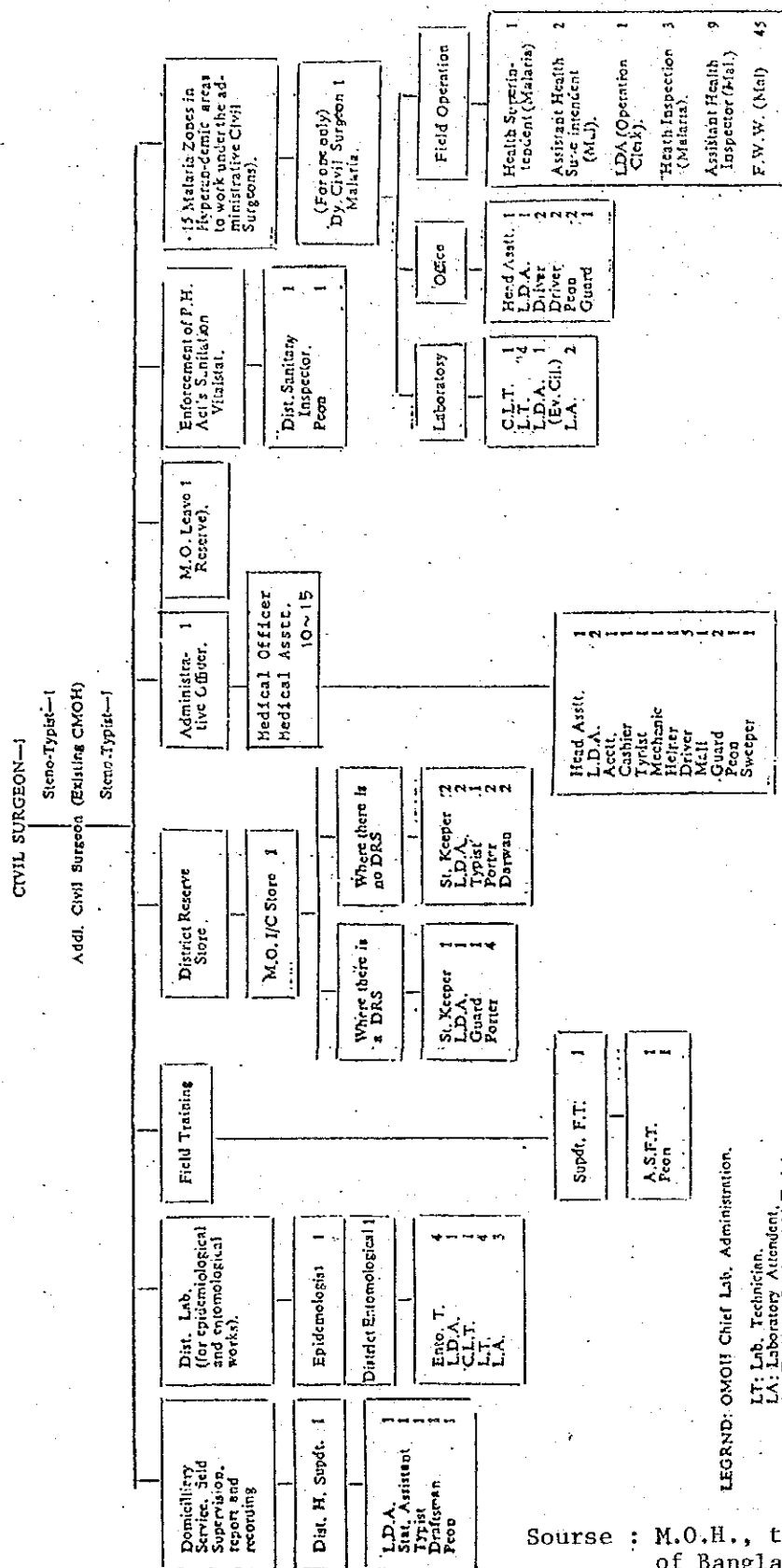
(Wards)

All the beds and stretchers used in wards are local products and the wards are all satisfactorily supplied.

Medical laboratory cases (per day)

- |                |                |
|----------------|----------------|
| • Blood tests: | about 30 cases |
| • Stool tests: | about 40 cases |
| • Urine test:  | about 30 cases |
| • Sputum test: | about 10 cases |

Table 3-2 Organization of The Medical Administrative Staff at The District Level



Source :: M.O.H., the Government of Bangladesh





### **Chapter 3 Program**



### Chapter 3 Program

#### I. Program Details

##### I-1 Program Objective

The purpose of the program is to supply appropriate medical equipment to active Upazila Health Complexes and district hospitals in Bangladesh and to implement improvements in order to upgrade the quality of original regional facilities.

##### (Upazila health complex)

The primary health care originally extended by Upazilla health complexes consists of disease prevention and initial diagnosis and treatment. The following points of improvement can be listed as contributing to the firm establishment of these types of medical activities.

- 1) Preparation of medical equipment and diagnostic facilities necessary for conducting initial diagnosis and treatment.
- 2) Preparation of fundamental equipment for medical examinations.

##### (District hospital )

As in the case of the Upazila Health Complexes, investigation must be made to determine priorities in the provision of medical equipment to the District Hospitals for the sake of modernization, since at present these hospitals have very scarce supplies of the same. The District Hospital is an intermediate-stage medical facility responsible for providing secondary health care as an extension of primary health care. The focal points of improvement over present conditions are as follows:

- 1) Although the District Hospital is an intermediate-stage facility, the fundamental emphasis will have to be on the provision of basic medical equipment.
- 2) Medical equipment must be prepared in a manner that facilitates streamlined accommodation of a large number of patients.

## I-2 Basic Policy

### (Technological level of equipment)

Foremost medical technicians of Bangladesh receive their training by studying abroad. However, these technicians at present are concentrated in the large hospitals attached to universities and research centers primarily in Dacca. Almost all of the personnel affected by the current regional medical project have received their education domestically and are only at the initial stage of competence in handling medical equipment.

Consequently, the simplest possible types of medical equipment are to be selected under the project.

### (Maintenance)

Another very important factor to consider in the selection of medical equipment is control of its maintenance after installation. In view of the level of technical competence of medical technicians at the hospitals, the composition of personnel which the hospitals can maintain, and the costs of equipment maintenance, machinery must be selected which is as solidly built as possible, easy to service, and difficult to damage. In planning electrical equipment for medical purposes, in particular, attention must be paid to such matters as frequency of machine use, maintenance conditions, technological service, and stability in

the supply of required current and voltage. As for electronic medical equipment, power source stabilizing devices must be attached; refrigerators for blood banks must have emergency generators attached.

In determining the quantities of machinery to be supplied, consideration must be given to a number of factors such as the regional character of the particular hospital, conditions of its location, number of outpatients handled, number of bed patients, etc. Ample attention must also be given to the regional characteristics of particular diseases.

(Consumables)

In recent years the advanced nations have come to use almost all electrical related equipment for medical examinations and treatment together with automatic analysers, automatic film developers, and disposable products, etc. In view of post-delivery maintenance costs, status of disposables replacement, and other factors in Bangladesh, however, the most traditional basic modes of analysis, examination and treatment have been assumed, and the most simplified basic modes of equipment (i.e., manually-operated) shall be selected for the project. Special consideration shall thus also be given to the provision of spare machine parts and replacements of consumables, etc., so that at a later date these can be easily purchased locally in Bangladesh on a regular basis.

(Machine repairs and replacements)

As pointed out previously, in selecting medical equipment for the project, ample consideration must be given to the competence of local medical technicians, location conditions, maintenance control costs, etc. Equipment is to be selected which can be

easily serviced or replaced locally in Bangladesh after delivery. In planning X-ray equipment, in particular, the importance of post-delivery repairs, maintenance and replacements must be amply considered along with such factors as equipment percision capacity, examination targets, frequency of use and applicability to the local hospital. In selecting X-ray equipment, therefore, a thorough investigation must be made of the ability of each manufacturing company to meet local needs in Bangladesh for repair and maintenance services and for replacements.

## II. Basic Design

### II-1-1 Medical Equipment Plan of Upazila Health Complex

Priority should be given to the following list of machinery during the project in consideration of objectives and basic policy discussed above.

- X-ray Equipment

This machinery is a major diagnostic tool during initial diagnosis and treatment. It can be used for a diverse range of functions beginning with chest X-rays for prevention of T.B. and X-rays of fractures in arms and legs. The scale of the equipment shall be at 100mA.

- Regular diagnostic equipment
- Dental equipment
- Clinical examination equipment
- Surgical equipment

The above list comprises fundamental medical care and examination equipment.

## II-1-2 Medical Equipment List of Upazila Health Complex

	Q'ty
<b>Radiology</b>	
• X-Ray Machine (100mA)	1 unit
• Film Processing Unit	1 set
• Film Preserving Box	1
• Film Illuminator	1
• Radiation Shield (Control)	1
• Radiation Shield Apparatus	1 set
• Shield Screen	1 set
<b>General Equipment</b>	
• Medical Instrument Kit, for examining room	2 sets
• Sphygmomanometer	3
• Instrument Cart	2
• Instrument Sterilizer	2
• Emergency Set	1
• Treatment Cart	2
• Dental Examining Equipment Kit	1 set
• Examining Light	1
• Research Microscope, Binocular	1
• Blood Sedimentation Unit	1 set
• Hemacytometer	1
• Centrifuge, electric	1
• Sahli's Hemometer	1
• Refractometer, serum protein	1
• Urinometer	2
• Balance	1
• Distilling Apparatus, ION	1
• p.H Test	2
• Microtome, simple	1
• Slide Staining Set	1 set
• Labo Glass Ware Set	1 set
• Operating Table, simple	1
• Operating Lamp, simple	1
• Surgical Instrument Set, simple	2 sets
• Suction Unit, portable	1
• Instrument Sterilizer	1
• Dressing Drum	3
• Instrument Cart	1
• Stainless Steel Instrument	1 set



## II-1-3 Installation Conditions of Upazila Health Complex

### 1) X-ray room

One of the major pieces of equipment in the Upazila Health Complex is the X-ray equipment, and the conditions of its installation must be examined. The medical standards adopted for the project are those of the W.H.O. which Bangladesh has been abiding by in the past.

#### (Space)

The amount of space required for installation of a 100 mA X-ray machine is a floor area of 4.0 m x 4.5 m and a ceiling height of at least 2.5 meters. X-ray rooms in Upazila Health Complexes can be roughly divided into two standard designs: the old type and the new type. Since the floor space of both types is 5.4 m x 4.9 m and 4.3 m x 6.2 m, and the ceiling height is between 3.0 m and 3.5 m for either type, there is more than enough space in these rooms for conducting operations. Figures 4-1 and 4-2 illustrate trial installation of a 100 mA X-ray machine in the new and old types of room.

#### (Floor weight load)

Both the old and new types of X-ray room are located on the first floor, which is made of reinforced concrete. The gross weight of a 100 mA X-ray equipment is about 300 kg, which becomes 100 to 150 kg/m<sup>2</sup> if this weight is evenly distributed, an amount that poses absolutely no problems with a reinforced concrete floor.

#### (X-ray room shield)

Consideration must be given to protecting the entire periphery of the X-ray room against radiation. The walls of both the new

and old types of rooms are made of brick 30 cm in thickness, and the ceilings of about 15 cm of reinforced concrete. Since this protection is roughly the equivalent of a lead shelter of at least 2.0 mm, there is no need for special shelter to protect against direct radiation or radiation scattering. Shields must be installed at the windows and doorways, however, which are also used as blackout curtains.

- New type rooms (window) 0.8W x 1.4H (6 sheets)  
(doorways) 1.0W x 2.1H (2 sheets)
- Old type rooms (window) 2.0W x 1.2H, 1.2W x 1.2H  
(1 sheet each)  
(doorways) 1.2W x 1.2H, 0.9W x 2.1H  
(2 sheets)

(Shield of X-ray operating space)

In order to ensure protection against radiation scatter during X-ray operations, there must be a three-sided screen made available in both the old and new types of X-ray rooms of the Upazilla Health Complexes.

According to W.H.O. standards of X-ray protection, operators or technicians within the X-ray control area must not register an exposure rate of more than 1 ORM/week, and steps must be taken to guarantee that this limit is not exceeded.

(Power source)

The maximum electric power capacity of the 100 mA/100 kV X-ray unit is 10 kVA of single phase 240 V. The low capacity wire connected to the X-ray rooms at present is inappropriate. There must be an separate power line set up from the main switchboard panel of the building to be used exclusively by the X-ray equipment.

(Illumination)

In order to conduct examination by fluroscopy, the X-ray room must be made dark. A light for dark-room use must therefore be installed.

2) Dark Room

(Film development)

The dark room must be equipped with a film development tank and a rinse tank. At the same time, arrangements must be made for water supply and drainage. A special tank for developer fluid and for fixing solution must also be prepared and joined to the film development tank. There is a special drainage tank for joint disposal of developer and fixing solution. In examining all the facilities it was found that they all use water with a pH of 8 for cleaning film. Although the quality of the water for film washing was judged to be barely adequate, this water still contains a large portion of other substances and results of quality analysis of this water are given in the appendix.

(Ventilation)

A ventilation fan has been built into the room but because it is a dark room, the fan must be designed so that no light passes through it.

(Illumination)

Special lighting for dark-room use has been installed.

3) Other

All medical equipment outside of that in the X-ray room and dark room is of the simplest form, which may require power from a regular outlet, depending upon the situation. No special facilities are required.

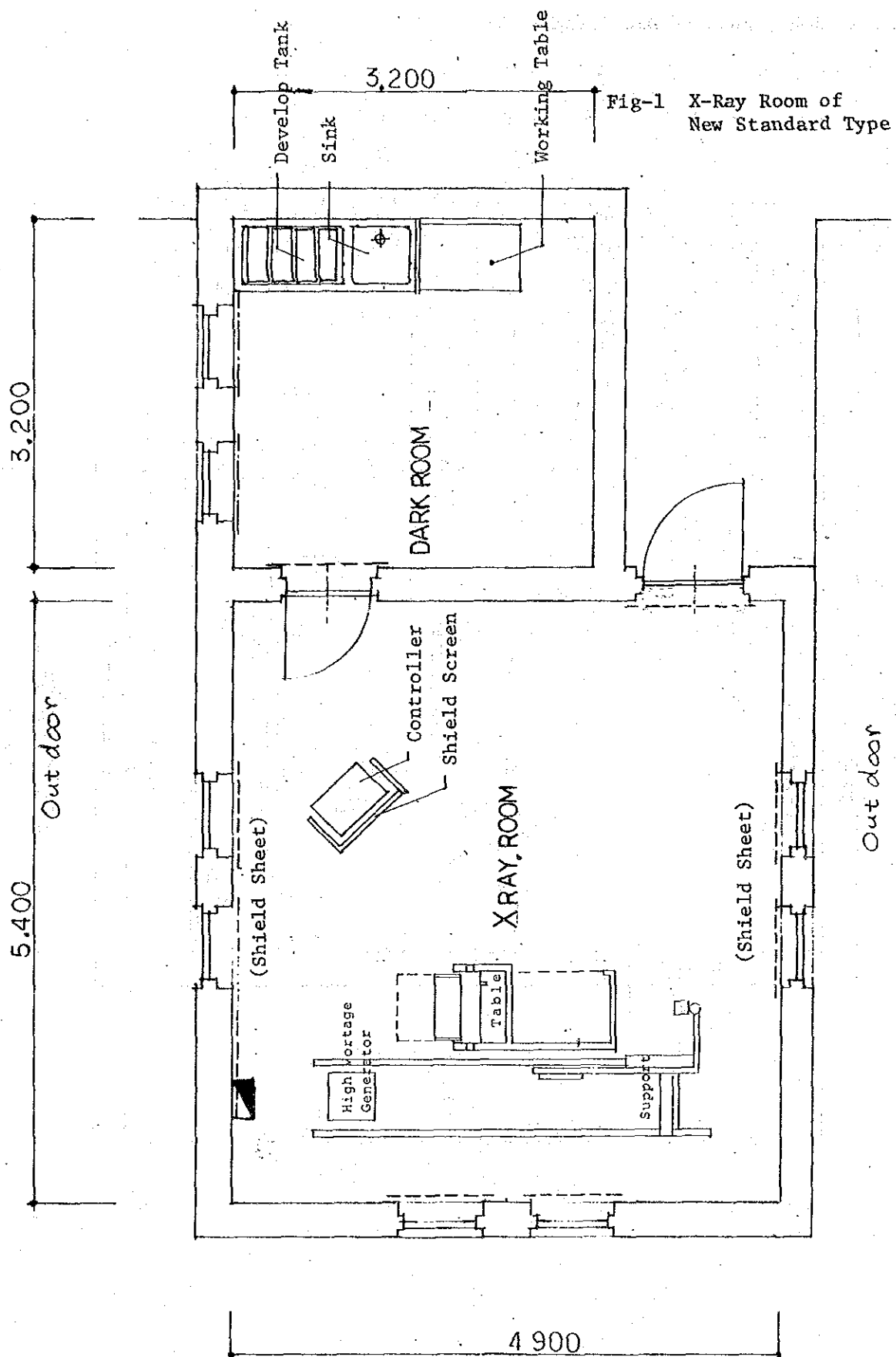
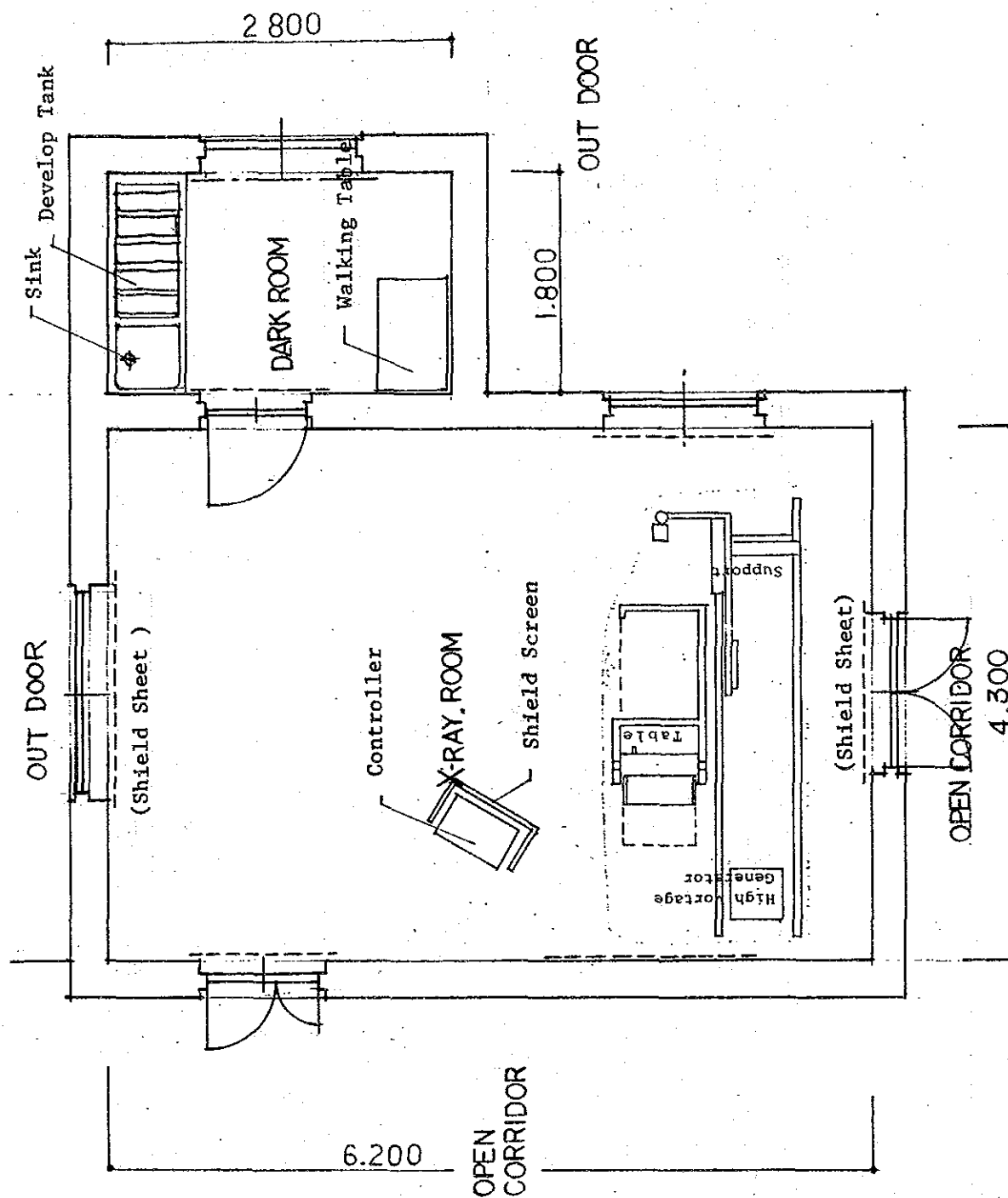


Fig-2 X-Ray Room of Old Standard Type



## II-2-1 Medical Equipment Plan of District Hospital

Priority should be given to the following list of medical equipment for the project in view of the objectives and basic policy discussed in the previous section.

- X-ray equipment

This equipment should make it possible to carry out all types of diagnostic examinations with X-ray including photographs of the chest and four limbs, the lumbar vertebrae, the head, the internal organs, digestive tract, etc. The scale of the equipment shall be at 500mA.

- Clinical test equipment

This equipment should facilitate examination of bacteria, biochemical substances, blood and infectious diseases. Specific subjects of examination are listed as follows: blood, urine, stools, sputum, cultivation and detection of disease-producing microbes, classification and cultivation of bacteria.

- Blood bank

- Surgical equipment

- General medical equipment

- Dental

The above list refers to basic medical equipment.

## II-2-2 Medical Equipment List of District Hospital

	Q'ty
General Equipment	
• Medical Instrument Kit	3 sets
• Sphygmomanometer	6
• Examining Light, stand	3
• Instrument Cart	5
• Stop Watch	3
• Instrument Sterilizer	3
• Film Illuminator	2
• Instrument Cabinet	3
• Emergency Set	1 set
• Minor Operating Light	1
• Minor Operating Set	2 sets
• Electrocardiograph, 3-channel	1 unit
• Refrigerator	1
• Treatment Cart	2
• Instrument Cart	2
• Ophthalmic Unit	1 set
• E.N.T. Treatment Unit	1 set
• Urological Unit	1 set
Operating Theater	
• Operating Table, universal type	2
• Operating Lamp	1
• Operating Lamp, mobile	2
• Suction Unit	2
• Suction Unit, portable	2
• Anesthesia Apparatus	2
• Surgical Instrument Set, general	2 sets
• Surgical Instrument Set, gynecology	2 sets
• Water Sterilizer	1
• Electro-Surgical Unit	1
• Delivery Bed	1
• Infant Incubator	1
• New Born Baby Bed	5
• Suction Unit, obstetrics	1
• Baby Scale	1
• Instrument Cabinet	2
• Instrument Cart	3
• Film Illuminator	2
• Oxygen Cylinders	2
• Equipment Cart	2
• Airconditioner	2
• Steam Sterilizer, 40 x 60 cm	1
• Stainless Steel Instrument	1 set



	Q'ty
Radiology	
• X-Ray Unit (500mA)	1 set
• X-Ray Unit, mobile	1 set
• Shield Booth	1 set
• Shield Panel	1 set
• Film Processing Unit	1 set
• Film Dryer	1
• Film Illuminator	1
• Radiation Shield Apparatus	1 set
• Film Preserving Box	1
• Dosimeter, pocket	1
• Airconditioner	1
Blood Bank	
• Blood Refrigerator	2
• Freezer, -30°C	1
• Distilling Apparatus	1
• Blood Test Kit	1 set
• Electric Generator	1
• Incubator	1
• Water Bath	1
• Centrifuge, electric	1
Clinical Lab.	
• Centrifuge, electric	1
• Water Bath	1
• Microscope, Binocular	1
• Microscope, stereo zoom	1
• Microtome, rotary	1
• Incubator	1
• p.H Meter	1
• Blood Sedimentation Unit	2 sets
• Hand Counter	2
• Blood Analyzer	1
• Hemacytometer	2
• Urino Test	1 set
• Spectrophotometer	1
• Analytical Balance	1
• Balance, beam	1
• Distilling Apparatus	1
• Refrigerator	1
• Slide Staining Set	1 set
• Refractometer, serum protein	1
• Micro-Projector	1
• Instrument Sterilizer	1
• Magnetic Stirrer	1
• Labo. Glass Ware Set	1 set
• Gas Burner, with gas cylinder	1
• Electric Power	2 units

Dental

Q'ty

- Dental Unit & Chair 1 set
- Dental Treatment Set 1 set

## II-2-3 Installation Conditions of District Hospital

### 1) X-ray equipment

The X-ray machine is the major piece of equipment in the District Hospital and the conditions of its installation must be considered.

#### (Space)

The space required to install a 500 mA X-ray equipment consists of a floor space of 4.0m x 5.0m and a ceiling height of at least 3.0m. Each of the X-ray rooms in the District Hospitals is different in configuration but they all have adequate space, including the segment for operation. Figure 4-3 illustrates the trial installation of a 500mA X-ray unit in the standard District Hospital X-ray room.

#### (Floor weight load)

All the X-ray rooms are on the first floor and the floor is made of reinforced concrete. The gross weight of a 500mA X-ray machine is about 700 kg. A per area conversion of this weight becomes 200 to 250 kg/m<sup>2</sup>, which poses no problems with a reinforced concrete floor.

#### (X-ray room shelding)

Most of the District Hospitals in Bangladesh use an old 100mA X-ray unit manufactured by Siemens but plans are now being made under the current project to exchange these for new 500mA units. None of the X-ray rooms of these hospitals is equipped with any special protection against X-rays and thus investigation will have to be made for installing new forms of

protection the same as in the case of the Upazila Health Complex. The walls surrounding the X-ray room are made of brick 30 cm in thickness and the ceilings are of 15 cm of reinforced concrete. These dimensions are the equivalent of at least 2.0 mm of lead wall protection each, which means that no special wall protection facilities need to be installed.

However, openings at the windows and doorways, in the X-ray rooms of standard design will require installation of protective sheets (also used as blackout curtains) for the following dimensions:

(window)	0.8W x 1.4H	(one location)
(doorway)	1.0W x 2.1H	(three locations).

(Shielding of X-ray operating space)

All operation of X-ray equipment takes place inside the X-ray rooms at all the District Hospitals behind a three-sided screen. In view of the danger of X-ray scatter, however, these screens ought to be replaced with boxes.

(Power source)

The X-ray Equipment currently in operation are 100mA units but the new machines replacing them will be 500mA units, and a basic estimate of maximum electrical capacity required will be 50 kVA at 240 V single phase, which is five times that of the present units. This means that present power sources are inadequate and that a separate line will have to be installed from the building switchboard panel directly to the X-ray room.

## 2) Operating room

(Air conditioner)

Neither the old nor new type operating rooms have air conditioners and most of them use an overhead fan. The basic purpose of modern operating room equipment is to keep the atmosphere within the room clean and thus prevent infection during surgery caused by dust or dirt in the air. The overhead fan serves to cool the room during surgery but it is a most unsanitary unit in that it disseminates air throughout the room and causes dust and dirt to rise up from the floor.

It would be very difficult to install a complete air conditioning system in an operating room all at once, but at least a heat-pump type cooling device can be provided. As accessory equipment, a 1.0 kVA power generator and a scrap water drain will have to be installed.

## 3) Dark room

Since the dark rooms at the District Hospitals are all functioning at present without any problems, they require no special facilities.

## 4) Blood bank

(Emergency power unit)

There must not be any power failure at a blood bank because blood must always be preserved at a low temperature. Power sources in Bangladesh, however, are unstable and failures do occur at times. This means that a special emergency generator must be installed at all blood bank.

5) Other

Only simple forms of equipment are required in rooms other than the X-ray room, operating room, or blood bank. They do not require special facilities and they usually function, depending on the case, with a general power source.

Fig-3 X-Ray Room of Standard Type

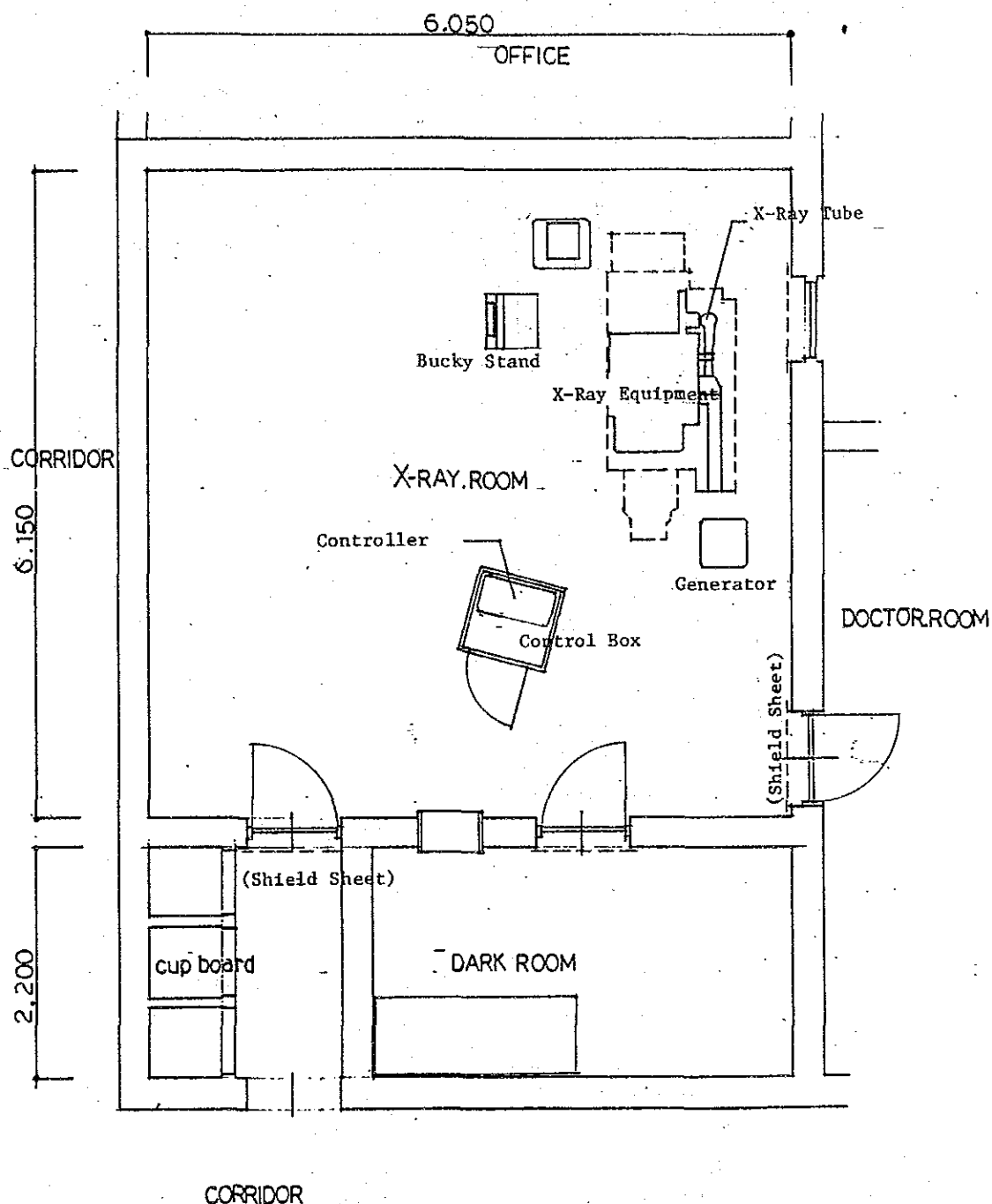
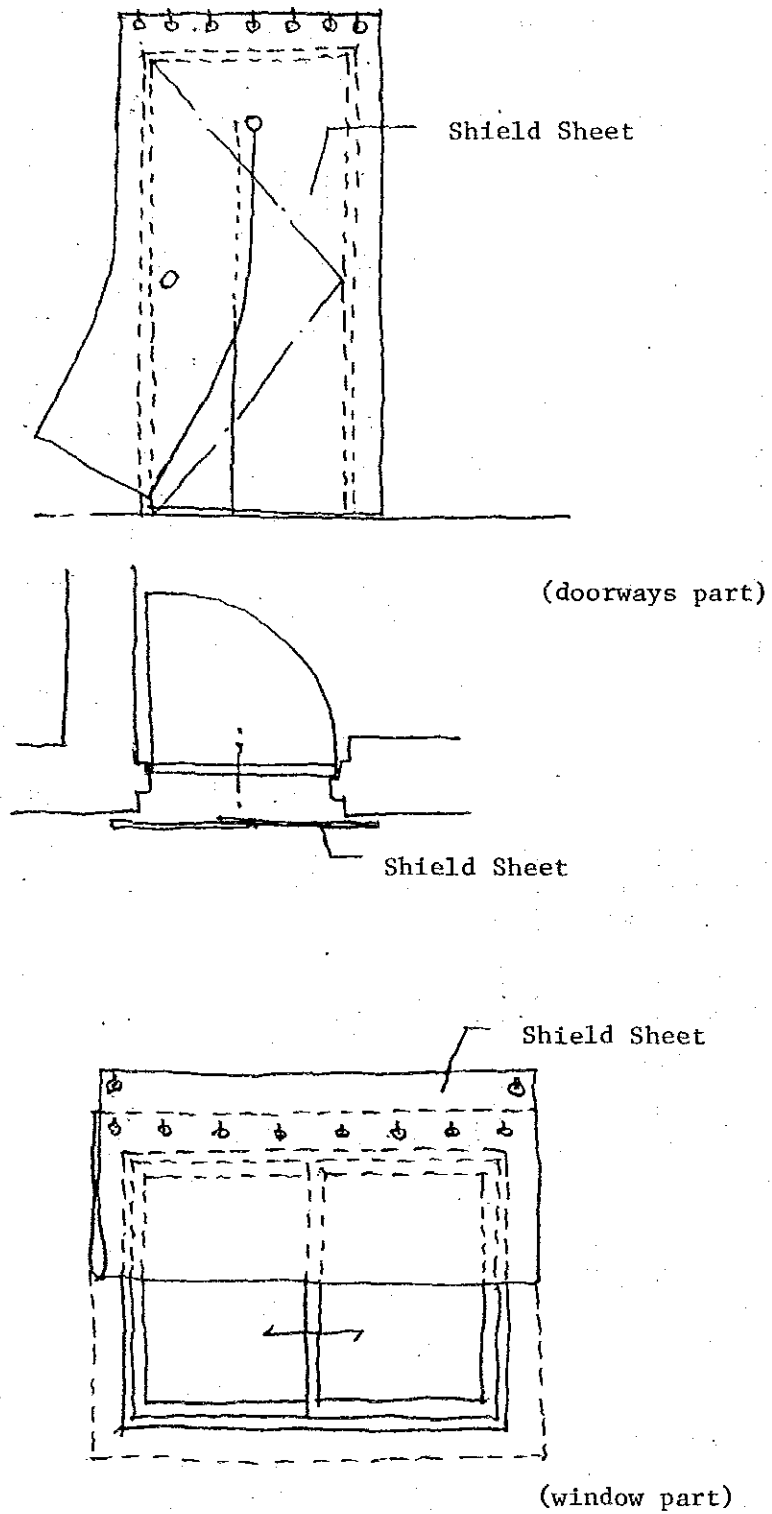


Fig-4 Setting Pattern of Shield Sheet

Setting Pattern of Shield Sheet





### III. Estimated Budget

Operating Expenses Borne by the Government of Bangladesh

Import duties on individual equipment and other tax payments  
(the Government of Bangladesh allows duty-free imports for  
public works related equipment).

#### . Air conditioning

Duct and outlet work; power outlet set up, and installation

20,000 yen x 7 points = 140,000 yen

Grand total : 140,000 yen



## **Chapter 4 Implementation Program**



## Chapter 4 Implementation Program

### I. Implementation Outline

#### I-1 Implementation Policy

##### (Implementation outline)

This project shall be implemented on the basis of Bangladesh Government operations, covering through consultant management the determination of equipment to be supplied and specification details, selection of suppliers through tender offers, and supply and installation of equipment. It is assumed that the consultant and the suppliers will be of Japanese nationality; they must adequately understand the Japanese Government's system of Grant aid and the substance of the current project.

##### (Equipment supply)

In order to execute supply of equipment under the project, the fundamental policy shall be to import from Japan or elsewhere only those items which cannot be manufactured domestically and are thus not restricted from importation into Bangladesh.

##### (Consultation service)

In implementing the project, uniform consultation service must be provided in order to ensure operations are conducted fairly and smoothly from the issue of equipment orders to the completion of equipment delivery. The major duties involved are listed as follows:

- Composition of detailed specification sheets for equipment, diagrams and operational procedure charts.
- Composition of tender documents, submission of tender bid, and performance of duties covering execution and supply contracts.

- Supervision of transportation, delivery and installation of all types of equipment and inspection of all equipment.
- Discussions and adjustments with various related organizations and other matters.

(Implementation schedule)

Implementation of the project is scheduled to take up a total of about 12.5 months as shown in Table 4-1. A breakdown of stage is as follows:

- Design stage: After the consultant contract has been signed, 2.5 months are spent drawing up detailed specification sheets and diagrams. Approval of designs by the Bangladesh Government is included in these two months.
- Bidding stage: This stage is executed over a period of 1.5 months and includes preparation for tender bidding, submission of bids, consideration of bids and formation of supply contracts.
- Equipment delivery stage: This stage requires a period of 8.5 months and covers machine manufacture, transportation, delivery and installation. During the term of equipment manufacture, the Bangladesh side will receive training covering equipment installation, secondary equipment installation, and other matters pertaining to equipment installation.

(Equipment transportation)

- Marine transport

Transportation of all equipment from Japan or third party nations will be by sea to Chittagong port. The time required for transportation, for example, from Yokohama port to Chittagong, including other related time periods, will be a total of about three months.

- Land transport

Land transport from Chittagong port to the 29 Upazila Health Complexes and the 7 District Hospitals will be by truck.

I-2 Implementation Scope

(Responsibilities of the Japanese side)

- Provision of all types of medical equipment to 29 Upazilla Health Complexes and 7 District Hospitals, plus transportation, delivery and installation of the same.
- Provision of instruction in operation of all the equipment referred to above.
- Consultant service.

(Responsibilities of the Bangladesh side)

- Installation of secondary facilities pertaining to the installation of equipment at 7 District Hospitals.
- Payment of tariff duties for the importation of all equipment and of all other taxes.
- Exemption of all Japanese personnel involved in the project from customs and other domestic taxes.

- Extension of entry permits and residency permits to all Japanese personnel participating in the project and provision of all other rights, permits or licenses as required.
- Provision of maps, and all other information deemed necessary for implementation of the project.
- Distribution of all personnel and provision of all expendables required for smooth and effective use of equipment supplied under the project and for maintenance supervision of the same.



Table 4-1 Implementation Schedule

MONTH	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9
PHASE		● Consultation Agreement Exchange of Notes				● Contract of Supplying Equipments										● Completion
GOVERNMENT of JAPAN					PREPARATION			MANUFACTURING			TRANSPORTATION			INSTALLATION OPERATION		
			Verification of Consultant Agreement					Verification of Contract of Supplying Equipments								
GOVERNMENT of BANGLADESH								Approval of Tender and Contract of Supplying Equipments						Operation		
			Consultant Agreement		Approval of Tender document			Incidental Engineering			Management					
CONSULTANT																
			Consultant Agreement		Equipment Agreement			Approval of Tender Document								
			Detail Design		Approval of Tender			Evaluation of Tender								
								Supervision of Project								
CONTRACTOR								Contract of Supplying Equipment			Transportation		Installation			
								Manufacturing of Equipments								

## II. Maintenance Control Program

In implementing the project, the following important issue arises concerning maintenance supervision.

- Networks for the provision of equipment maintenance facilities, required personnel and control of various equipment provided through the project, as well as for the replacement of expendable, must be administered efficiently.

### II-1 Administration

#### (Supervision)

Administration of supervision continues under the old system but improvements can be made in both the scope and quality of diagnosis and treatment services provided by each department. Administration of new medical equipment and of related accessory components and expendable materials must be executed smoothly by personnel responsible for the management of each of these areas.

#### (Required personnel)

In implementing the project, the only places where personnel will have to be increased in numbers both at the Upazila Health Complexes and the District Hospitals is in the X-ray diagnostic departments. Since the project does not involve the expansion of operations in other departments such as those in regular diagnosis and treatment, no additional personnel will be required in them. The following three additional specialists will be required in the X-ray department: 1) Medical Officer (Radiologic); 2) Medical Assistant (Radiologic), and 3) Para-Medical Technician (Radiographer).

## II-2 Maintenance Costs Covering Major Equipment

### (X-ray equipment)

- Costs for additional personnel: monthly amount

Medical Officer: Radiologic 2,100 - 2,600 TK

Medial Asst.: Radiologic 1,400 - 2225 TK

Para-Medical Technician-Radiographer 1,400 - 2225 TK

- Power consumption costs

Although the electrical capacity of X-ray equipment is large, its consumption of power is not continuous. Power is consumed in less than a second of time and thus the amount is not large enough for special consideration.

- Film costs

The cost for use of standard size film (14 inches x 14 inches) over a one-month period, assuming 500 sheets (20 sheets per day) at 35 TK/sheet, equals 17,500 TK.

- Developer and fixing solution

One month's consumption of developer (50 l at 2 l per day) at 17 TK per liter equals 850 TK.

One month's consumption of fixing solution (50 l at 2 l per day) at 21 TK per liter equals 1,050 TK. Total 1,900 TK.

### III. Evaluation of Operation

Assuming that all the places investigated by the survey team will be covered under the project, the Achievement percentages can be given as indicated below by tabulating the percentages these places take up in the whole of Bangladesh.

	Upazila Health Complex	Histrict Hospital
No. of Study Places	29	7
Total No. of Places in Bangladesh	460	68
Achievement Percentage	(6.3%)	(10%)
Total Population in Studied places	6.6 millions	13.5 millions
Total Population	90 millions	90 millions
Achievement Percentage	(7.5%)	(15%)

In the case of both Upazila Health Complexes and District Hospitals, the Achievement percentage for specific population is somewhat greater than that for number of individual places. It is quite understandable that areas of relatively large population would be selected for the survey.

## Conclusion, Proposal

A uniform program of medical equipment provision can be implemented in Bangladesh because almost all of the nation's regional medical facilities are of standard design, and there are no significant regional differences. Most of the 29 Upazilla Health Complexes and the 7 District Hospitals investigated by the study team are of standard design, although some of them do deviate from standards to some extent. This means that the project can be implemented with little difficulty. Although the number of medical personnel at each of the facilities is limited, there are still enough of them to meet requirements for proper operation of equipment. There are also supply networks for expendable items and networks for machine maintenance. These points were confirmed through basic design investigations.

Construction of almost all medical facilities in Bangladesh is carried out by domestic concerns, and medical personnel receive their training through the domestic medical education system. With a few exceptions, however, Bangladesh must import most of its supply of medical equipment under overseas assistance, etc. And this explains why in striving to improve its regional medical services, Bangladesh has not been able to obtain an adequate supply of medical equipment and has not devoted attention to augmentation of equipment.

In fully augmenting a medical care system, equal attention must be paid to medical facilities, medical personnel and medical equipment, since these three factors are mutually indispensable for system operation. Provision of medical equipment to the regional medical facilities in Bangladesh should prove to be a very promising undertaking and steps should be taken in this direction quickly.

On the basis of its national policy, Bangladesh has achieved a substantial degree of success in constructing regional medical facilities. Of the total of 460 Upazilla Health Complexes planned for construction, 373 have already been completed or are being constructed at present. In almost all of these facilities, however, there is still a scarcity of medical equipment.

The rate of implementation of the current project throughout the regions of Bangladesh is still small. Hopefully, the project will continue to be implemented in its present form so that medical equipment can be supplied to all of the remaining medical facilities in the nation.

## Appendix

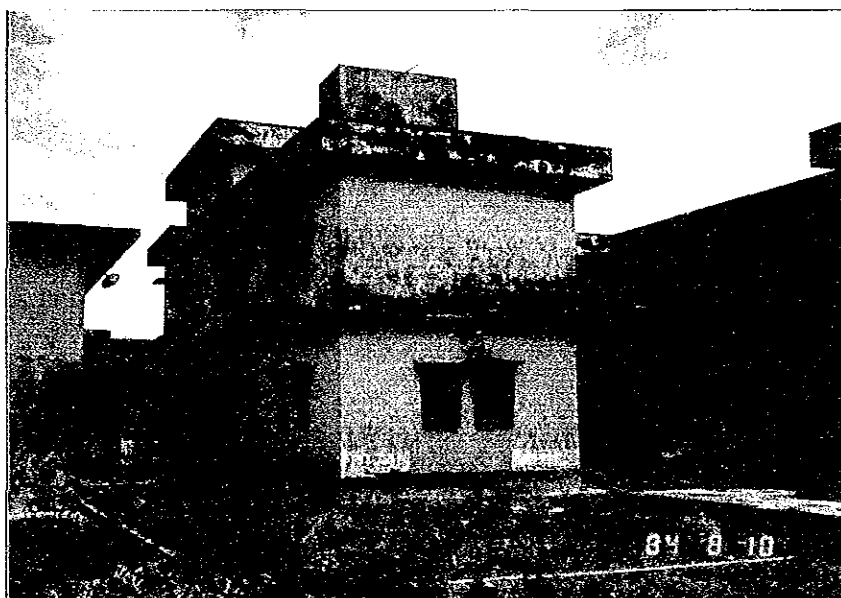
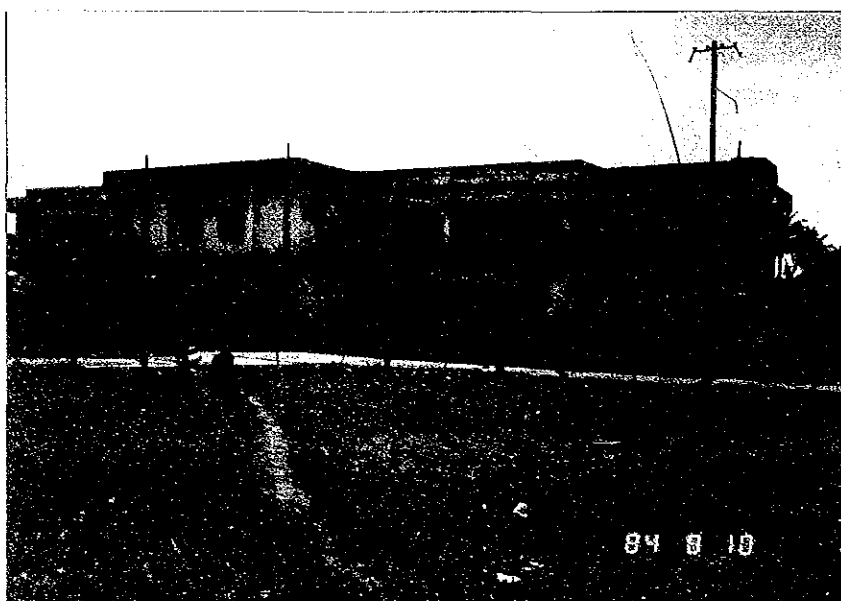




## Appendix

1. Facilities Reference Diagram
  - . Upazila Health Complex new standard design
  - . Upazila Health Complex old standard design
  - . Union Health & Family Welfare Centre
  - . District Hospital standard design
  - . Sivil Surgeon
2. X-ray Protection Standards : W.H.O. Index
3. Bangladesh local meterological data
4. Water quality analysis
5. List of Upazila and District administrative units
6. study record

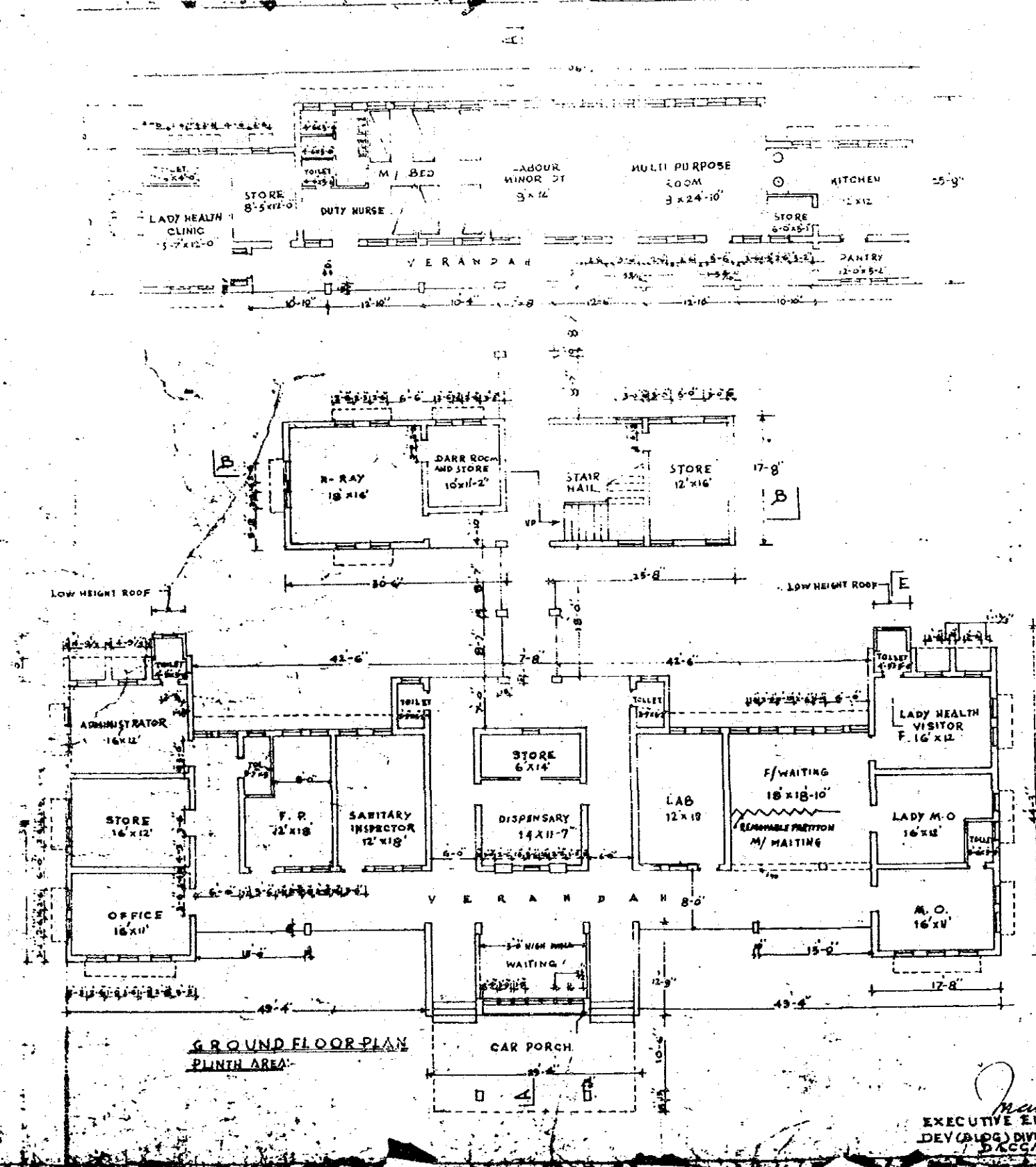




Photograph No 1 Upazila Health Complex (Bhanga)  
(New Standard)

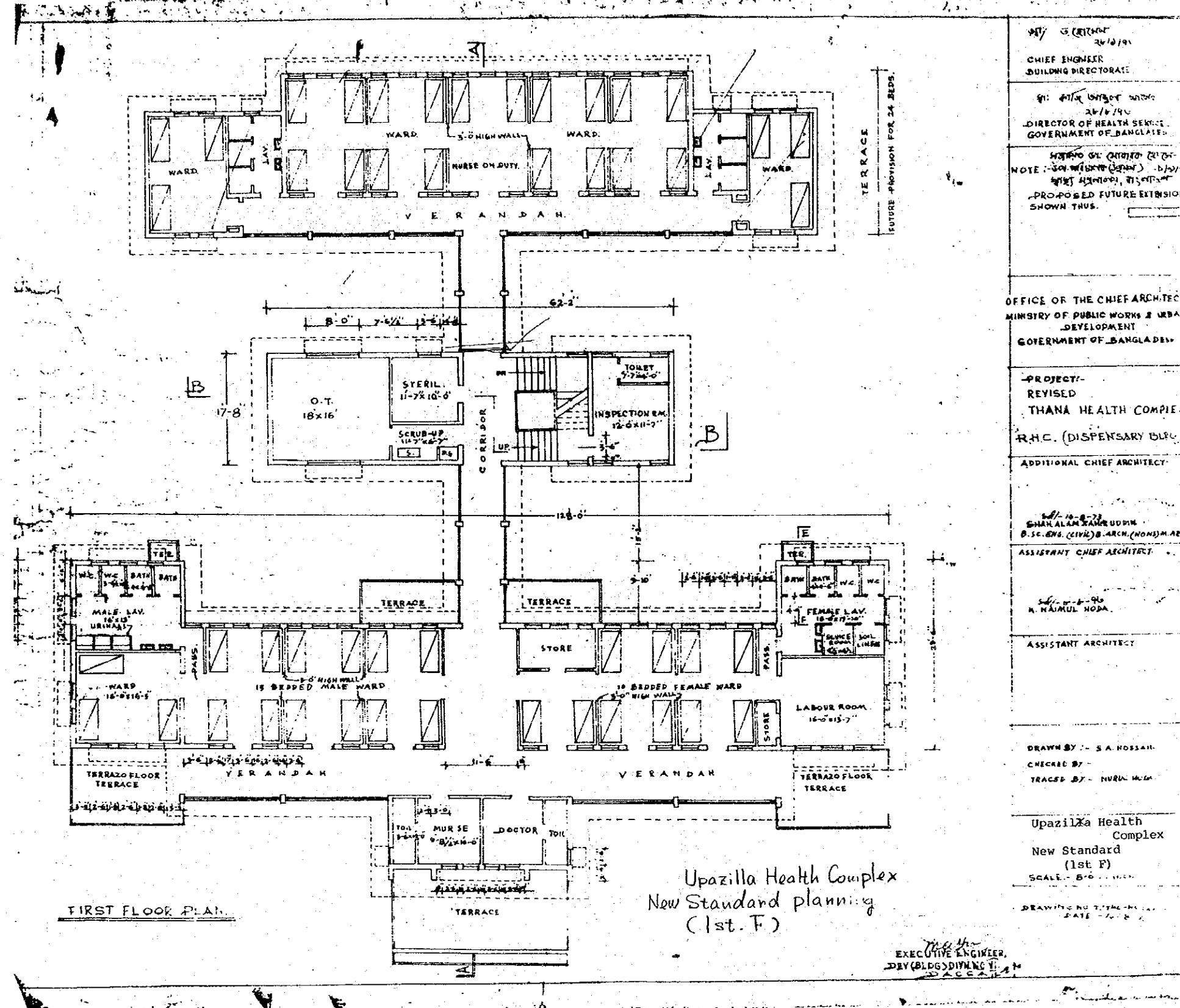
Fig-1 Upazila health Complex new Standard (1)

11/10/77  
 2 PM 2/7  
 11/10/77  
 11/10/77



CHIEF ENGINEER  
 BUILDING DIRECTORATE,  
 GOVERNMENT OF BANGLADESH  
 DIRECTOR OF HEALTH SERVICES  
 GOVERNMENT OF BANGLADESH  
 OFFICE OF THE CHIEF ARCHITECT  
 MINISTRY OF PUBLIC WORKS AND URBAN  
 DEVELOPMENT,  
 GOVERNMENT OF BANGLADESH.  
 REVISED  
 THANA HEALTH COMPLEX  
 R.H.C. (DISPENSARY BLOCK)  
 ADDITIONAL CHIEF ARCHITECT  
 SHAN ALAM ZAHIR UDDIN  
 B.SC. ENGG. (CIVIL) & ARCHITECTURE  
 ASSISTANT CHIEF ARCHITECT  
 K. HAIMUL HODA  
 ASSISTANT ARCHITECT  
 DRAWN BY: A. HOSSAIN  
 CHECKED: M. KHAN  
 TRACED: M. KHAN  
 Upazila Health  
 Complex  
 New Standard  
 (Ground F)  
 SCALE: 8'-0" = 1" INCH  
 DRAWING NO. T/THC-NC/254  
 DATED: 14.8.73  
 EXECUTIVE ENGINEER  
 DEV. (LOG) DIVN. NO. 1  
 D.A.C.C.A.

Fig-2 Upazila health complex new Standard (2)



20/10/90  
CHIEF ENGINEER  
BUILDING DIRECTORATE

20/10/90  
DIRECTOR OF HEALTH SERVICES  
GOVERNMENT OF BANGLADESH

NOTE: 1. 20/10/90  
2. 20/10/90  
3. 20/10/90  
PROPOSED FUTURE EXTENSION  
SHOWN THUS.

OFFICE OF THE CHIEF ARCHITECT  
MINISTRY OF PUBLIC WORKS & URBAN  
DEVELOPMENT  
GOVERNMENT OF BANGLADESH

PROJECT:  
REVISED  
THANA HEALTH COMPLEX  
R.H.C. (DISPENSARY BLDG.)

ADDITIONAL CHIEF ARCHITECT

20/10/90  
SHAH ALAM KHAN UDIN  
B.Sc. Eng. (CIVIL) B. Arch. (HONS) M. Arch.  
ASSISTANT CHIEF ARCHITECT

20/10/90  
M. HANMUL HODA  
ASSISTANT ARCHITECT

DRAWN BY: S. A. HOSSAIN  
CHECKED BY:  
TRACED BY: NURUL HUDA

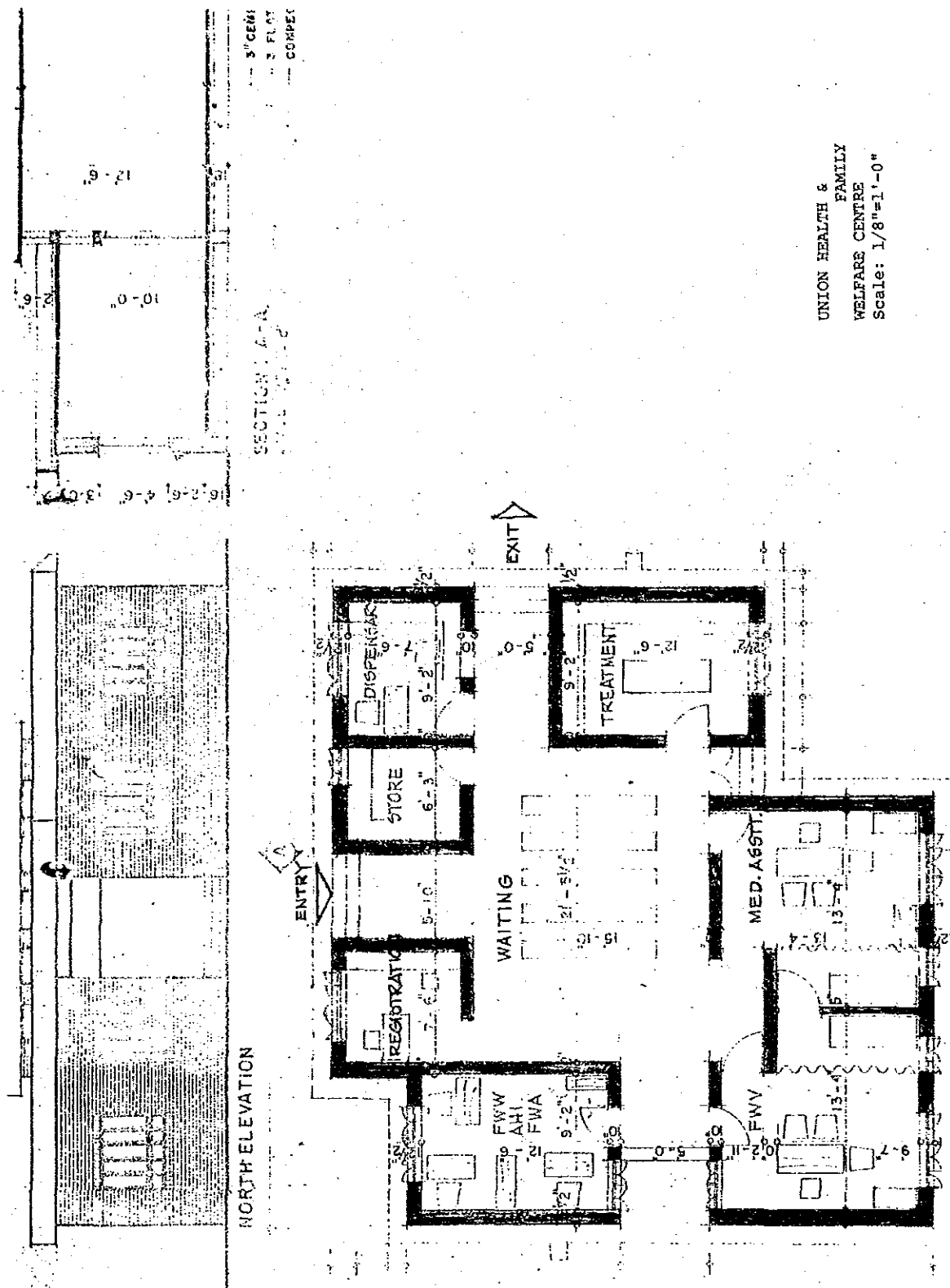
Upazilla Health  
Complex  
New Standard  
(1st F)  
SCALE: 1/8" = 1'-0"

DRAWING NO. T/THC/BLGG/1/90  
DATE: 20/10/90

Architectural drawing of the Upazila Health Complex Old Standard (Ground F). The drawing includes a front elevation at the top and a detailed floor plan below. The floor plan shows various rooms such as the X-Ray room, Medical Office, Health Visitor, and several examination rooms. Dimensions are provided for many of the rooms. The drawing is signed by the Chief Engineer (Building) and the Director of Health Services.

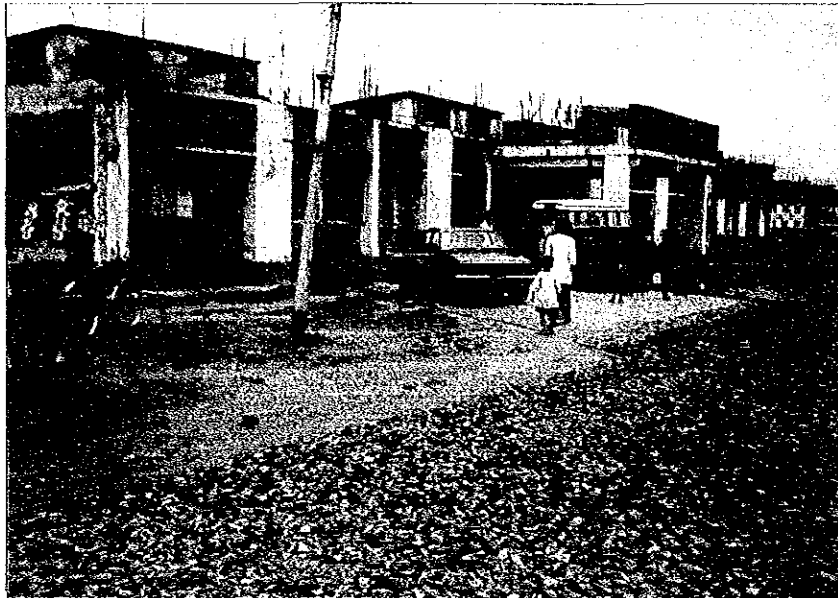


Fig-5 Union Health & Family Welfare Centre







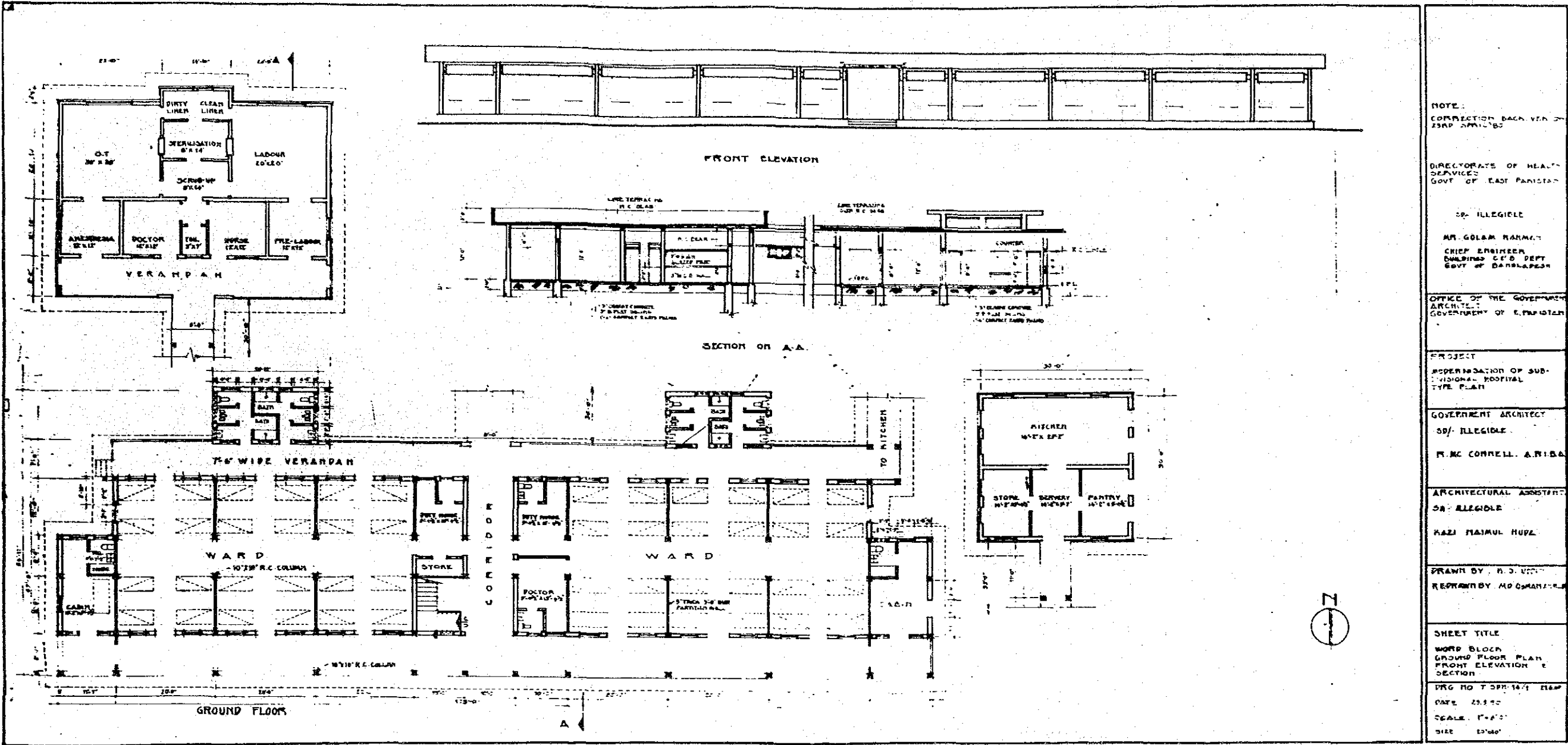


Photograph No2 District Hospital (Tangail)

[illegible]

-83-

Fig-7 District Hospital Standard (2)



District Hospital  
Standard (2)



Photograph No 3 OFFICE of CIVIL SURGEON (Jessore )  
( Standard )



### SUGGESTED LOCAL RULES TO BE DISPLAYED IN RADIOLOGICAL DEPARTMENTS

The following examples of local rules are designed to promote diagnostic radiological safety. They are to be regarded as basic rules, to which others might be added according to the particular circumstances. They should be displayed prominently for the guidance of all staff members.

#### Local rules for X-ray room — radiography only

1. Before making an exposure close the doors of the X-ray room.
2. Do not direct the X-ray beam at the windows of the room or towards the control panel or darkroom wall.
3. During radiography all staff must stand behind the protected control panel and may observe the patient through the lead glass window.
4. Gonad shields must be used on patients whenever appropriate, and the field must be adjusted to the minimum size consistent with adequate clinical diagnosis.
5. When films or patients require support, use *mechanical* supports whenever possible.
6. No patient should wait or change in the X-ray room while another patient is being radiographed.
7. If anyone is ever required to support a patient or film during an exposure, he must:
  - (a) wear a protective apron and gloves and avoid the direct beam by standing to one side away from the X-ray tube,
  - (b) record, in the notebook provided, his name, the date, the number of exposures, and the radiographic technique used.

A copy of these rules must be posted at the control panel of every X-ray room, together with a notebook (suitably ruled for the information required under item 7), which will be inspected during every radiation survey. The rules are a suitable basis for radiological care at level 1 and above. Additions may be necessary for special techniques at level 3 and above and for fractures at level 2.

**Local rules for X-ray room — radiography and fluoroscopy**

1. Before making an exposure close the doors of the X-ray room.
2. Do not direct the X-ray beam at the windows of the room, or towards the control panel or darkroom wall.
3. During radiography or fluoroscopy, all staff must *either* stand in the protective cubicle, observing through the lead glass window, or wear protective aprons, keeping well away from the patient when not specifically required to come close. Protective gloves must be worn when handling the patient during fluoroscopy.
4. In conventional fluoroscopy the current must not exceed 4 mA at 100 kV. With image intensifiers the current should not exceed 1 mA at 100 kV. Examination time and field size should be kept to a minimum consistent with adequate clinical diagnosis.
5. Gonad shields must be used on patients whenever appropriate.
6. If films or patients require support, use *mechanical* supports whenever possible.
7. No patient should wait or change in the X-ray room while another patient is being radiographed.
8. If anyone is ever required to support a patient or film during an exposure he must:
  - (a) wear a protective apron and gloves and avoid the direct beam by standing to one side and away from the X-ray tube,
  - (b) record, in the notebook provided, his name, the date, the number of exposures, and the radiographic technique used.

A copy of these rules must be posted at the control panel of every X-ray room, together with a notebook (suitably ruled for the information required under item 8), which will be inspected during every radiation survey. The rules are intended as a basis for radiology at level 2 and above.



2 — 3 X-ray Protection Standard (W.H.O index)

TABLE 1. PROTECTIVE BARRIERS AGAINST PRIMARY RADIATION FOR DIAGNOSTIC X-RAY INSTALLATIONS

Maximum tube voltage (kV)	Distance from target (m)	Barrier thickness	
		lead (mm)	concrete of density 2.35 g/cm <sup>3</sup> (mm)
100	2	1.8	150
	3	1.6	130
	5	1.2	100
125	2	2.1	170
	3	1.8	150
	5	1.3	110
150	2	2.2	190
	3	1.9	170
	5	1.4	130

The values given in the table are suitable for a workload not exceeding 150 mA min per week of radiography and should reduce the exposure at the stated distance to 10 mR in a week.

TABLE 2. PROTECTIVE BARRIERS AGAINST SECONDARY RADIATION ARISING FROM FLUOROSCOPY, WITHOUT RADIOGRAPHY

Maximum tube voltage (kV)	Distance from target (m)	Barrier thickness	
		lead (mm)	concrete of density 2.35 g/cm <sup>3</sup> (mm)
85	1	1.2	130
	2	1.0	105
	3	0.8	85
100	1	1.35	110
	2	1.05	90
	3	0.85	70
125	1	1.4	110
	2	1.1	90
	3	0.9	70

These values are suitable only for existing installations where the primary beam is trapped by the lead protection of the fluorescent screen or intensifier. For new installations and where radiography is possible the room shielding must be designed for primary radiation (see Table 1). This table is intended for fluoroscopy workloads not exceeding 300 mA min per week and a maximum permissible level of 10 mR in a week.

## 2 — 4 X-ray Protection Standard (W.H.O index)

## ANNEX 4

TABLE 3. SHIELDING FOR UNEXPOSED X-RAY FILMS

Storage time	Lead shielding thickness required at following distances from X-ray tube to stored film		
	2 m (mm lead)	3 m (mm lead)	6 m (mm lead)
1 day	2.7	2.5	2.0
1 week	3.4	3.1	2.6
1 month	3.8	3.6	3.1

The values given in the table assume a workload of less than 400 mA min per week at 125 kV. For other shielding materials the lead equivalents are given in Table 4.

TABLE 4. APPROXIMATE LEAD EQUIVALENT THICKNESSES OF VARIOUS MATERIALS, ASSUMING BROAD-BEAM CONDITIONS

Material	Density (g/cm <sup>3</sup> )	Material thickness in millimetres									
		50 kV		100 kV				150 kV			
Lead thickness (mm)		0.5	1.0	0.5	1.0	2.0	3.0	0.5	1.0	2.0	3.0
Brick *	1.8	100	200	70	120	195	260	85	150	260	340
Hollow brick *	1.4	135	280	100	165	270	360	115	200	350	490
Concrete *	2.2	62	130	44	80	140	190	60	105	180	250
Barium concrete *	3.2	15	31	4	9	17	24	7	15	33	51
Steel *	7.9	3	6.5	3.2	6.4	13	—	6.6	14	28	—
Air entrained concrete *	0.63	230	480	145	270	470	—	190	340	600	—
Gypsum *	0.84	140	290	110	200	—	—	140	270	—	—
Brick (yellow stock)	1.6	85	150	65	110	195	280	70	124	230	330
Barium plaster (gypsum base)	2.0	16	—	5	9	16	24	7	15	30	45
Clinker concrete	1.2	—	—	—	—	—	—	75	140	240	350
Brass	8.3	3.1	5.4	2.1	3.7	6	—	—	—	—	—
Plate glass	—	—	—	40	78	—	—	—	—	—	—

\* Extracted from: German Standards Commission (1974) *Medizinische Röntgenanlagen bis 300 kV: Strahlenschutzregeln für die Errichtung* [Medical X-ray equipment up to 300 kV: radiation protection rules for installation], Berlin (DIN 6812).

TABLE 5. APPROXIMATE TENTH-VALUE THICKNESSES OF VARIOUS MATERIALS UNDER BROAD-BEAM CONDITIONS

Material	Density (g/cm <sup>3</sup> )	Tenth value thickness in millimetres at		
		50 kV	100 kV	150 kV
Lead	11.3	0.18	0.84	0.96
Concrete	2.35	13	55	70
Concrete	2.2	22	68	101
Brick	1.8	36	104	145
Hollow brick	1.4	49	144	193
Barium concrete	3.2	5.4	7	14
Steel	7.9	1.0	5.4	13
Air entrained concrete	0.63	76	230	328
Gypsum	0.84	45	172	260

The tenth value thickness is the thickness of material that reduces the dose to one tenth of its value. The figures are calculated (partly extrapolated) from data in: German Standards Commission (1974) *Medizinische Röntgenanlagen bis 300 kV: Strahlenschutzregeln für die Errichtung* [Medical X-ray equipment up to 300 kV: radiation protection rules for installation], Berlin (DIN 6812); and International Commission on Radiological Protection (1973) *Data for protection against ionizing radiation from external sources: supplement to ICRP publication 15*, Oxford, Pergamon (ICRP publication 21).

## Monthly normal temperature, humidity

Station	January						February					
	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain- fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain- fall in inches
			00:00 GMT	03:00 GMT	12:00 GMT				00:00 GMT	03:00 GMT	12:00 GMT	
Chittagong	78.7	56.8	93	78	68	0.41	81.5	60.5	92	75	69	0.30
Cox's Bazar	79.8	56.1	—	71	68	0.42	82.1	50.7	—	70	68	0.48
Sylhet	77.1	55.0	93	78	67	0.94	80.3	57.1	88	75	57	1.65
Srimangal	78.5	47.4	96	86	75	0.43	82.2	52.3	95	80	62	1.29
Rangamati	79.7	50.3	99	84	59	0.57	84.1	55.2	95	75	50	2.43
Majdee Court	78.2	55.3	92	76	67	0.83	82.3	60.4	91	75	52	0.59
Comilla	79.5	53.8	95	80	64	0.41	83.0	58.5	94	75	54	1.73
Brahmanbaria	78.4	54.1	93	77	66	0.40	82.5	47.7	91	72	56	0.97
Dhaka	77.9	53.1	93	74	61	0.70	82.5	56.1	90	65	48	1.23
Narayanganj	79.5	55.9	91	75	60	0.56	83.1	60.3	88	71	52	1.12
Mymensingh	77.5	52.7	89	82	62	0.45	81.7	56.7	87	77	54	0.72
Faridpur	75.7	52.8	94	80	65	0.50	80.9	56.7	92	74	60	1.04
Khulna	79.3	56.4	90	73	62	0.47	84.1	60.5	91	71	55	0.66
Barisal	78.7	56.5	89	76	60	0.60	82.9	61.3	90	74	56	0.73
Jessore	77.9	50.6	92	81	67	0.54	83.2	55.5	92	77	59	0.85
Satkhira	79.8	53.5	91	77	62	0.61	84.2	58.6	90	74	58	0.77
Rangpur	75.9	51.9	92	83	67	0.49	80.6	55.1	89	75	54	0.58
Dinajpur	76.9	58.4	92	80	59	0.40	81.0	54.0	86	70	48	0.52
Pabna	78.3	52.7	91	77	68	0.43	82.9	56.7	89	71	55	0.81
Serajganj	76.8	53.5	94	77	76	0.53	82.4	56.2	90	69	60	0.66
Bogra	77.0	52.8	—	78	59	0.54	81.7	55.7	—	72	48	0.65

2.6—contd.

Station	May						June					
	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain- fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain- fall in inches
			00:00 GMT	03:00 GMT	12:00 GMT				00:00 GMT	03:00 GMT	12:00 GMT	
Chittagong	89.7	76.9	93	77	79	11.17	87.9	77.4	93	83	85	22.41
Cox's Bazar	90.0	76.6	—	76	79	11.52	86.8	76.8	—	85	86	30.34
Sylhet	87.9	72.3	93	84	79	27.41	87.5	76.3	96	85	82	53.93
Srimangal	90.0	73.8	93	81	77	17.26	89.3	76.0	94	87	85	20.36
Rangamati	94.5	76.1	89	71	67	8.53	89.7	76.3	93	81	82	16.51
Majdee Court	89.7	77.9	89	77	76	12.96	87.2	77.8	92	85	83	28.27
Comilla	91.1	76.4	92	79	75	12.45	88.3	77.8	94	84	83	18.84
Brahmanbaria	91.3	75.0	91	78	75	11.16	89.2	76.7	93	84	84	14.60
Dhaka	92.7	77.7	98	78	75	7.65	89.1	78.6	95	84	81	12.67
Narayanganj	91.7	76.9	89	76	74	9.47	89.9	78.5	91	82	80	13.71
Mymensingh	90.3	74.1	90	82	74	12.32	88.3	76.9	93	87	82	17.84
Faridpur	91.5	75.6	93	77	75	10.66	88.9	77.5	95	85	84	13.58
Khulna	93.4	77.8	93	78	74	7.25	90.8	78.9	94	83	82	12.20
Barisal	92.1	78.2	91	74	74	9.16	89.4	78.8	92	83	82	16.58
Jessore	95.0	76.6	91	79	71	7.44	91.3	78.0	95	85	82	10.81
Satkhira	95.3	77.9	90	76	70	7.40	91.8	78.7	93	84	79	11.59
Rangpur	92.5	74.4	90	78	65	11.93	89.5	76.3	95	86	81	20.44
Dinajpur	92.8	74.6	85	76	63	7.37	90.0	77.4	92	84	77	13.61
Pabna	95.2	76.3	91	79	61	7.12	91.8	78.0	95	85	81	11.52
Serajganj	92.5	76.2	93	80	71	9.27	88.9	77.9	96	87	86	12.98
Bogra	92.9	75.2	—	78	67	7.68	90.3	77.8	—	86	82	13.00

## 3 — 2 Bangladesh local meteorological data

and rainfall by station.

March						April					
Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain- fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain- fall in inches
		00.00 GMT	03.00 GMT	12.00 GMT				00.00 GMT	03.00 GMT	12.00 GMT	
86.8	68.3	91	78	73	3.50	89.6	74.3	91	75	76	2.67
86.8	67.2	—	73	73	1.27	89.5	74.0	—	73	75	3.15
87.1	63.4	83	63	51	2.60	91.1	71.2	87	70	63	7.57
89.7	61.9	93	75	57	3.29	92.3	69.8	92	76	65	9.00
88.7	62.3	95	69	51	3.09	95.2	72.9	91	68	53	0.22
88.1	67.4	89	72	61	2.11	90.7	75.6	90	73	69	3.51
90.6	67.5	93	74	55	2.07	92.4	73.8	93	75	65	6.24
89.9	66.3	89	72	53	2.75	93.3	72.6	91	73	62	5.55
90.5	65.9	88	64	44	2.29	95.1	74.2	91	70	54	4.04
91.1	68.8	85	69	45	1.81	93.0	74.2	85	73	62	6.46
89.8	64.6	86	73	49	1.66	93.0	71.5	88	76	56	5.30
90.4	64.6	89	68	49	1.43	94.0	73.1	90	73	58	5.04
91.9	69.1	91	73	53	1.35	94.2	75.5	93	76	65	3.56
90.5	69.8	90	74	56	1.49	93.0	75.7	91	74	66	3.94
92.3	65.2	90	72	52	1.36	96.6	73.6	91	75	57	3.47
93.0	68.4	92	74	53	1.40	96.3	75.3	91	75	61	2.60
88.1	61.4	82	60	42	0.89	94.6	71.3	83	67	47	3.31
92.2	61.7	78	57	36	0.63	96.0	69.9	75	60	39	1.86
92.2	64.7	86	67	44	1.39	97.4	72.7	87	71	41	2.17
90.1	64.5	89	64	50	1.45	96.4	72.4	89	68	50	3.44
91.4	63.3	—	63	37	1.07	96.4	71.7	—	67	42	2.49

July						August					
Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain- fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain- fall in inches
		00.00 GMT	03.00 GMT	12.00 GMT				00.00 GMT	03.00 GMT	12.00 GMT	
86.9	76.7	94	84	86	24.57	86.4	76.6	95	85	86	22.23
85.5	76.5	—	88	88	36.75	85.5	76.4	—	89	88	30.71
88.1	77.6	97	86	83	23.37	88.9	77.6	95	85	84	20.91
89.7	76.3	94	87	85	13.26	89.3	76.6	95	88	86	13.52
87.7	76.5	95	86	89	26.75	88.8	76.9	95	81	85	15.65
85.9	77.8	93	87	83	25.32	86.4	78.1	93	87	84	22.15
87.6	77.6	94	86	84	15.91	87.9	77.6	95	86	83	16.43
88.5	77.6	92	83	83	12.01	88.6	77.9	92	84	82	11.58
87.3	78.8	95	87	82	17.20	87.9	79.1	94	86	83	12.00
88.5	79.0	91	84	80	13.66	88.6	79.1	90	83	79	14.36
88.4	78.2	94	87	81	14.82	88.5	78.1	94	88	81	15.97
87.2	78.2	96	87	85	13.31	87.2	78.9	93	86	84	12.30
88.1	79.1	95	86	84	14.95	88.4	79.0	95	85	84	11.76
87.1	78.5	94	87	83	18.54	87.5	78.5	94	85	83	17.03
88.5	78.1	96	86	86	12.38	88.9	78.2	96	88	87	12.09
88.6	78.6	96	87	84	14.05	88.6	78.4	95	88	84	12.33
89.2	79.0	95	85	81	16.96	89.1	79.3	95	86	82	13.67
88.9	78.8	93	86	79	15.35	89.3	78.7	93	85	80	13.93
89.3	78.7	96	86	85	10.52	89.2	79.1	95	85	84	11.37
87.3	78.9	95	87	85	12.29	87.4	79.5	94	86	86	12.64
88.6	79.0	—	86	81	12.50	88.8	78.9	—	87	82	13.80

## 3 - 3 Bangladesh local meteorological data

2.6—contd.

Monthly normal temperature, humidity and rainfall by station.

(Station)	September						October					
	Max. Temp. °F	Mini. Temp. °F	Relative Humidity %			Rain- fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain- fall in inches
			00-00 GMT	03-00 GMT	12-00 GMT				00-00 GMT	03-00 GMT	12-00 GMT	
Chittagong	87.7	77.0	95	83	85	12.04	87.4	74.6	96	82	82	11.45
Cox's Bazar	86.6	76.3	—	85	85	17.45	87.6	74.4	—	78	80	10.83
Sylhet	87.5	76.3	95	86	85	25.80	86.4	72.4	96	85	84	10.80
Srimangal	89.6	76.0	96	87	87	11.01	87.9	71.0	95	85	88	7.57
Rangamati	88.7	76.3	97	83	87	11.09	88.3	74.7	97	85	83	10.45
Maijdee Court	87.3	77.9	93	85	82	17.52	87.1	75.6	95	82	81	10.04
Comilla	88.9	75.5	95	84	82	13.27	88.1	74.6	86	80	80	8.89
Brahmanbaria	89.3	87.1	92	83	82	9.05	88.0	75.3	93	79	81	6.89
Dhaka	88.2	87.5	95	84	83	9.28	87.7	74.7	95	78	79	6.64
Narayanganj	89.7	79.2	90	81	79	9.57	89.4	75.9	92	76	75	5.78
Mymensingh	88.8	77.8	94	85	82	13.42	87.5	74.1	93	83	79	7.81
Faridpur	88.1	78.7	94	83	83	9.64	87.3	74.7	95	79	81	7.09
Khulna	89.2	78.7	95	83	83	8.78	88.2	75.6	94	78	78	6.01
Barisal	88.6	78.6	94	83	82	12.27	88.2	75.8	94	79	77	7.72
Jessore	89.8	77.6	96	87	86	7.40	88.9	73.1	95	84	83	5.35
Satkhira	89.4	78.1	95	84	84	9.14	89.3	74.5	96	80	80	5.84
Rangpur	89.0	78.2	95	84	82	12.03	87.4	72.8	93	83	77	6.53
Dinajpur	89.6	77.8	92	84	81	11.81	88.4	72.2	93	80	75	5.41
Pabna	90.2	78.6	95	84	85	9.24	89.4	74.0	95	79	81	6.64
Sirajganj	88.2	78.8	94	85	85	9.36	87.4	74.7	95	80	84	5.86
Bogra	89.4	78.5	—	85	82	10.83	87.8	73.8	—	81	76	7.07

2.6—concl'd.

(Station)	November						December					
	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain- fall in inches	Max. Temp. °F	Mini. Temp. °F	Relative Hum. %			Rain- fall in inches
			00-00 GMT	03-00 GMT	12-00 GMT				00-00 GMT	03-00 GMT	12-00 GMT	
Chittagong	84.5	65.9	95	79	76	1.97	79.4	59.7	95	83	73	0.41
Cox's Bazar	85.0	66.9	—	75	71	2.49	86.0	59.9	—	74	70	1.29
Sylhet	83.7	62.8	93	74	75	0.28	79.5	57.4	95	79	73	0.22
Srimangal	84.0	59.8	96	84	86	1.69	79.6	50.8	97	87	83	0.12
Rangamati	84.1	61.9	99	90	69	0.84	80.7	56.1	99	91	67	0.93
Maijdee Court	82.8	66.0	93	76	79	1.80	79.2	57.9	93	77	73	0.01
Comilla	84.6	65.0	95	77	75	1.77	80.3	56.8	95	80	70	0.10
Brahmanbaria	84.2	66.3	93	76	76	1.33	79.8	57.8	94	79	72	0.11
Dhaka	83.6	63.6	94	73	71	1.00	79.3	54.9	95	78	70	0.09
Narayanganj	85.6	66.6	91	73	69	1.21	80.9	58.6	91	76	66	0.08
Mymensingh	83.9	64.6	90	81	73	0.66	79.7	56.3	91	84	67	0.10
Faridpur	82.4	64.4	94	77	76	1.15	77.3	55.7	94	80	75	0.07
Khulna	84.2	66.2	91	72	69	1.28	80.0	58.4	91	72	67	0.09
Barisal	84.0	66.7	91	75	69	1.63	79.6	58.7	89	78	64	0.13
Jessore	84.4	61.5	95	80	74	0.88	79.7	52.3	93	82	74	0.06
Satkhira	84.5	63.6	93	75	70	1.23	80.2	55.6	92	77	66	0.09
Rangpur	83.5	61.7	93	80	74	0.44	77.9	55.5	94	86	77	0.08
Dinajpur	84.0	60.8	91	74	68	0.45	78.9	52.9	82	77	64	0.04
Pabna	84.8	63.3	94	75	76	0.74	79.8	55.1	95	76	75	0.06
Sirajganj	83.3	63.9	95	76	82	0.32	79.5	56.9	95	77	80	0.02
Bogra	83.5	63.5	—	78	69	0.53	78.5	55.6	—	79	65	0.08

Note : Based on data for 1931-1960

Source : Bangladesh Meteorological Department.

# Water Quality Test Report

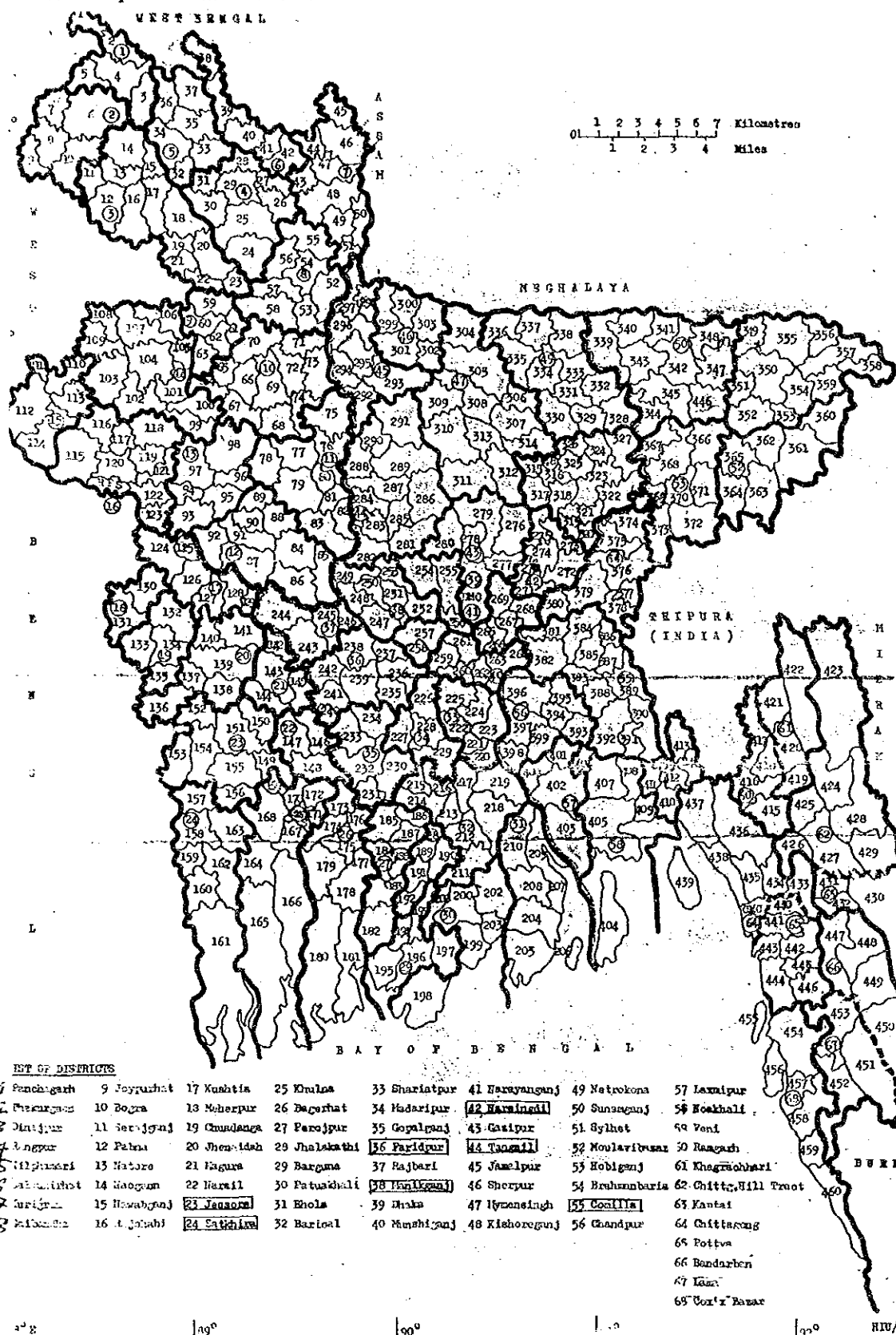
September 10, 1984

- . Sample collection date : August 10, 1984
- . Water sample source : Bhanga, Bangladesh
- . Analyst : Nihon Haisui Giken (Ltd.)

## \* Analysis Result

Test Items	Unit	Water Sample	dard	Japanese stan- of water work
p.H		7.8 at 30°C		6.8 - 8.6
Electric conductivity	µs/cm	-		
Overall hardness	ppm	610		50 - 60
Ca, "	"	170		15 - 20
Mg, "	"	46		10 - 15
Total salt content	"	34		15 - 30
Chloramine	"	-		
Sulfuricion	"	-		
Nitricacidion	"	-		
Na, ion	"	-		
K, "	"	-		
Total, "	"	non		0.03 or less
Manganese, Ma	"	-		
Copper, Cu	"	-		
Lead, Pb	"	-		
Sillica, Si	"	-		
Florine, F	"	-		
Aluminum, Al	"	-		
Evaporation Deposit	"	540		60 - 100

## 5 List of Upazila and District administrative units



## 5 - 1 Reference data

District	Population in 000 1983	Medical College Hospital No./Bed	District Hospital No./Bed	Upazila Health Complex Hospital No./Bed	Other Hospitals No./Bed	Total Hospitals No./Bed	Union Sub-Centers (Rural) (Type/Rural) (Type/Rural)	Urban Dispensaries	School Health Clinics	T/3 Clinics	Total Stat. Health Care Facilities
1 Panchagarh	621		1/20	4/10	-	5/30	16	-	-	-	21
2 Thakurgaon	880		1/50	3/20	-	4/70	13	-	-	1	14
3 Dinajpur	1958		1/100	10/60	-	11/160	29	1	1	1	32
4 Rangpur	1841	1/630	-	6/35	1/20	8/235	39	-	1	1	41
5 Nilphamari	1246		1/50	5/80	1/20	7/150	22	-	1	-	23
6 Lalmonirhat	806		1/31	3/20	-	4/51	12	-	-	-	12
7 Kurigram	1429		1/50	7/45	-	8/95	13	-	-	1	14
8 Gaibandha	1672		1/50	4/30	-	5/80	33	-	-	1	34
9 Joypurhat	667		1/30	3/35	-	4/65	12	-	-	-	12
10 Bogra	2272		1/100	9/137	1/20	11/237	40	-	1	1	42
11 Serajganj	2621		1/100	6/55	-	7/155	25	-	-	1	26
12 Pabna	1688		1/100	7/71	2/420	10/591	12	-	1	1	14
13 Natore	1152		1/50	4/41	-	5/91	10	1	-	1	12
14 Naogaon	1864		1/50	9/92	-	10/142	40	-	-	-	40
15 Nawabganj	1013		1/50	4/41	-	5/91	19	-	-	1	20
16 Rajshahi	1665	1/650	-	8/85	2/170	11/905	33	1	1	1	36
Total											
17 Kushtia	1335		1/100	5/155	-	6/255	23	-	1	1	25
18 Meherpur	471		1/50	1/31	-	2/81	8	-	-	1	9
19 Chuadanga	704		1/50	3/93	-	4/143	15	-	-	1	16
20 Jhenaidaha	1207		1/50	5/55	-	6/105	16	-	-	-	16
21 Magura	662		1/50	2/62	-	3/112	10	-	-	1	11
22 Narail	639		1/20	2/62	-	3/82	10	-	-	-	10
23 Jessore	1838		1/100	6/186	1/20	8/306	22	-	1	1	24
24 Satkhira	1481		1/50	5/45	-	6/95	8	-	-	1	9
25 Khulna	1917		1/148	6/101	2/120	9/369	12	5	1	1	19
26 Bagerhat	1328		1/50	6/86	-	7/136	6	-	-	1	7
27 Pirojpur	1177		1/50	6/154	-	7/204	7	-	-	1	8
28 Jhalakathi	639		1/50	4/66	-	5/116	5	-	-	-	5
29 Barguna	769		1/30	3/51	-	4/81	8	-	-	-	8
30 Patuakhali	1220		1/100	4/50	-	5/150	12	-	-	1	13
31 Bhola	1235		1/50	6/86	-	7/136	6	-	-	1	7
32 Barisal	1997	1/500	1/120	7/108	1/20	10/728	31	-	1	1	33
Total:											



## 5 - 2 Reference data

District	Population in 000 (1985)	Medical College Hospitals No/Bed	District Hospitals No/Bed	Lepra Hospitals No/Bed	Other Hospitals No/Bed	Total Hospitals No/Bed	Union Sub-centre (HWC/Small Dispensary)	Urban Dispensary	School Health Clinics	TB Clinics	Total State Health Care facilities
33 Shariatpur	919	-	-	5/51	-	5/51	18	-	-	-	28
34 Nadaripur	1022	-	1/50	3/93	-	4/143	13	-	-	1	18
35 Gopalganj	1065	-	1/50	4/124	-	5/174	22	-	-	1	23
36 Faridpur	1360	-	1/100	5/155	1/20	7/275	28	-	1	1	30
37 Rajbari	789	-	1/50	3/93	-	4/143	22	-	-	-	24
38 Manikganj	1157	-	1/50	4/62	-	5/112	22	-	-	-	24
39 Dhaka	4727	2/1470	-	4/93	8/1575	14/1768	17	20	6	2	57
40 Munshiganj	1164	-	1/50	5/55	-	6/105	22	-	-	1	23
41 Narayanganj	1288	-	1/25	3/93	-	4/118	11	-	-	-	12
42 Narsingdi	1452	-	1/50	2/31	-	3/81	12	-	-	-	12
43 Gazi pur	1177	-	1/31	4/93	-	5/124	11	-	-	-	12
44 Tangail	2643	-	1/100	6/122	-	7/222	63	-	1	1	65
45 Jamalpur	1610	-	1/100	5/113	-	6/213	30	-	-	1	31
46 Sherpur	1036	-	1/31	3/41	-	4/72	9	-	-	1	10
47 Mymensingh	2321	1/646	-	8/248	-	9/294	26	-	1	-	27
48 Kishoreganj	2047	-	1/50	10/237	-	11/287	16	-	-	1	17
49 Netrokona	1709	-	1/50	8/186	-	9/236	20	-	-	-	20
Total											
50 Sunamganj	1516	-	1/50	7/186	-	8/236	10	-	-	1	11
51 Sylhet	1967	1/500	-	8/201	3/156	11/357	25	-	1	1	27
52 Moulavibazar	1267	-	1/50	5/123	-	6/173	16	-	-	1	17
53 Habiganj	1380	-	1/50	6/124	-	7/174	10	-	-	-	10
54 Brahmanbaria	1869	-	1/50	6/113	1/20	8/183	25	-	-	1	26
55 Comilla	2629	-	1/110	10/289	-	11/409	45	-	1	1	47
56 Chandpur	1942	-	1/50	4/103	-	5/153	20	-	-	1	21
57 Laxmipur	1226	-	1/31	3/51	-	4/82	16	-	-	-	16
58 Noakhali	1936	-	1/160	4/72	-	5/232	28	-	1	1	30
59 Feni	963	-	1/50	3/66	1/20	5/136	19	-	1	1	21
60 Rangarh	139	-	1/10	1/10	-	2/20	5	-	-	-	5
61 Khagrachhari	166	-	1/70	2/20	-	3/90	3	-	-	-	3
62 Chittg. Hill Tract	262	-	1/100	6/40	-	7/140	9	-	1	1	11
63 Kaptai	77	-	-	2/20	-	2/20	2	-	-	-	2
64 Chittagong	3254	1/795	-	8/185	2/120	11/305	46	7	1	1	55
65 Pottyn	1596	-	-	5/155	-	5/155	31	-	-	-	31
66 Bandarban	83	-	1/20	1/10	-	2/30	1	-	-	-	1
67 Loma	102	-	-	1/10	-	1/10	-	-	-	-	1
68 Cox's Bazar	1109	-	1/50	4/124	-	5/174	13	-	-	1	14
Total:		8-5:11		4-124							
Grand Total	74205	8/5211	58/1357	352/6182	27/2721	422/4763	1275	25	23	46	17071

5 - 3 Reference data

LIST OF UPDATES

1 Tentulia	67 Kandiyan	123 Damarhuda	199 Golachupa	265 Harnyanang(S)	331 Appara	397 Chandpur(S)
2 Panchagari(S)	68 Shergar	134 Chuananga(S)	200 Patakhaid(S)	266 Bandar	332 Kharagaj	398 Gachar
3 Dabiganj	69 Boyra(S)	135 Jibhagar	201 Harnaganj	267 <u>Sekharaga</u>	333 Barhatta	399 Faridganj
4 Boda	70 Shibganj	136 Hachapur	202 Daupha	268 Arsiharar	334 Hetrokoma(S)	400 Tairpur
5 Akari	71 Satala	137 Kotechandpur	203 Barhaya	269 Barwanj	335 Furbachala	401 Rangonj
6 Thakurgaon(S)	72 Gaitali	138 Kaliganj	204 Lalulaha	270 Palash	336 Dhebra	402 Laxmipur(S)
7 Chaldaganj	73 Sarinkandi	139 Chencidha(S)	205 Charfession	271 Harsingdi(S)	337 Durgapur	403 Rangonj
8 Benibankhail	74 Bhupat	140 Karinkunda	206 Kumpura	272 <u>Rajmura</u>	338 Kalukunda	404 Katiya
9 Haripur	75 Kucipur	141 Sallakona	207 Rajuonadin	273 Dalaboo	339 Chornapacha	405 Sadharan(S)
10 Parganj	76 Saraganj(S)	142 Sroopur	208 Aradindin	274 Sibpur	340 Tachpur	406 Chakhal
11 Beshaganj	77 Raiganj	143 Mugura(S)	209 Daulatkhani	275 <u>Honohori</u>	341 Miswanbarpur	407 Duganganj
12 Birel	78 Tarash	144 Salika	210 <u>Rajin(S)</u>	276 <u>Kanasia</u>	342 Sunaganj(S)	408 Sgatas
13 Kharol	79 Ulepara	145 <u>Behanagar</u>	211 Bokenanj	277 Kaliganj	343 Janaganj	409 Chauranganj
14 Barga	80 Kana-Khandi	146 Lohagara	212 Barisal(S)	278 Oatipur(S)	344 Salla	410 Sonagaji
15 Kacnara	81 Polkuchi	147 Harvil(S)	213 Bahugonj	279 Sroopur	345 Boorai	411 Deganbhaya
16 Chakpur(S)	82 Chumali	148 <u>Kalia</u>	214 <u>Khatipur</u>	280 <u>Kalikhatir</u>	346 Jagannathpur	412 Feni(S)
17 Chiribandar	83 Shahadpur	149 <u>Abhoyagar</u>	215 <u>Kourchadi</u>	281 Hirsapur	347 Chhatk	413 Parsura
18 Parbatipur	84 Sathia	150 Bagerpara	216 Agailghara	282 Jagarpur	348 Barabazar	414 <u>Chayachaya</u>
19 Fulbari	85 Dora	151 Jossore(S)	217 Haladi	283 Daiduar	349 Goponiganj	415 Hanikohari
20 <u>Haribhag</u>	86 Sujanagar	152 Chougacha	218 Mohandiganj	284 Tanail(S)	350 Sylhet(S)	416 Rangpur(S)
21 <u>Haripur</u>	87 Panna(S)	153 Saroa	219 <u>Higla</u>	285 Basail	351 Dismantha	417 Kataranga
22 <u>Chorikhat</u>	88 Paridpur	154 <u>Chikaragacha</u>	220 Goshairhat	286 Sakhipur	352 Balaganj	418 <u>Lamichhari</u>
23 Barga	89 Bagera	155 <u>Khatimur</u>	221 Dandhya	287 <u>Kalibatti</u>	353 Fenchaganj	419 Kahlakhari
24 <u>Chhapur</u>	90 Chetnagar	156 <u>Kashabagar</u>	222 Sharitpur(S)	288 Chupur	354 Golaganj	420 Kharagchhari(S)
25 Pirgachha	91 Atghoria	157 <u>Kolaria</u>	223 Chetarganj	289 <u>Chattail</u>	355 Gouinghat	421 Panohari
26 Konia	92 <u>Isarai</u>	158 Sathira(S)	224 Haria	290 <u>Gosainpur</u>	356 Jaitapur	422 <u>Dighala</u>
27 Gangachara	93 Kalpur	159 Dobhata	225 <u>Janira</u>	291 <u>Chhuhura</u>	357 Khatigat	423 Dajitohari
28 Rangpur(S)	94 Dagaipara	160 Kaliganj	226 Shitbar	292 Barisabari	358 Zekiganj	424 Langada
29 Chakiganj	95 Baraigra	161 Shyamagar	227 Rajoir	293 Janalpur(S)	359 <u>Ranathagar</u>	425 Manarchar
30 <u>Taraganj</u>	96 Garudachpur	162 Akrassuni	228 Madaripur(S)	294 Madaganj	360 Parlotha	426 Lowkhali
31 <u>Saidpur</u>	97 <u>Natore(S)</u>	163 <u>Tala</u>	229 <u>Kalikit</u>	295 Holisidha	361 Kulaura	427 Rangmati(S)
32 Kishoreganj	98 <u>Sinara</u>	164 Pailgacha	230 Kowalipara	296 Icharpur	362 Rajnagar	428 Barkal
33 Halphanari(S)	99 Abrai	165 Koyra	231 Pongipara	297 Douanganj	363 Kanaiganj	429 <u>Jumichhari</u>
34 Jalchaka	100 Raninagar	166 Japoo	232 Gopalganj(S)	298 <u>Bakhirani</u>	364 Srisangal	430 Dolaichhari
35 Bonar	101 Baogon(S)	167 Dotiaghata	233 Kasiani	299 Sribardi	365 <u>Moulyibagar</u>	431 Kaptai
36 Dinko	102 Mania	168 Durnia	234 <u>Hoksedpur</u>	300 Jhenagati	366 Sabiganj	432 <u>Rajithali</u>
37 Patgan	103 Minatpur	169 Thultala	235 <u>Shamra</u>	301 Shergar(S)	367 Anniganj	433 Rangmat
38 Khatibandha	104 Mahadobpur	170 Daulatpur	236 <u>Sanderpur</u>	302 Hajhla	368 Panachong	434 Rowan
39 Kaliganj	105 Kotalgachhi	171 Rapar	237 Chakravarasan	303 <u>Palitabari</u>	369 Lakini	435 <u>Itakori</u>
40 Amikari	106 Dhanairhat	172 <u>Terakada</u>	238 Faridpur(S)	304 Kalughat	370 Sabiganj(S)	436 Fatikohari
41 Lalumuhat(S)	107 Patuitala	173 Hollarhat	239 Hagarkanda	305 Fulpur	371 Bahubel	437 Hiranarai
42 Rajarhat	108 Sapaha	174 Fakirhat	240 Alfadanga	306 <u>Gourapur</u>	372 Gunarughat	438 Sitakma
43 <u>Libari</u>	109 <u>Bagga</u>	175 Bagerhat(S)	241 Kasiani	307 Iowariganj	373 Madhabpur	439 <u>Sandip</u>
44 Shurugachari	110 Gopastapur	176 Chitalnari	242 <u>Naduhalli</u>	308 Hymensingh(S)	374 Nasiragar	440 Daulkhali
45 Hageswari	111 Sholohat	177 Mechua	243 Boliakandi	309 <u>Muktigacha</u>	375 Sarail	441 Potiya ( )
46 Bariganj(S)	112 Shitganj	178 Koorlaganj	244 Paanga	310 Fulbari	376 Brahmanbari(S)	442 Chandanich
47 Uliapur	113 Machol	179 Karpal	245 Rajbari(S)	311 Bhallaha	377 Akhara	443 Anura
48 Chikari	114 <u>Harnaganj(S)</u>	180 Hongla	246 <u>Gonlaghat</u>	312 <u>Chikaragan</u>	378 Kasta	444 Banakhali
49 Rowari	115 <u>Godagari</u>	181 <u>Ganukhola</u>	247 <u>Karirapur</u>	313 <u>Frissal</u>	379 Mahinagar	445 Sathonia
50 <u>Pratapur</u>	116 Tanova	182 Nathbaria	248 <u>Shibajaya</u>	314 <u>Lundail</u>	380 <u>Rangharapur</u>	446 <u>Lokamra</u>
51 <u>Fulchhari</u>	117 Ughampur	183 Choudaria	249 Daulatpur	315 Hossainpur	381 Homa	447 <u>Bandarban(S)</u>
52 Shaghatta	118 Dagnara	184 Porajpur(S)	250 <u>Chior</u>	316 Kishoreganj(S)	382 Daulkandi	448 Bawangchhari
53 Gachibanda(S)	119 Durgapur	185 Hazipur	251 <u>Hanikganj(S)</u>	317 Pakundia	383 <u>Shandina</u>	449 Rura
54 Sundarganj	120 Paba	186 Zanaripara	252 Sinajir	318 Katiandi	384 Haradnagar	450 <u>Thanchi</u>
55 Sadulapur	121 Puthia	187 <u>Sharyabathi</u>	253 <u>Satoria</u>	319 Kullarebar	385 Debidwar	451 Altkadan
56 Palachhari	122 Chorghat	188 <u>Kotidaha</u>	254 <u>Chakral</u>	320 Khatrab	386 Brahmapara	452 Hykongchhari
57 <u>Gobindaganj</u>	123 Bocha	189 <u>Jhalakathi(S)</u>	255 <u>Savar</u>	321 Tajitpur	387 Durichong	453 Lona(S)
58 Panchhatti	124 Daulatpur	190 Kachithi	256 <u>Karaganj</u>	322 Astagan	388 Darura	454 Chakeria
59 Joyantahat(S)	125 Chetnara	191 Rajapur	257 <u>Honaganj</u>	323 <u>Nilai</u>	389 Gonilla(S)	455 Katabdia
60 Kalai	126 Hirpur	192 <u>Kotaila</u>	258 <u>Rohar</u>	324 Hatanai	390 Ghoddagan	456 Mahichkhali
61 Khatol	127 Kachha(S)	193 <u>Setagi</u>	259 <u>Sroopur</u>	325 Kariaganj	391 Hargolkot	457 Cox's Bazar
62 <u>Kalpur</u>	128 <u>Kachhali</u>	194 <u>Seta</u>	260 <u>Lokaganj</u>	326 <u>Tarail</u>	392 <u>Tokhara</u>	458 Baga
63 <u>Adanighi</u>	129 <u>Flaker</u>	195 <u>Bathanghata</u>	261 <u>Sirajuddin</u>	327 <u>Ilona</u>	393 <u>Saharathi</u>	459 Ukhala
64 <u>Shuparavio</u>	130 <u>Shamra</u>	196 <u>Paraganj(S)</u>	262 <u>Shamra</u>	328 <u>Shaitabari</u>	394 <u>Rajiganj</u>	460 <u>Tetrai</u>
65 <u>Kataloo</u>	131 <u>Almanga</u>	197 <u>Kalagura</u>	263 <u>Shaitaganj(S)</u>	329 <u>Kadan</u>	395 <u>Kadua</u>	
			264 <u>Chakira</u>	330 <u>Kandoo</u>	396 <u>Katich</u>	

(S) for Sadar  
Wardilla = G.

6 study Record

a. study period: July 26 to August 13, 1984 (19 days)

study Itinerary: See Table 6-1

b. study team members:

Masaaki FUKUSHIMA

Leader, Professor,  
Department of Public Health,  
Fukushima Medical University

Tetsuo NISHIMURA

Grant Aid, Grant Aid Div.,  
Economic Cooperation Bureau,  
Ministry of Foreign Affairs

Norio SHIMOMURA

Project Coordinator, Basic Design Study  
Div., Grant Aid Dept.,  
Japan International Cooperation Agency

Goro ICHIKAWA

Medical Planner,  
International Total Engineering Cooperation  
(ITEC)

Chikashi OZAKI

Medical Equipment Specialist  
ITEC

Tadashi HASEGAWA

Facilities Engineer  
ITEC

c. Conference with relevant personnel

The study team has entered into discussions with relevant personnel in the Bangladesh Government, and on August 8th exchanged minutes concerning points of agreement on basic designing in the future. Details of the discussion are given in Appendix

d. Facilities Visited

The study team visited the following places under the guidance of relevant personnel from the Bangladesh side.

- 1) Central Medical Store
- 2) Paramedical Training
- 3) 7 District Hospitals
- 4) 29 Upazilla Health Complexes

The various locations under 3 and 4 above are illustrated in Appendix and Appendix . Flooding conditions were found in all the areas studied because the study was conducted during the rainy season. At times, the study team had to change its destination. At other times the roads were blocked and destinations had to be reached by ferry. The team was faced with a very tight schedule since there were a large number of different places to visit under these conditions.

e. Major persons interviewed

- 1) Japanese Embassy in Dacca: Ambassador Kobayashi,  
Councilor Okubo,  
Secretary Ohashi,  
Secretary Sato
- 2) JICA, Dacca Office:  
Chief Ezaki,  
Staff Member Ishida
- 3) Ministry of Health and Population Control  
Mr. A. B. M. Ghulam Mastafa (Secretary)  
Mr. Mukhlesur Raman (Joint Secretary)  
Dr. J. A. Rashid (Deputy " )  
Dr. A. I. Begum (Chief Planning Cell)  
Dr. M. D. Shamsul Islam (Asst Chief Planning Cell)
- 4) Economy Research Division  
Mr. A. K. M. Salamatullah (Deputy Secretary)  
Dr. Mubarak Hossain (Joint Chief)

Table 6-1

## TENTATIVE ITINERARY OF THE BASIC DESIGN STUDY TEAM

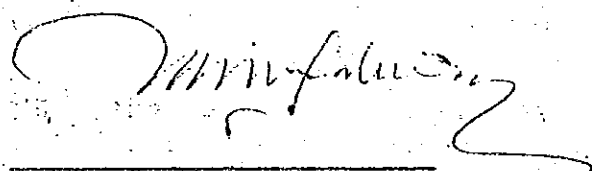
Date	Place of Stay	Schedule
1st Jly 26 (Thu)	Bangkok	All of member leave Tokyo 13:00 LV Tokyo 17:00 AR Bangkok
2nd 27 (Fri)	Dhaka	Arrive at Dhaka 11:00 LV Bangkok Meeting with Japanese Embassy and JICA 12:00 AR Dhaka
3rd 28 (Sat)	"	Meeting with P.C., E.R.D. and M.O.H. of Bangladesh, G
4th 29 (Sun)	"	Inspection of Thana Health Complexes and Sub-Divisional Hospitals in Dhaka District
5th 30 (Mon)	"	"
6th 31 (Tue)	"	"
7th Aug 1 (Wed)	"	"
8th 2 (Thu)	"	Meeting with M.O.H. Exchange Signing of Agree Minute of Meeting
9th 3 (Fri)	"	
10th 4 (Sat)	"	Meeting with Japanese Embassy and JICA
11th 5 (Sun)	"	Messrs, Fukushima, Shimomura leave Dhaka
12th 6 (Mon)	"	Adjustment and arrangement of Reports
13th 7 (Tue)	"	Collecting of Data Investigation of Local Supply
14th 8 (Wed)	"	Meeting with M.O.H., Inspection of Sub-Divisional Hospital and Thana Health Complexes
15th 9 (Thu)	"	Mr. Nishimura Leave Dhaka
16th 10 (Fri)	"	
17th 11 (Sat)	"	Meeting with Japanese Embassy and JICA
18th 12 (Sun)	Bangkok	The other Members leave Dhaka 14:00 LV Dhaka 17:00 AR Bangkok
19th 13 (Mon)		12:55 LV Bangkok Arrive at Tokyo 20:45 AR Tokyo

MINUTES OF DISCUSSIONS

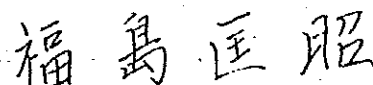
Based on the request made by the Government of the People's Republic of Bangladesh, the Government of Japan has sent, through Japan International Cooperation Agency, a team headed by Dr. Masaaki FUKUSHIMA, Professor, Department of Public Health, Fukushima Medical University to carry out the Basic Design Study on the Improvement Project of Medical Equipments for Upazila (formerly Thana) Health Complexes and Districts (formerly Sub-divisional) Hospitals for 19 days from 26th July to 13th August, 1984.

The team has had a series of discussions and exchanged views with the authorities concerned of the Government of Bangladesh and has conducted the field survey. As a result of the discussions and the field survey, both parties have agreed to recommend to their respective Governments to examine the result of the study attached herewith towards the realization of the Project.

4th August, 1984.



Mr. M. Mokhlesur Rahman  
Joint Secretary  
Ministry of Health and  
Population Control,  
Government of the People's  
Republic of Bangladesh.



Dr. Masaaki FUKUSHIMA  
Leader, Basic Design  
Study Team,  
J I C A.

#### Attachment

1. The Project consist of two components; (1) to provide X-ray machines to Upazila Health Complexes and (2) to improve medical equipments for District Hospitals. The Project aims at upgrading and expanding the health services for the vast majority of the rural people.
2. Both parties have agreed that the team will carry out the necessary study on approximately 30 Upazila Health Complexes and 7 District Hospitals as listed in Annex I.
3. The criteria for the provision of X-ray machine are shown in Annex II.
4. The basic equipments proposed by the Bangladesh side for each of the District Hospitals are shown in Annex III. Equipments will be selected by the team based on the request by the Bangladesh side and the result of the survey.
5. The result of the study will be compiled into the Basic Design Study Report. The Report will be submitted to the Bangladesh side by the end of October, 1984.
6. The Japanese Team explained to the Bangladesh side that the measures listed in Annex IV will be necessary to be taken by both Governments on condition that the grant assistance by the Government of Japan is extended.



Annex I A. Tentative List of Upazila Health Complexes to be covered by the Basic Design study.

District		Upazila.	
1.	Dhaka.	(1) Masimpur	(11) Rupganj
		(2) Tejgaon	(12) Singair
		(3) Uthali	(13) Baider Bazar
		(4) Monohardi	(14) Dohar
		(5) Dhamrai	
		(6) Sreenagar	
		(7) Nawabganj	
		(8) Joydebpur	
		(9) Savar	
		(10) Ghior	
2.	Tangail	(1) Ghatail	
		(2) Madhupur	
		(3) Kalihati	
		(4) Gopalpur	
3.	Mymensingh	(1) Muktagacha	
4.	Comilla	(1) Gauripur	(3) Barura
		(2) Laksham	(4) Akhaura
5.	Jessore	(1) Abhoynagar	(4) Burazbagar
		(2) Harinakunda	(5) Lakshmipura
		(3) Maheshpur	(6) Salikupa.
6.	Others.		

Note : Above list is subject to change depending on the accessibility of the Upazila Health Complexes.

B. Tentative List of District Hospitals to be Covered by the Basic design study.

1. Comilla District Hospital

2. Tangail "

3. Jessore "

4. Manikganj "

5. Munshiganj "

6. Narshingdi "

7. Jamalpur "

Note : Above list is subject to change depending on the accessibility of the District Hospitals.

Annex II. The criteria for installation of X-ray (100 mA) machinery.

Installation Terms :

1. Space for X-ray equipments: 4.0M x 4.5M  
(13 ft. x 14.7 ft)
2. Weight of X-ray equipments: 300 Kg (136 lb.)
3. Shield of X-ray : 15 cm (6-inch) concrete thickness or  
30 cm (12-inch) brick thickness or  
1 mm (0.04-inch) lead thickness
4. Electric Power Source : 220V 3P AC 10 KVA  
Water Supply : Ion Exchange Filter of well water  
(p.H  $\div$  7.0)  
Drainage : Drainage Tank for liquid  
developer (20 L)

Operational Terms:

1. Doctors  
X-ray Technician/Radiographer

2. Consumable Goods

X-ray Film	6,000 sheets/year	Tk. 210,000
(14-inch x 14 inch)		

Liquid Developer	50 L/year	Tk. 24,000
------------------	-----------	------------

3. Running cost of Electricity

1 Year Basic Charge	Tk. 2,640
---------------------	-----------

1 Year Actual Charge	Tk. 400
----------------------	---------

---

Total 1 Year	Tk. 237,040.
--------------	--------------

Annex III. Medical Equipments proposed by the Bangladesh  
side for District Hospitals.

1. Medical Equipments for General use
2. Laboratory Equipments
3. Equipments for Operating Theatre
4. Equipments for Dental Procedures Room
5. Equipments for Radiology
6. Others.

Annex IV. Necessary measures to be taken by both Governments

	Japan	Bangladesh
1. To provide and install equipment. (including transportation to the site)	0	
2. To reinforce the building as needed		0
3. To provide facilities for distribution of electricity and water		0
4. To ensure prompt unloading and customs clearance at the port of disembarkation in Bangladesh of imported materials		0
5. To exempt Japanese nationals concerned from duties, internal taxes and other fiscal levies which may be imposed in Bangladesh with respect to the supply of materials and services for the Project.		0
6. To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into Bangladesh and stay therein for the performance of their work.		0
7. To maintain and use properly and effectively that the equipment provided under the grant.		0
8. To bear all the expenses other than those to be borne by the Grant, necessary for the Project.		0

Table 6-2 Study List of District Hospital  
and Upazila Health Complex

(Division)	(District)	(Studied District Hospital)	(Studied Upazila Health Complex)
DHAKA	Dhaka		1. Tejgaon (new standard type)
			2. Dhamrai (old standard type)
			3. Savar (new standard type)
	Narayanganj		4. Sonargaon (old standard type)
	Narshingdi	1. Narshingdi (31 beds non standard type)	5. Monohardi (old standard type)
			6. Raipura (new standard type)
	Manikganj	2. Manikganj (50 beds standard type)	7. Uthali (Sibalay) (old standard type)
			8. Ghior (new standard type)
	Madaripur		9. Kaliakoir (old standard type)
			10. Kapasia (new standard type)
			11. Joydebpur (new standard type)
			12. Masimpur (Tungi) (old standard type)
	Faridpur	3. Faridpur (100 beds non standard type)	13. Gualando (new standard type)
			14. Bhauga (new standard type)
			15. Sardarpur (old standard type)
	Mymensingh		16. Trishal (new standard type)
			17. Muktagacha (new standard type)
			18. Ghafargaon (old standard type)
	Tangail	4. Tangail (100 beds non standard type)	19. Ghatail (old standard type)
			20. Madhupur (new standard type)
			21. Kalihati (old standard type)
			22. Gopalpur (new standard type)
CHITTAGONG	Comilla	5. Comilla (100 beds non standard type)	23. Gauripur (old standard type)
			24. Chandua (old standard type)
KAULNA	Jessore	6. Jessore (100 beds non standard type)	25. Monirampur (old standard type)
			26. Keshabpur (new standard type)
			27. Abhayngar (new standard type)
			28. Jhikargacha (old standard type)
			29. Kalaroa (new standard type)
	Satkhira	7. Satkhira (50 beds standard bed)	

**BANGLADESH ADMINISTRATIVE UNITS**

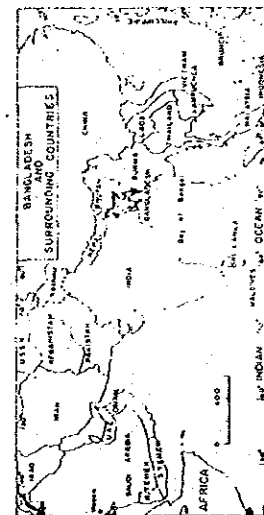
**LEGEND**

- INTERNATIONAL BOUNDARY
- DIVISION BOUNDARY
- DISTRICT BOUNDARY
- UPAZILA/THANA BOUNDARY
- Studied District Hospital
- Studied Upazila Health Complex

**Scale:** 0 1 2 3 4 5 6 7 Kilometers / Miles

**Map Labels:** INDIA, BURMA, BAY OF BENGAL, RAJSHAH, CHITTAGONG, DHAKA, Jessore, Jhikargacha, Abhaygar, Monirampur, Keshabpur, Kalaroa, Satkhira, Rajshahi, Chittagong, Dhaka, Comilla, Chandina, Sonargaon, Gaipur, Faridpur, Bhanga, Sardarpur, Manikganj, Savar, Narshingdi, Tongi, Dhamrai, Joydebpur, Kaliakoir, Monohardi, Kapasia, Chatail, H A K A, Gopalpur, Trishal, Muktagacha, Madhupur, Kalihati, Tangail, Ghafargaon, Rajshahi, Chittagong, Dhaka, Comilla, Chandina, Sonargaon, Gaipur, Faridpur, Bhanga, Sardarpur, Manikganj, Savar, Narshingdi, Tongi, Dhamrai, Joydebpur, Kaliakoir, Monohardi, Kapasia, Chatail, H A K A, Gopalpur, Trishal, Muktagacha, Madhupur, Kalihati, Tangail, Ghafargaon.

**Inset Map:** BANGLADESH, SURROUNDING COUNTRIES, INDIA, PAKISTAN, AFRICA, ASIA, OCEAN, Bay of Bengal, Indian Ocean.









JICA