Table 2-4 Comparison of Health Indication Between each Countries (1990)

	Population (million)	Increase rate (%)1990-95	Birth-rate (/1,000 pop.)	Mortality (/1,000 pop.)	Life expectancy	Infant mortality at birth (/1,000 bir.)
Total	5,292.2	1.7	26	9	66	63
Advanced industrial countries	1,206.6	0.5	14	10	75	12
Developing countries	4,085.6	2.1	30	9	63	70
Asia	3,002.7	1.8	27	8	65	64
South East Asia	444.8	1.9	28	8	63	55
Cambodia	8.2	2.2	37	15	51	116
Indonesia	184.3	1.8	27	8	63	65
Laos	4.1	2.9	44	15	51	97
Malaysia	17.9	2.3	28	5	71	20
Myanmar	41.7	2.1	30	9	63	59
Philippines	62.4	2.3	30	7	65	40
Singapore	2.7	1.1	16	6	74	8
Thailand	55.7	1.4	20	7	67	24
Vietnam	66.7	2.2	30	8	64	54
South Asia	1,200.6	2.3	33	11	59	91
Afghanistan	16.6	6.7	52	22	43	162
Bangladesh	115.6	2.7	41	14	53	108
Bhutan	1.5	2.3	38	16	50	118
India	853.1	2.1	31	10	60	88
Iran	54.6	2.0	33	7	67	40
Nepal	19.1	2.3	36	13	54	118
Pakistan	122.6	2.9	42	11	59	98
SLR	17.2	1.3	21	6	72	24
Japan (1988)	123.5	0.4	12	8	79	5

Source : UNFPA Statistics (1991)

2.2.2. State of Illnesses

(1) Health Index

The following table shows Indian health index. The average life expectancy at birth is 60 years which is similar to surrounding countries, however in terms of the birth rate, the infant mortality rate is high. Statistics on the main causes of death are rather scarce, but the main factors reported are infections of respiratory and digestive organs for children under 5 years old. This is due to the fact that the national state of the health and hygiene environment is poor, the medical system is ill equipped and that nearly 30% of the population are living in poverty and suffer from a chronically poor state of nutrition.

Table 2-5 Health Index

Catagory	1989 ~ 1991
Increase rate in Pop.	2.1%/year
Population	843,486,000
Life Expectancy at Birth	Male 58.6
	Female 59.6
Crude Birth Rate	30.5%
Crude Death Rate	10.2%
No. of Government Hospitals	4,732
No. of Beds	439,047
No. of Private Hospitals	6,522
No. of Beds	180,386
Hospital Beds per 1,000 Pop.	0.74
No. of Doctors	365,000
No. of Nurses	264,504

Source : M H R D

(2) State of Diseases and Main Fatal Diseases

As can be seen in the following table on the state of diseases in India, diarrhoeal diseases and acute respiratory infections dominate, indicating how poor the sanitary situation is, and a disease structure typical to developing countries. However due to the fact that statistical control in such a huge country is totally insufficient and analysis of trends on a national scale is so difficult, India is in a situation where it is unable to compile sufficient policies concerning health, medicine and hygiene.

Table 2-6 Major High Diseases Rate

Name of Disease	1989		1990	
	Case	Rate(/1000)	Case	Rate(/1000)
Acute Diarrhoeal Diseases	--	--	9,579,000	1,164.19
Acute Respiratory Infections	--	--	8,929,000	1,085.19
Leprosy	--	--	2,546,000	309.43
Malaria	2,018,000	251.71	1,777,000	215.96
Tuberculosis	--	--	1,331,000	132.45
Kalazar	345,000	43.03	577,000	70.12
Mental Diseases	49,300	6.14	49,900	6.06
Cancer	45,200	5.63	44,600	5.42
Meningitis	19,600	2.44	13,700	1.66
Japanese Encephalitis	6,500	0.81	2,900	0.35
Cholera	5,040	0.62	3,700	0.44

Source : MHRD

* The state of major diseases varies on the region meaning it is usually impossible to calculate national outbreak rate statistics.

As stated previously, reliable statistics on major fatal diseases are not analysed, but infectious diseases are the majority. The following table displays major cases of infectious disease and death rates. High death rates can be seen arising from tuberculosis, acute diarrhoeal diseases, pneumonia and tetanus all of which are preventable through building a good sanitary environment, and the poorness of the country's medical and health services is reflected well.

Table 2-7 Major Cases of Infectious Diseases and Death

(Unit : 1,000)

Name of Disease	1989		1990	
	Case	Death(%)	Case	Death(%)
Acute Diarrhoeal Diseases	9,288	4.79	9,579	8.63
Acute Respiratory Infections	7,388	2.20	8,929	2.98
Tuberculosis	1,040	9.38	1,131.7	9.31
Pneumonia	499	3.32	434	3.05
Typhoid	321	0.44	370	0.64
Viral Hepatitis	134.9	1.85	124.5	1.79
Whooping Cough	146	-	113	0.05
Gonococcal Diseases	111.7	-	90.9	0.07
Measles	157.2	0.66	87.4	0.32
Syphilis	44.7	-	48.0	0.01
Tetanus	28	3.56	23.2	4.0
Poliomyelitis	11.4	0.25	10.4	0.24
Diphtheria	10.0	0.39	8.42	0.48
Rabies	8.5	0.42	6.01	0.68

Source : MHRD

2.2.3. Medical and Health Administration

(1) Medical and Health Sectors and Mechanism

The medical and health administration of India can be divided into the following three main sectors. First, the national medical institutions which are controlled by the Ministry of Health and Family Welfare. Second, there are educational hospitals controlled by the Ministry of Human Resource Development. Finally, there are the local government run institutions controlled by the state governments, medical institutions directly controlled by other governmental organization (the Ministry of Railway, the Ministry of Defence Army, the Ministry of Telegram, etc.), and privately run institutions. All of those coexist and support the Indian medical service. However, as of yet, there is no definite national organization for the health system, and excluding special hospitals and research facilities, the medical service for the general

public consists of secondary and tertiary institutions such as hospitals attached to national universities and medical colleges; below these institutions there are, the district and divisional hospitals which provide primary and secondary services; and below these hospitals there are, health centers which provide primary medical services. In other words, medical institutions under the Ministry of Human Resource Development are included in the medical system which should really be under the control of the Ministry of Health and Family Welfare (see Figure 2-4).

1) Ministry of Health and Family Welfare

This department is composed of the Department of Health, the Department of Family Welfare and 21 directly controlled offices placed around the country.

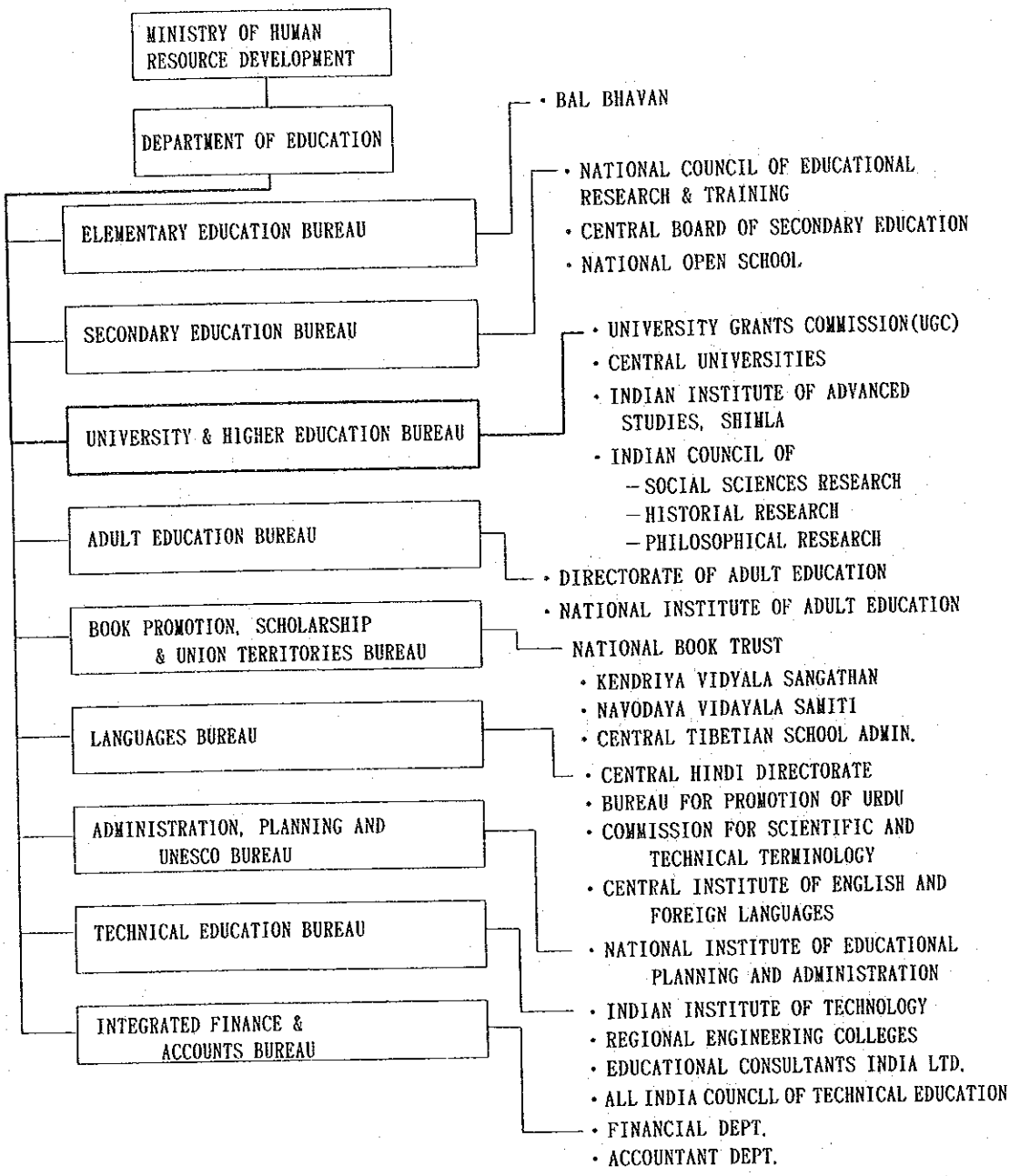
Dept. of Health : Below the Director and Vice Director are seventy local body branches working for the improvement of local health and hygiene by emphasizing medical care and sanitation.

Dept. of Family Welfare : Promotes state level projects and activity with the support of the Director, Vice Director and Family Welfare Committee.

2) Ministry of Human Resource Development

This ministry is composed of the Department of Education, the Department of Culture, the Department of Sports and the Department of Women and Child Welfare. The university and senior education sections of the Department of Education are in charge of university attached hospitals. The following figure shows the organization diagram of the Department of Education.

Figure 2-3 Organization Chart of Ministry of Human Resource Development



(2) India Medical and Health Setup

1) Structure of Medical Facilities

Medical and health facilities in India can be roughly divided into national and public (local government) bodies which offer free medical services to the poor, and private bodies which charge for services and are thus aimed at the wealthier classes. The Health

Ministry controls the whole country divided into 31 states and special areas and is in charge of primary care carried out in doctorless dispensaries and traditional medical facilities, and secondary and tertiary care carried out by local government hospitals, private bodies and voluntary hospitals. However these bodies are not sufficient enough to carry out tertiary medical care, and this is left to the charge of post graduated intitute of medical education research, state institute of postgraduates and the national university attached hospitals and medical college attached hospitals which are controlled by the Ministry of Human Resource Development. Moreover, the medical college attached hospitals controlled by the Ministry of Human Resource Development are also responsible for secondary medical care.

The projected site under this project is located in Uttar Pradesh State which has a population of 130 million or roughly the same as all of Japan. However despite having such a big population, the state possesses a mere ten medical institutions where tertiary medical care can be carried out, clearly indicating the degree to which a national system of health care is not in place.

As stated earlier, medical facilities in India are mainly composed of national bodies, local government controlled bodies and private or voluntary bodies, and the following table illustrates statistics of the numbers of such facilities and beds. According to government figures, the number of beds per 100,000 people has doubled over the past forty years, however demand is still not being satisfied and this ratio has been declining in recent years. In contrast to this, private medical bodies are experiencing rapid growth, and from the 644 authorized private hospitals in 1974 had risen in number to 5,497 in 1988 and over 6,000 in 1991. The ratio of private hospital beds out of the national total rose from 25% in 1974 to 29% in 1991.

Table 2-8 Number of Hospitals & Beds at each state (1991)

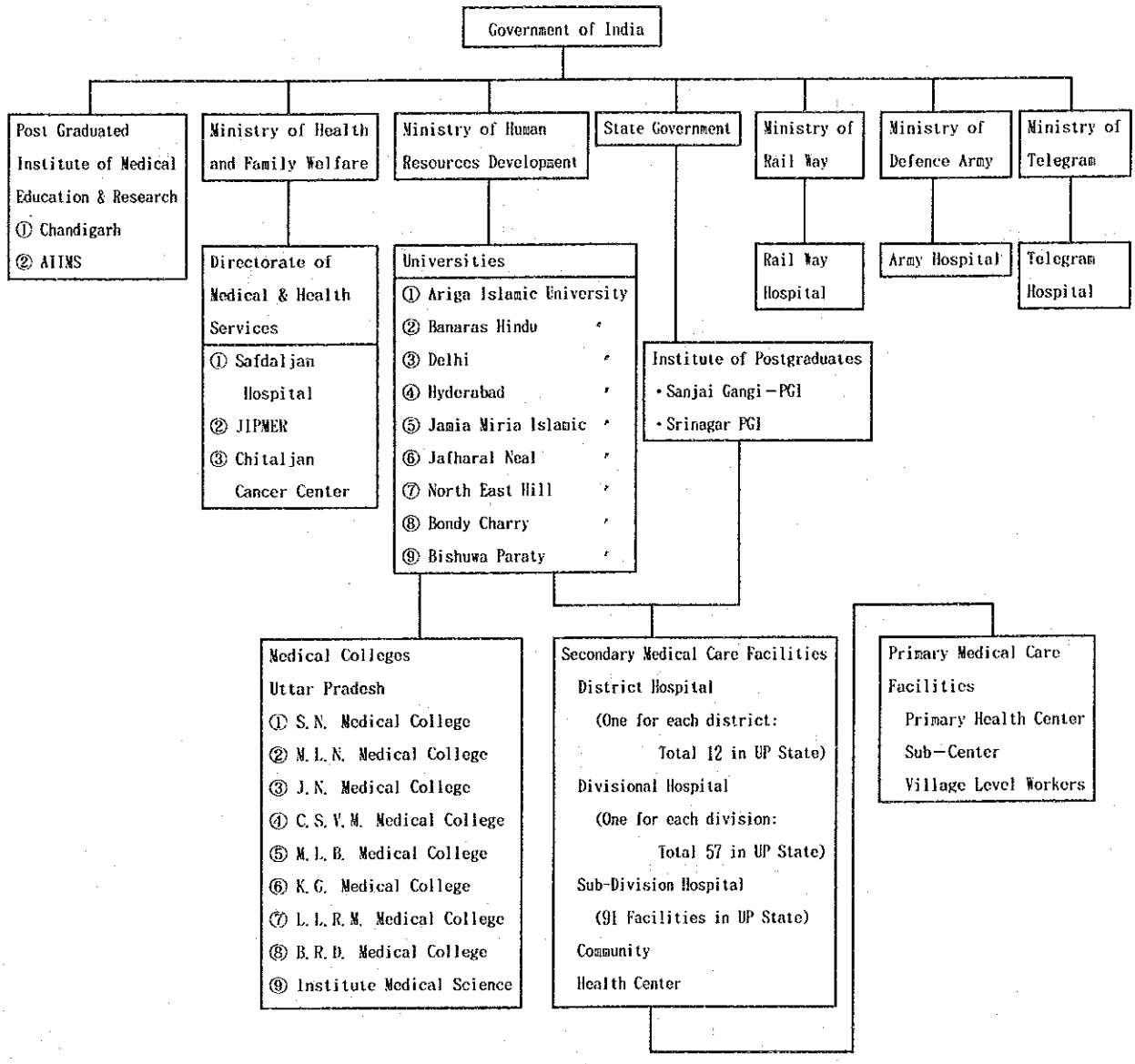
States	Population (Thousand)	Public		Local Government		Private Sector		Total	
		Hospital	Bed	Hospital	Bed	Hospital	Bed	Hospital	Bed
1. Andhra Pradesh	66,304	345	25,251	4	46	266	11,103	615	36,400
2. Arunachal Pradesh	858	18	1,091	0	0	0	0	18	1,091
3. Assam	22,294	122	11,678	46	957	39	1,825	207	14,460
4. Bihar	86,338	242	22,553	1	48	55	5,536	298	28,137
5. Goa	1,168	16	1,808	0	0	92	1,575	108	3,383
6. Gujarat	41,174	170	16,578	74	4,703	1,319	25,093	1,563	46,374
7. Haryana	16,317	58	4,711	0	0	20	2,232	78	7,003
8. Himachal Pradesh	5,111	52	3,769	5	58	8	447	65	4,274
9. J. & K.	7,718	65	8,062	0	0	2	140	67	8,202
10. Karnataka	44,817	209	26,424	28	714	51	7,339	288	34,477
11. Kerala	29,011	137	26,474	0	0	2,787	43,875	2,924	70,349
12. Madhaya Pradesh	66,135	362	22,103	–	–	–	–	362	22,103
13. Maharashtra	78,706	693	62,684	92	10,955	1,319	37,781	2,104	111,420
14. Manipur	1,826	21	1,360	0	0	4	100	25	1,460
15. Meghalaya	1,760	10	1,094	0	0	5	660	15	1,754
16. Mizoram	686	11	844	0	0	3	310	14	1,154
17. Nagaland	1,215	31	1,114	0	0	0	0	31	1,114
18. Orissa	31,512	252	12,576	6	111	29	1,301	287	13,988
19. Punjab	20,190	187	11,133	4	103	39	3,782	230	15,018
20. Rajasthan	43,880	227	19,727	2	54	38	2,034	267	21,815
21. Sikkim	403	5	525	0	0	0	0	5	525
22. Tamil Nadu	55,638	282	37,935	7	479	119	10,366	408	48,780
23. Tripura	2,244	23	1,531	0	0	0	0	23	1,531
24. Uttar Pradesh	138,760	534	34,267	42	985	159	12,026	735	47,278
25. West Bengal	67,982	260	46,462	21	603	129	6,912	410	53,977
26. A. & N. Island	280	6	706	0	0	2	29	8	735
27. Chandigarh	642	2	1,500	0	0	0	0	2	1,500
28. D. & N. Hareli	138	1	50	0	0	1	12	2	62
29. Daman & Diu	101	1	100	0	0	2	50	3	150
30. Delhi	9,420	27	8,926	21	3,603	32	5,712	80	18,241
31. Lakshwadeep	51	2	70	0	0	0	0	2	70
32. Pondicherry	807	8	2,462	0	0	2	146	10	2,608
TOTAL	843,486	4,379	415,628	353	23,419	6,522	180,386	11,254	619,433

Source : MHRD 1993

2) System of Public Medical Facilities

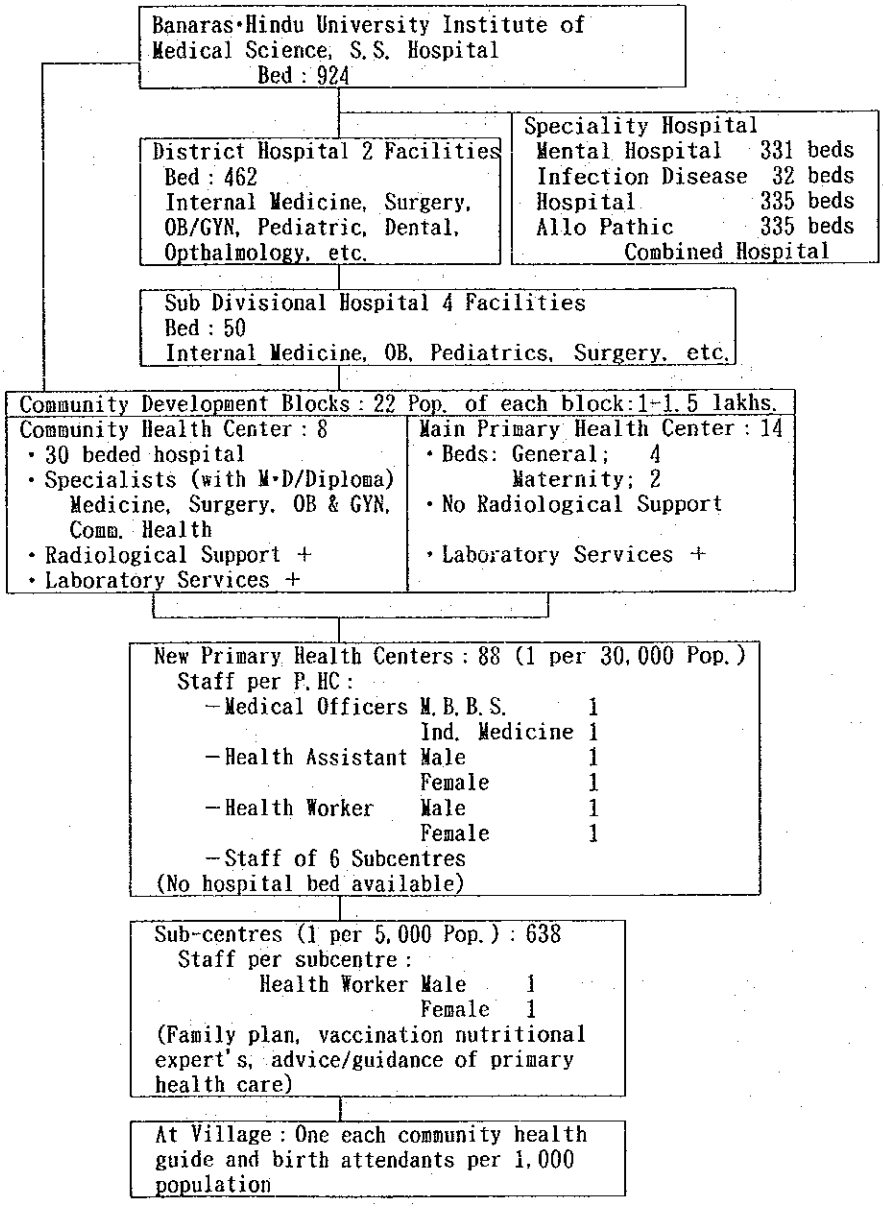
The following figure is the system organization diagram of public medical facilities. The Ministry of Human Resource Development directly controls the country's nine university hospitals, and is also responsible for controlling lower level primary and secondary medical bodies.

Figure 2-4 Health Organization In India



Varanasi is one of the districts among 31 states and special areas of the medical system. As the following figure shows, the area's medical organization is in a pyramid form with the Institute of Medical Sciences, SS Hospital at the peak, and below that, two district hospitals, four sub divisional hospitals, eight community health centers and fourteen major health centers. Of these, the Institute of Medical Sciences concentrates on tertiary health care, the district and sub divisional hospitals and health centers are in charge of secondary and tertiary health care, and the lower level facilities are mainly responsible for primary health care.

Figure 2-5 Health Organization in Varanasi District



(3) State of Medical Staff

In 1990, the number of doctors in India was 365,000, the number of dentists was 11,011 and the number of nurses including assistant nurses from 1989 was 405,695 (see following table). Ideally speaking, there should be three nurses for every doctor, but the current situation of 380,000 registered doctors and 400,000 registered nurses shows a chronic shortage of nursing staff. It is also reported that there are shortages in the number of pharmacists, laboratory technicians and radiographers.

Table 2-9 Trends in Numbers of Medical Staff

Medical Staff	1986	1987	1988	1989	1990
Medical Doctor (Registered)	320,304	331,886	355,695	352,196	365,000
Dentist (Registered)	9,275	9,750	9,796	10,475	11,011
Nurse/Midwife				264,504	–
Assistant Nurse/Healthworker				141,191	–
Health visitor/Health superviser				16,635	–

Source : MHFW 1991

The following table shows an international comparison of the number of doctors per 10,000 people. Compared to neighbouring developing countries, India possesses twice the number of doctors per 10,000 population, but in reality the situation of one doctor for every 2,500 people is extremely low.

Table 2-10 Comparison with Medical Staff (%)

(10,000 Pop.)

Countries	Year	Medical Doctor	Dentist	Pharmaceu-tist	Medical Doctor	Dentist	Pharmaceu-tist
Japan	1988	201,685	70,572	143,429	16.4%	5.8%	11.7%
U.S.A.	1984	501,200	137,950	158,000	21.4	5.9	6.7
India	1984	297,228	9,598	– – –	3.9	0.1	– – –
Sri Lanka	1985	1,914	301	– – –	1.2	0.2	– – –
Thailand	1984	8,058	1,326	3,312	1.6	0.3	0.7

Source : WHO HEALTH STATISTICS 1988

The following table shows the numbers of medical staff in the Varanasi area as of 1990, and of the numbers necessary. The shortages of specialist doctors and staff in the health centers responsible for primary and secondary medical care are striking.

Table 2-11 Health Manpower Working in Rural Areas

Category	Sanctioned Posts	Number in Position	Vacant Posts	Col. 5 as percentage of col. 3
1. Specialists in Rural Areas	3,523	2,481	1,042	29.6%
2. Doctors at Primary Health Centres	25,671	22,078	3,593	14.0
3. Block Extension Educators	6,068	5,513	555	9.2
4. Health Assistants (Male)	24,850	23,266	1,584	6.4
5. Health Assistants (Female)/LHVs	25,726	22,999	2,794	10.9
6. Health Workers (Male)	88,182	80,701	7,481	8.5
7. Health Workers (Female)/ANMs	130,941	119,906	11,035	8.4
8. Pharmacists	19,225	17,702	1,523	7.9
9. Radiographers	667	518	149	22.3
10. Lab. Technicians	10,516	8,744	1,772	16.9

Source : MHFW

(4) Medical and Health Sector Budget

According to sources of the government of India, the medical and health budget for 1989 was only 2.1% of the whole budget and well below the 10% recommended by the WHO. However, as mentioned earlier, the Ministry of Human Resource Development is also responsible for medical care, and so it is reported that an estimated 3% of the total government budget is devoted to the medical and health sector. The budget continually shows an excess of expenditure and so the ratio of the medical and health budget within the total decreases with every budget announced by the government (in the first budget, 3.3%, in the fourth, 2.1% and in the seventh, 1.8%). There are also problems concerning regional budget differences. Compared to a budget of 69.5

rupees per head for Haryana in 1991, it is reported that the same statistic for Madhya Pradesh was 9 paisa (100 paisa = 1 rupee). Moreover, between 60 and 85% of the total budget for public hospitals is allotted to staff salaries meaning the budget itself is being slashed.

Table 2-12 1989 National Budget Allocation

(unit: 1 billion rupees)

Revenue item	Amount	Ratio	Expenditure item	Amount	ratio
1. Tariffs	178.80	46.5	1. Defense	104.43	17.5
2. Consumption tax	133.93	34.8	2. Agriculture, forestry & fisheries	14.87	2.5
3. Corporation tax	47.55	12.4	3. Mining & construction	12.98	2.2
4. Income tax	24.10	6.3	4. Energy		
			5. Transport & communications		
			6. Education	21.63	3.6
			7. Health	12.64	2.1
			8. Social welfare & housing		
			9. Loan repayments	170.00	28.5
			10. Other	260.17	43.3
Total	384.38	100.00	Total	596.72	100.0

2.2.4. Training of Medical Staff

In India, as well as so called contemporary medicine, traditional Indian medicine which combines the use of herbs and animal organs as medicine with surgery, and homeopathy which originated in Germany are practised. As a result there exist medical colleges for teaching western medicine, homeopathic colleges for teaching homeopathy and also Indian medical colleges. There are 106 medical colleges in all of India and nine such colleges in Uttar Pradesh. Two of those nine are national colleges of which one is the projected site. The other seven are state colleges.

Admission requirements for the medical department demand those over 17 years old who possess twelve years of schooling plus excellent results in the science curriculum undertaken before entry. The medical

department course last for six years and six months of which graduates become a bachelor of medicine (MBBS). Masters degrees can be obtained from medical colleges that possess post graduate courses, and on completion of a high level post graduate course, one can obtain a doctorate. The projected site does possess a high level post graduate educational functions.

The table 2-13 shows results of bachelors degree courses over the past three years. In India, around 12,000 bachelors of medicine are raised every year.

Table 2-13 Number of Admitted and Passed Students for Doctor Course

Year	No. of Medical College	Admitted Students	Passed Students
1987~1988	128	14,166	12,100
1988~1989	128	13,262	12,292
1989~1990	128	11,791	

Source : B/D Study

2.2.5. Trends of Aid Organizations

(1) State of International Cooperation in Medical and Health Sector

The following table illustrates the current state of aid from aid organizations in the medical and health sector.

Table 2-14 Aid Received from Foreign Countries in Health Sector

Country/Organization	Contents of Aid Received	Amount
I. D. A.	Aids control project	US$ 73,820,200.00
	Leprosy control project (Planning)	US$ 94,061,800.00
	Blind disease control project	US$164,044,940.00
	Development of secondary health system in Andhara Pradesh	US$ 71,866,450.00
USAID: Agency for International Development, U.S.A.	The project for medical thechnology support (signed on 1985)	US$ 65,000,000.00
SIDA : Swedish International Development Agency	T.B. Control Project	US$ 820,220.00 (¥91,250,000.-)
Danish International Development Agency	Money grant for blind.	US$ 7,298,350.00
	(Equipment, training, development of administration system evaluation of the project	
	Leprosy control plan	US$ 196,850.00
WHO ; World Health Organization	Development of health medical system	US$ 13,810,100.00
	〃 〃 primary health care system	
	Mother and child health project	US$ 15,287,800.00
	Development of primary health care system	
OECF	The project for the improvement of institute of all India medical center	¥ 82,535,000.-
	Theloncus and trachelophyma control project	¥ 43,450,000.-
	Institute of Rotavirus project	¥ 14,780,000.-
	Project for health control of Pupils in A. P. State	¥1,320,560,000.-
JAPAN	The project for the improvement of equipment for Sanjay Gandhi Post-graduate Institute of Medical Sciences	
	(1986~87)	¥1,973,000,000.-
	(1987~88)	¥1,364,000,000.-

2.3 Outline of Related Projects

2.3.1 National Development Plan

In April, 1992, the Government of India shifted its priorities to policy reform based on the market economy, and launched the 8th Five Year Development Plan. The emphasis was placed on a policy reform related to economy rather than any specific quantitative targets. However, according to the draft, the public sector is expected to show a jump from 5% GDP growth under the 7th Plan to 5.6% under the 8th Plan. In order to achieve this marked increase in GDP in reality, reforms based on growth in savings, investment, investment efficiency and exports are necessary. However the latest specific draft plans

remain generalized and ambiguous on the issue. The following are particularly important themes:

- cutting back the public sector by selling off loss making and inessential industries and encouraging private involvement in such sectors as power, steel and transport;
- focusing on agriculture and rural development, which will absorb 50 per cent of outlays; and
- concentrating on illiteracy, aiming to remove it entirely by the end of the 1990s, and other aspects of social infranstructure such as securing of safety drinking water.

The main achievement targets of the thus compiled present Five Year Plan are as follows.

1) Revitalization of the economy through fostering of the private sector and promotion of liberalization.

2) Stabilization of the lifestyle of citizens through the correction of social and regional differences. Issues for the achievement of the plan's objectives are
   ① upgrading of the infrastructure;
   ② expansion of employment opportunities and relief of poverty;
   ③ securing of drinkable water and furtherance of basic medicine and health; and
   ④ improvement in the literacy rate and restraint of population growth.

When looking at the economic side of the National Development Plan, one can see a targeting of subsides and revenue deficit reduction even though GNP has almost remained the same from the 7th into the 8th Plans (see following table 2-15).

Table 2-15 8th Five Year Development Plan Targets

(% of GDP, unless otherwise indicated)

	7th Plan Averages	8th Plan First draft (1989)	8th Plan (1992)
GDP change (%)	5.0	6.0	5.6
ICOR	4.3	4.2	3.9
Total savings of which[c]	21.1	23.3	21.6
Private corporate	1.8	2.0	...
Household	17.2	19.0	...
Public	2.4	3.0	...
Total investment	23.1	24.9	23.2
Net capital inflow	2.0	1.6	1.6
Tax ratio	16.9	18.9	...
Subsides	3.4	1.9	...
Revenue deficit	2.1	1.2	...
Public consumption	12.1	13.3	...
Exports(% real changes)	7	10.0	13.6

Source : Planning Commission, Approval Papers for 8th Plan.

[c](Components based on different data and therefore may not sum to total)

2.3.2. National Health Plan

In 1983, the Government of India compiled a national health policy for the medical and health sector having the slogan, "Health for all citizens by 2000". It has pushed this policy with the following three issues at its root.

① The diffusion of medical and health services to the people's level

② Promotion of resident participation

③ Supply of drinking water and improvement of environmental sanitation and nutrition etc.

The 8th Five Year Plan (1990-1995) currently under way also makes upgrading of the infrastructure, creation of employment opportunities, securing of drinking water and improvement of basic medical and health services its major issues. Major projects currently under way to deal with high priority infectious and non-infectious diseases under the 8th Five Year Health Plan are as follows.

1. Malaria Eradication Programme
2. Kalazar and Japanese Encephalitis Programme
3. Leprosy Eradication Programme
4. Tuberculosis Control Programme
5. Blindness Control Programme
6. Guineaworm Eradication Programme
7. Aids Control Programme
8. Diarrhoeal Diseases Control Programme
9. Cancer Control Programme
10. Iodine Deficiency Disorder Control Programme
11. Diabetes Control Programme
12. Mental Health Programme

A number of projects within this plan being carried out via the medical enforcement base receive 100% central government support. However, state governments are free to compile and implement projects relating to the regions.

The following table shows the budget plans for the health sector within the 8th Five Year Plan. The allotment indicates state/government led budget policy with the emphasis on medical education and training.

Table 2-16 Eighth Plan Outlay - Health Sector

(Unit : Crores)

Programme	States/UTs	Centrally Sponsored Programmes	Central Schemes	Total
1. Minimum Needs Programme/Rural Health	2250.38	–	1.00	2251.38
2. Control of Communicable Diseases		1031.00	14.75	
3. Hospitals and Dispensaries		–	94.00	
4. Control/Containment of Non-Communicable Diseases		–	85.00	
5. Medical Education and Training	3525.54	–	267.00	5324.54
6. ICMR		–	124.50	
7. Indian System of Medicine		5.00	83.00	
8. Other Programmes		20.00	74.75	
Total	5775.92	1056.00	744.00	7575.92

Source : MHRD

The current development plan is also promoting a target project for the training of medical staff. The main points of the project are as follows.

i) National policy for medical education forms the basis of training of medical staff.

ii) To reconsider the present and forecasted supply and demand for medical staff, and the state of training and facilities.

iii) To take appropriate measures in coordinating the gap between present staff numbers in primary, secondary and tertiary medical care and the necessary numbers of trainees and researchers.

iv) To give high priority to the continued education of medical staff For this purpose, training facilities on the district and regional level will be strengthened. Facilities including such specialist organs as the medical colleges and the Indian Medical Association (IMA) will continue to fulfill their role in achieving these objectives working together with the National Academy of Medical Sciences (NAMS).

v) To confirm the need for the establishment of medical universities on the regional level in order to achieve a standardization of the education of medical and supplementary medical staff. Therefore, when policy is decided, the necessary work can be done.

vi) To strengthen epidemiology and health management training facilities in the medical universities, and to establish special facilities for training on medical education.

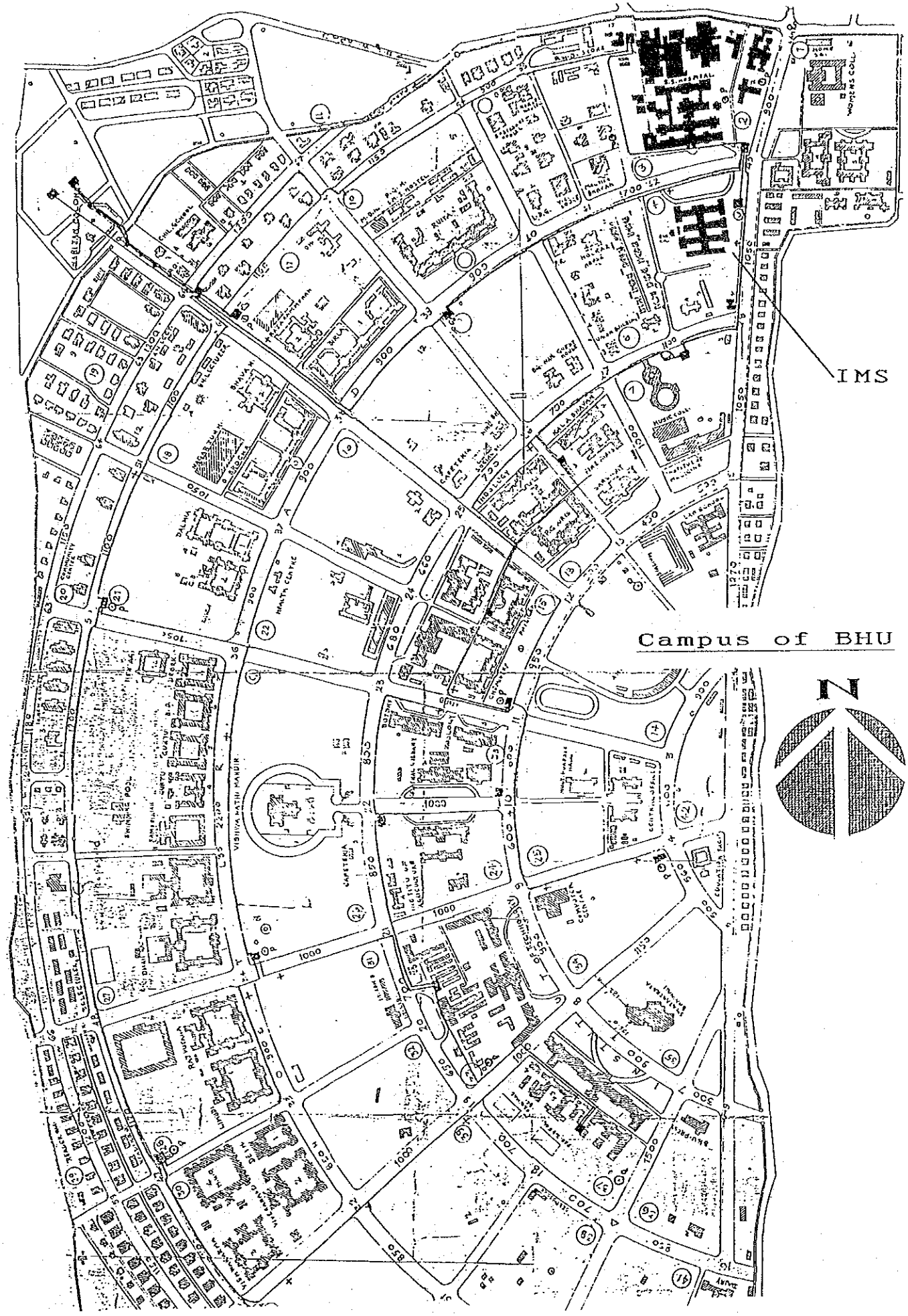
vii) To reconsider the doctor training system and to investigate and adapt the methods demanded from primary medical services and the National Health Plan.

viii) To recoordinate the health plan started under the 7th Plan, and to propagate the need for health care national health policy and plan through education and training.

2.4 Outline of Projected Site Under This Project.

2.4.1. Location and Outline of the Projected Site

The Banaras Hindu University, commonly known as the BHU, Institute of Medical Sciences as IMS, Sir Sunderlal Hospital (SS Hospital) lies midway between the capital, Delhi and Calcutta on the Bay of Bengal, and to the south of the largest Hindu sacred ground in north east India, Varanasi. The Varanasi Region where the city of Varanasi is located is 5,000 km^2 in area, has a population of 3.7 million (as of 1981) with a population density of 727 people per square kilometer, and lying within Uttar Pradesh which is the most populated state in India, has many people living in poverty. The University is 15km from Varanasi Station and can be reached by bus, three wheel vehicle or rickshaw. The University campus covers 2,132km^2 of which the SS Hospital takes up 27,800m^2. The locational map of the institution is shown in Figure 2-6.


IMS
Campus of BHU
N

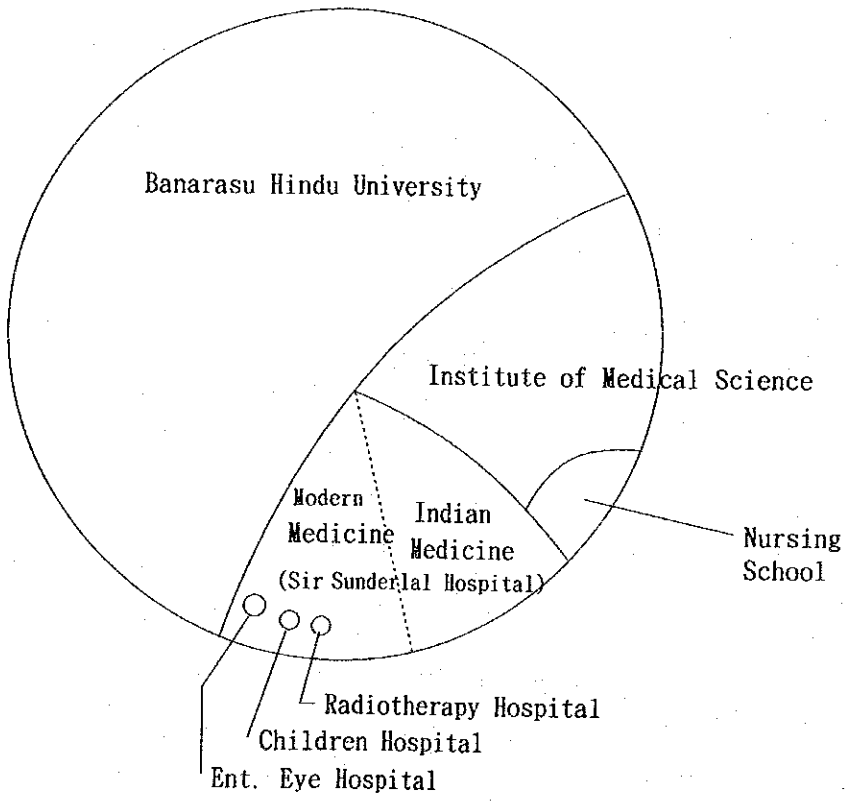
2.4.2 Outline of the Projected Site

(1) Organizational Activity

The BHU is a general university composed of four Institutes including the Medical Institute, the Agricultural Institute and the Engineering Institute, and 28 Departments including economics, fine arts, social studies, management studies and theological studies.

The projected site under this project is the Institute of Medical Science (IMS). The Institute is composed of the Modern Medicine Department, the Traditional Medicine Department and the attached Sir Sunderlal Hospital. Within the Modern Medicine Department are 23 sections and eleven departments, and the Traditional Medicine Department is made up of eight sections. The SS Hospital is composed of two hospitals, one of which provides modern medical care and another which provides traditional medical care. Figure 2-7 shows the structure of Banaras Hindu University.

Figure 2-7 Banaras Hindu University



The figure in the chapter 3 displays the organization of the IMS. The institute is composed of four main organizations namely modern medicine,Indian medicine,hospital and nursing shool and the each organigation has its own head under the directorship of IMS.

(2) Operations

The role of the Institute may be given as the training of graduate and post graduate medical students; medical research; and the supply of medical services as the central hospital in the district. The main activity contents are as follows.

① Medical Education

The Institute admits around 60 students per year for basic medical education for 1.5 years, clinical training for three years and intern training for one year, and in total carries out medical training for about 600 students. It also admits 24 students for a 3.5 year nurse training program and is educating around 100 students in that field.

② Medical Research

As an extension to its educational activities, the Institute carries out research into the fields of microbiology, parasitology, pharmacology, hematology, pathology and basic medicine. At the same time, it acts as the laboratory department for the attached hospital.

③ Medical Service

The SS Hospital possesses 927 beds and is run by a total of 2,500 staff including 549 doctors, 491 nurses and around 1,600 paramedical and clerks. As well as being responsible for Uttar Pradesh, it also covers the neighbouring states of West Bittor, East Uttar Pradesh and Madhya Pradesh which in total include a population of 100 million people. The main activity is referral hospital for these regions and providing secondary and tertiary medical care.

These three areas of activity; education, research and medical service are controlled and run by the same departments. The following shows the itemized breakdown of these departments.

Table 2-17 Faculty of BHU

I. Faculty of Modern Medicine	21. Dept. of Radiotherapy & R.M.
	22. Dept. of Dental Surgery
1. Dept. of Anatomy	23. Dept. of Psychiatry
2. Dept. of Biochemistry	24. Dept. of Central Unit
3. Dept. of Biophysics	24-1 Ayurvedic Pharmacy
4. Dept. of Physiology	24-2 Art & Photo Section
5. Dept. of Pharmacology	24-3 Institute Workshop
6. Dept. of Pathology	24-4 Animal House
7. Dept. of Microbiology	24-5 Publication Unit
8. Dept. of Forensic Medicine	24-6 Surgical Research Lab.
9. Dept. of Medicine	24-7 Institute Library
9-1 Section of Endocrinology	24-8 Blood Bank
9-2 Section of Gastroenterology	24-9 C.S.S.D.
9-3 Section of Neurology	24-10 Laundry(Linen Supply)
9-4 Section of Nephrology	24-11 Clinical Pathology Lab.
9-5 Section of Cardiology	24-12 Immuno-Diagnostic Training & Research Center
10. Dept. of Surgery	25. Cooperative Function
10-1 Section of Plastic Surgery	25-1 National Teachers' Training Center
10-2 Section of Neuro Surgery	25-2 Post Partum Programme
10-3 Cardiothorcic Surgery	25-3 Molecular Biology
10-4 Section of Urology	26. Nursing School
10-5 Section of Pediatric Surgery	
10-6 Section of Surgical Oncology	II. Faculty of Indian Medicine
11. Dept. of Obstetric & Gynecology	
12. Dept. of Preventive & Social Medicine	1. Dept. of Kayachikitsa
	2. Dravyaguna
13. Dept. of Anesthesiology	3. Basic Principals
14. Dept. of Skin & V.D.	4. Prasuti Tantra
15. Dept. of T.B. & Chest	5. Shalya Shalakya
16. Dept. of Radiology	6. Rasa Shastra
17. Dept. of Ophtalmology	7. Medicinal Chemistry
18. Dept. of Pediatrics	8. Ayurveda Samhita
19. Dept. of Orthopedics	
20. Dept. of E.N.T.	

Source:BHU

(3) Medical Staff

The total number of employees is roughly over 2,600 including 549 doctors and 491 nurses. This comes to 1.6 hospitalized patients and 3.6 outpatients for each doctor. The number of nurses is very low with only 0.89 for each doctor. Professors, assistant professors and lecturers combine Hospital and Institute works. The following table shows the breakdown of staff.

Table 2-18 Medical Staff

Staff	Modern Medicine	Indian Medicine	Others	Total
Professor	64	7	-	71
Reader	62	7	-	69
Lecturer	52	10	-	62
Senior Resident	282	-	-	282
Resident	65	-	-	65
Sub Total	525	24	-	549
Nurse	385	-	-	385
Assistant Nurse	1	-	-	1
Nurse Student	103	-	-	103
Midwife	2	-	-	2
Sub Total	491	-	-	491
Paramedical	391	155	35	581
Clerk	65	8	31	104
Others	142	18	809	969
Sub Total	590	181	875	1,646
Total	1,606	205	875	2,686

Source:BHU

(4) State of Activity

The following table shows the activity indicators for the past four years. The figures show that in comparison to the number of outpatients, numbers of beds, hospitalized and discharged patients are much the same. This does not mean the numbers of patients who need the hospitalization have not been increasing, but means the the inability of the Hospital to admit patients due to deficiencies in its setup and equipment.

Table 2-19 Statistics of the hospital for a period of 4 years:

	1988	1989	1990	1991
Bed Complement	927	927	927	927
OPD Attendance	507,849	473,924	478,761	518,348
Admissions	25,514	27,634	27,431	26,896
Discharges	25,495	28,042	27,088	26,418
No. of Ope.	32,611	30,312	31,725	32,838
Births	2,559	2,593	2,712	2,833
Average length of stay	12.5	12.1	12.8	12.5
Bed occupancy-rate	91.5	89.2	91.2	92.0
Death Rate (Gross)	6.86	6.37	6.24	6.66

Source : BHU

(5) Trends in Diseases

The following table indicates trends in diseases within the Hospital over the past four years. Bone fractures due to traffic and industrial accidents followed by infectious diseases and so on which require primary medical care are the most common.

Table 2-20 Name of the Diseases of Higher Morbidity Rate

Diseases	1987	1988	1989	1990	Average
1. Fractures	571	602	619	592	596
2. Cataract	498	514	615	618	561
3. Corvix Uteri	541	562	496	472	517
4. Hernia of abdominal cavity of Intestinal obstruction	496	461	512	398	466
5. Rheumatic fever & Rheumatic heart disease	312	383	415	384	373
6. Pulmonary Tuberculosis	325	392	295	321	333
7. Amoebiasis	275	291	311	384	315
8. Nephritis and Nephrotic syndrome	172	211	216	198	199
9. Cleft palate & cleft lips	139	149	261	148	174
10. Uterovaginal Prolaps	181	183	145	163	168
11. Meningitis	84	91	101	79	88

Source: BHU

(6) Major Fatal Diseases

The following table shows mortality rates by disease. Circulatory system diseases such as C.V.A. and myocardial infraction are leading killers next to encephalitis. However the total number of encephalitis patients is only 290 indicating that such disease does not so commonly occur. Tuberculosis which has been almost completely stamped out in the advanced nations, shows a mortality rate of 12% and claims on average 66 lives a year, which indicates a pressing need for early handling of this and other infectious diseases.

Table 2-21 Mortality Rates by Disease 1987-1991

(%)

DISEASES	1987	1988	1989	1990	1991
1. Encephalitis	70.7	56.6	50.7	50.8	44.2
2. C.V.A.	30.7	31.4	41.5	27.0	37.6
3. Myocardial Infraction	32.5	26.2	18.7	26.4	30.7
4. Ischemic Heart Diseases	21.0	20.6	14.6	15.4	14.7
5. Tuberculosis Pul	12.8	14.5	13.8	12.1	10.9
6. Malignancy of Stomach	11.9	8.1	15.3	13.7	11.9
7. Nephrotic Syndrome	7.4	9.2	13.5	9.7	11.5
8. Diabetic Millitus	9.7	6.7	5.7	6.6	5.8
9. Chronic Rheumatic Heart Diseases	5.8	6.7	4.1	8.0	5.7
10. Intestinal Obstruction	3.1	3.7	5.8	3.6	3.7

Source: BHU

The following table shows infectious disease cases and fatality figures. This also highlights the seriousness of the tuberculosis and encephalitis mortality rates.

Table 2-22 Cases and Fatalities by Infectious Disease 1987-1991

DISEASES	1987		1988		1989		1990		1991	
	Case	Death	Case	Death	Case	Death	Case	Death	Case	Death
1. Pulmonary Tuberculosis	475	61	571	82	496	76	512	58	498	54
2. Encephalitis	171	121	198	112	201	102	181	92	201	89
3. Typhoid fever	168	22	198	27	211	20	151	17	177	16
4. Other Pneumonia	98	29	132	37	124	25	107	19	81	25
5. Lobar Pneumonia	81	27	101	21	107	23	96	15	72	15
6. Tuberculosis of other forms	35	-	46	3	51	2	68	7	47	2
7. Malaria	23	9	39	11	41	10	36	8	26	7
8. Filariasis	23	-	27	-	35	-	39	-	31	-
9. Polimyelitis	21	-	36	-	32	-	30	-	27	-
10. Diphtheria	2	-	1	-	3	-	1	-	1	-
11. Rabies	1	1	-	-	-	-	-	-	-	-

Source: BHU

(7) Inpatient Statistics

The following table shows results concerning inpatients for each department ward. The annual number of inpatients totals over 22,500 and the average hospitalization period is three weeks. Excluding the figures for delivery of birth, the number of inpatients to the opthalmic department is strikingly high and is thought to be indicative of the high numbers of infectious eye disease cases.

Table 2-23 Statistical Analysis of Inpatient Care (1992)

Sl. No.	Ward	Beds	Admission	Discharge	Death
1.	Eye	50	2,381	2,373	-
2.	E.N.T.	25	266	259	3
3.	Dental Surgery	4	42	42	-
4.	Radio Therapy	12	380	372	3
5.	Paed. Surgery	20	440	430	25
6.	Paed. Medicine	41	1,158	1,143	185
7.	Traumatic	32	393	381	8
8.	Special	42	666	656	21
9.	Chest	25	508	502	53
10.	Post Partum	20	679	682	-
11.	Psychiatry	25	200	189	2
12.	Maternity	47	2,380	2.375	18
13.	Gynecology	33	503	497	-
14.	General Medicine－A	53	1,302	1,290	392
15.	General Medicine－B	14	300	300	105
16.	Cardiology	19	411	405	81
17.	Neurology	19	378	367	49
18.	Endocrinology	14	275	267	22
19.	Nephrology	10	275	270	34
20.	Gastroenterology	20	445	439	69
21.	Male Surgical－A	52	1,265	1,261	35
22.	Male Surgical－B	14	331	330	20
23.	Orthopaedics	31	568	557	9
24.	Female Surgical－A	38	1,127	1,129	49
25.	Female Surgical－B	14	392	390	21
26.	Neurosurgery	19	335	330	26
27.	Urology	21	318	311	3
28.	Plastic Surgery	29	401	393	3
29.	Thoracic Surgery	16	440	432	7
30.	Skin & V.D.	18	71	68	3
31.	Cor. Care Unit	6	349	342	101
32.	Casualty	17	385	378	68
33.	Kaya Chikitsa - Male	48	1,030	1,020	38
34.	Kaya Chikitsa - Female	24	491	487	21
35.	Shalya-Shalayakaya-Male	23	514	511	－
36.	〃 -Female	10	126	124	－
37.	Stree Roga	14	258	247	1
38.	Prasuti - Tantra	8	851	848	－
	Total	927	22,634	22,398	1,475

Source: BHU

(8) Outpatient Statistics

The table 2-24 shows results concerning outpatients for each department ward. The opthalmic department again figures high up in third place behind the casualty and general medicine departments. The daily average for outpatients is 1,500 of which 6% or 80 are hospitalized.

Table 2-24 Classification on Outpatient
new and repeat basis (1992)

(patient)

Sl. No	Name of O.P.D.	New	Old	Total
1.	Cardiology	5,316	3,148	8,464
2.	Thoracic Surgery	1,110	2,944	4,054
3.	Thyroid	475	1,184	1,659
4.	Pain Clinic	158	138	296
5.	Urology	2,982	1,810	4,729
6.	Plastic Surgery	1,738	2,053	3,791
7.	Dental Surgery	10,632	9,536	20,168
8.	Neuro Surgery	1.360	964	2,324
9.	Neurology	3,818	2,610	6,428
10.	Psychiatry (Adult)	4,960	9,040	14,000
11.	Psychiatry (Child)	170	151	321
12.	Skin & V.D	17,592	13,920	31,449
13.	Nephrology	751	1,071	1,822
14.	Diabetic	3,018	2,994	6,012
15.	Endocrinology	3,735	3,586	7.321
16.	General Medicine	24,276	11,225	35,501
17.	Gastoenterology	5,544	3,583	7.321
18.	General Surgery	19,091	6,369	25,460
19.	Orthopedics	21,970	13,091	35,061
20.	Chest	12,375	7,967	20,342
21.	Ortho Rehab.	11,027	9,686	20,713
22.	Gynecology	12,573	6,302	18,875
23.	Ante Natal	1,254	943	2,197
24.	Post Partum	–	–	4,192
25.	Radio Therapy	1,086	4,622	8,708
26.	Eye	8,477	23,811	32,288
27.	E.N.T.	19,818	8,198	28,016
28.	Pediatrics Medicine	14,304	5,290	19,594
29.	Pediatrics Surgery	3,028	2,014	5,042
30.	Kaya Chikitsa	13,979	4,924	18,903
31.	Prasuti Tantra	13,241	8,020	21,321
32.	Shalya-Surgical Sec.	7,157	1,402	8,559
33.	Ano-Rectal	1,011	2,200	3,211
34.	Dravya Guna - Drug	1,067	403	1,470
35.	Rasa Shastra	517	275	792
36.	Haematology	56	499	555
37.	Casualty	35,515	–	35,515
Total		285,118	180,225	465,343

Source: BHU

(9) Present Situation of Main Departments

Following are present staff and services of the faculty in modern medicine.

1. Department of Anatomy

1) Staff

(person)

Professor	3	Senior Resident	6
Reader	6	Laboratory Technician	18
Lecturer	4	Laboratory Attendant	6
Doctor	1	Administrative	3

2) State of Services

The department which came into being in August 1960 gives at present, the lecture and training on Anatomy and Histology to sixty students for the duration of 18 months.

The research activity covers teratology, neuroanatomy, anthropology, cytogenetics, and other subspecialties of Anatomy. The department has published more than 350 research papers in various international journals.

The department had been conducting chromosomal studies of various patients attending the Department of Pediatrics and Obstetrics and Gynecology. Karyotyping and Genetic counselling has been routine service rendered over a period of the past ten years.

However, these activities have been stopped due to the shortage of equipment and the examination has partially been transferred to the Central Clinical Laboratory.

The principal equipment of this department is composed of that for pathology and dissection tables. The dissection hall and 31 units of dissecting tables are being kept in good condition. The equipment in the laboratory is automatic tissue processor, dissecting microscopes, research microscopes, freezing microtome and automatic knife sharpener, etc. which are all functionable although past their durable lives.

2. Department of Biochemistry

1) Staff (person)

Professor	2	Senior Resident	0
Reader	1	Laboratory Technician	0
Lecturer	2	Laboratory Attendant	0
Doctor	0	Administrative	0

2) State of Services

The department which started in 1964 engages in the research activity of medical biochemistry, neuro-biochemistry and molecular biology. Although hospital service was not included in the function of this department at the beginning, this department has an isotope facility and engages in the improvement of research and analysis since the department is now being entrusted in analyzing the specimens from patients. Joint studies with other departments are actively conducted.

The principal functioning equipment is liquid scintillation counter, Spectrophotometer and Deep freezer.

3. Department of Biophysics

1) Staff (person)

Professor	1	Senior Resident	0
Reader	1	Laboratory Technician	2
Lecturer	1	Laboratory Attendant	1
Doctor	0	Administrative	1

2) State of Services

This department which was established in 1971 is a comparatively new department and engages in research work in cooperation with the clinical department of the Hospital and provides teaching in biophysics to the undergraduate and the postgraduate. Teaching curriculums for the departments of surgery, pathology and medicine are shared partially by this department of biophysics. From 1973, the department has received resident and research scholars from the department of surgery and pathology and eight persons have obtained

Ph. D. degree and three persons are working on research.

The main equipment is ultra centrifuge, high speed refrigerated centrifuge, liquid scintillation counter, colorimeter, deep freezer, ultrasonic vibrator and electrical single pan balance etc. And although most of it was installed in 1973 and is beyond its durability life, it are functionable. In addition, a spectrophotometer installed in 1987 is being used.

4. Department of Physiology

1) Staff (person)

Professor	2	Senior Resident	1
Reader	0	Laboratory Technician	0
Lecturer	0	Laboratory Attendant	0
Doctor	1	Administrative	0

2) State of Services

Electroencephalograph, electromyograph and electrocardiograph are being installed although they are old models. This department engages in neurophysiological assessment of the neuropsychiatric patients and studies of sport medicine specializing in electrophysiological techniques.

In spite of scarcity of the equipment, the research work is active and the department has published 16 research papers during the last five years in reputed journals. Keeping close relationship with universities in U.S.A. and U.K., the department has positively participated in international conferences.

As principal equipment, beta counter, gamma counter, oscilloscope, computer and refrigerated centrifuge are installed and measuring instruments are rather new.

5. Department of Pharmacology

1) Staff

(person)

Professor	2	Senior Resident	0
Reader	4	Laboratory Technician	40
Lecturer	1	Laboratory Attendant	30
Doctor	4	Administrative	7

2) State of Services

In addition to the educational activities and studies of pharmacology, the department conducts the research and development of medicines to be used in the hospital.

Clinical trial with musa-pep (dried powdered plantain banana) in patients suffering from peptic ulcer disease has recently yielded encouraging results. Furthermore, the study is going on for the establishment of a system of therapeutic drug monitoring. The department has fully operated laboratory rooms and 73 specialists have undergone training here.

The department is equipped with telethermometer, colorimeter, deep freeze, ECG, electrophoresis apparatus, flame photometer, gas chromatograph, high speed liquid chromatograph, microtome, refrigerated centrifuge and spectrophotometer etc. most of which are more than ten years old.

6. Department of Pathology

1) Staff

(person)

Professor	6	Senior Resident	0
Reader	3	Laboratory Technician	0
Lecturer	3	Laboratory Attendant	28
Doctor	9	Administrative	0

2) State of Services

The department of pathology established in 1962 has lectureships on immunopathology, cytopathology, haematology and histopathology. The number of specimens received has grown to over 15,000 in the area of gastroenterology, urology, endocrine, nephrology,

neuropathology and oncologic pathology. The examinations of the specimens are conducted in collaboration with the departments of medicine pediatrics and obstetrics. The department has produced 72 specialists and has published over 500 research papers during the last 30 years.

The department is equipped at present with deep freeze, refrigerated centrifuge, haematocrit centrifuge, spectrophotometer, freezing microtome, platelet aggregometer and research microscope.

The department plays important role as the pathology examination function of the attached Hospital. It is no exaggeration to say, however, that the equipment is old and obsolete.

The functions of the divisions and the man power are as follows.

Cytopathology division

The division conducts histologic diagnosis and the detection of cancer is the most important area, and provides diagnosis with fine needle aspiration cytology totaling over 5,000 specimens per year.

Haemotology division

The division concentrates on the fields of blood coagulation, leukaemias and anaemias, and studies on coagulation have been conducted and these studies are regarded as the best achievement ever made in India in this field.

Immunopathology division

The Immunopathology division was established in 1966. The division is performs a large number of immunological test and diagnosis studies. The division is also doing tests for assessment of cell mediated immunity and for myeloma. Serologic diagnosis has been carried out for autoimmune diseases such as rheumatoid arthritis, diabetes, thyroid disorders and collagen disease. The division is also a Immunodiagnostic Training & Research Centre receiving a grant from the University Grant Commission (UGC).

7. Department of Microbiology

1) Staff (person)

Professor	2	Senior Resident	0
Reader	5	Laboratory Technician	4
Lecturer	4	Laboratory Attendant	4
Doctor	6	Administrative	6

2) State of Services

The department located in the three stories building next to the Institute of Medical Sciences which is apart from central area of the attached Hospital, engages in the study and diagnosis of bacteriology, immunology, parasitology, cytology, and virology etc..

In addition to its annual 50,000 examinations, studies are being conducted on diabetes caused by pulmonary tuberculosis, acute respiratory infection in children, and genital organ mycoplasma of pregnant women.

The department also plays a role as one of 12 centres for testing fluorescent polio vaccine.

The department fulfills the important function of undertaking the microbiological examinations of the attached hospital. The department has comparatively new procured equipment such as ultra deep freeze, deep freeze, refrigerated centrifuge, laminar flow, incubator. ELISA reader, CO_2 incubator, inverted microscope and fluorescent microscope etc.. As for a culture medium, agar is used and filled manually.

8. Department of Forensic Medicine

1) Staff (person)

Professor	0	Senior Resident	0
Reader	1	Laboratory Technician	2
Lecturer	1	Laboratory Attendant	2
Doctor	2	Administrative	4

2) State of Services

The department was established in 1964. Lecturers have exclusively been assigned and a specialist course or postgraduate training has been conducted since 1972.

The department engages not only in medicolegal postmortem examinations on the request of the judicial police but also in giving lectures and training of forensic medicine and dissecting to the students. The number of postmortems is about 1,500 per year.

Moreover, the department conducts various studies in collaboration with other departments as well as research work on drug abuse, toxicological analysis, suicide, violent asphiyxial death, homicide and accident death. The department carries also out judicial dissection of the dead bodies which are carried in.

The present judicial dissecting table is accompanied by a lecture theatre. However, since facilities required for the dissecting table are inadequate, construction is going on in an adjacent lecture theatre to build a dissecting table with the adequate facilities.

Most of the equipment which was procured in the years of 1970's is being used efficiently. Major equipment is autopsy table, dissecting microscope, microtome, tissue processor, dry oven electrophoresis apparatus, densitometer, high speed homogenesis, spectrophotometer and tissue chromatograph.

9. Department of Medicine

1) Staff (person)

Professor	3	Senior Resident	6
Reader	6	Laboratory Technician	18
Lecturer	4	Laboratory Attendant	6
Doctor	1	Administrative	3

2) State of Services

The department conducts the diagnosis and examination of Kala-azar, malaria, tuberculosis, aids and other immuno deficiency diseases. As for the laboratories, there are three in the department and three in the Hospital. Most of the equipment is basic and the majority of it is old and out of order.

The attached Hospital treats 35,000 out-patients (over 100 patients per day) and 2,500 in-patients annually.

The principal equipment is flamephotometer, spectrophotometer, refrigerated centrifuge and colorimeter etc..

9-1. Division of Endocrinology

1) Staff (person)

Professor	1	Senior Resident	0
Reader	0	Laboratory Technician	1
Lecturer	1	Laboratory Attendant	1
Doctor	6	Administrative	1

2) State of Services

The division has a laboratory in the Hospital, and also has an out-patient consultation room, 14 in-patient beds and one research chamber in the research building.

A 2 year post-doctoral course was started in 1976 and so far 15 such candidates have qualified. About 100 research papers have been published in domestic and international journals. The major existing equipment is U.V. spectrophotometer, flamephotometer, refrigerated centrifuge, manual gamma counter, automatic gamma counter, ECG, computer and incubator etc. all of which was procured during the 1970's and is functioning well.

9-2. Division of Gastroenterology

1) Staff (person)

Professor	1	Senior Resident	0
Reader	1	Laboratory Technician	4
Lecturer	1	Laboratory Attendant	3
Doctor	1	Administrative	1

2) State of Services

The division was started within the Department of Medicine in 1971. Due to the non-existence of any other education facilities of its kind, with the exception of this division of IMS, in north eastern India, the students who graduate this division are working as gastroenterology specialists all over India.

Up to now, the number of specialists who received training in this division is 14 and the number of the postgraduates is 106. 128 research papers have been published in Indian and international journals. In the last five years 29 research paper have been presented at the Annual Conference of the Indian Society of Gastroenterology. Present researches being conducted are, for instance, "Clinical Trial of Traditional Remedies in Viral Hepatitis" and " the Role of Holicobacter Pylori in Patients of Peptic Ulcer Disease".

The number of beds is 20. The main responsibilities of the division are diagnosis by upper and lower endoscopy, absorption test, parasitological test and diagnosis as well as therapy of gastrointestinal tract, liver duct, bile duct.

The annual number of out-patients is 7,600. The major existing equipment is upper gastrointestinal fiberscope, colon fiberscope, laparoscope and duodenum fiberscope etc.. Although the division is active, the shortage of the equipment compared to the number of patients as well as the lack of a video endoscopy system and side viewing system is considered to reduce the efficiency of diagnosis and educational functions. The housing and handling of the equipment is not done properly and the sterilization system for the fiberscopes is not well equipped.

9-3. Division of Neurology

1) Staff

(person)

Professor	1	Senior Resident	2
Reader	2	Laboratory Technician	1
Lecturer	1	Laboratory Attendant	1
Doctor	8	Administrative	2

2) State of Services

The division conducts brain wave tests, electromyogram tests and echo-encephalographic tests. Few equipment is assigned to the division and it is somehow functioning despite its old age.

150 rupees are charged from patients for such tests and the charge collected is directed to a revolving fund for maintenance of equipment.

The electrophysiological system is under annual service contract. The cost of the service contract is 33,000 rupees (approx. 120 thousand yen) per annum.

The major existing equipment is 16 channel electro-encephalograph (EEG) machine (made in 1979), 10 channel EEG machine, 4 channel electromyogram (EMG) system, echo-encephalograph (1972) and electrophysiological systems (1984). However, the EMG system and one echno-encephalograph unit are not functioning.

9-4. Division of Nephrology

1) Staff

(person)

Professor	1	Senior Resident	0
Reader	1	Laboratory Technician	8
Lecturer	2	Laboratory Attendant	1
Doctor	0	Administrative	8

2) State of Services

The division was established in 1976. It is one of 6 centres which impart specialists (nephrology) in India. In India, the first living kidney transplant was performed in 1968.

The division presently aims to be a representative centre for the establishment of regular kidney transplants including cadaveric transplant and for the issue of diplomas in dialysis technology. The division has trained 15 specialists and now they are actively working in related facilities. The target of the division is to conduct kidney transplants for the therapy of chronic renal failure. However, the present situation does not allow the conducting of transplants due to the shortage of essential equipment such as dialysis monitors, and therefore presently can only deal with patients of acute renal failure. The division, in future, plans to realize renal transplants in response to the needs of patients coming from an extensive area.

Although 4 units of Haemodialysis monitor are installed, only one unit is functioning normally. This equipment is operated by two 12 hour shifts.

The patients are charged for the therapy with 1,000 rupees for the first time and 500 rupees next time and thereafter.

The introduction of a water treatment system (R.O. apparatus) is being planned and the space for the system has been secured. Due to funding difficulties however, the dialysis is at present conducted using ordinary distilled water. A peritoneal dialysis machine is not installed and, instead, I.V. hanger stand and urine collector under the bed are used for the purpose. Other existing equipment is laboratory equipment such as flame photometer, osmometer, blood gas analyzer etc., and most of it is functioning although it past its durable life.

9-5. Division of Cardiology

1) Staff (person)

Professor	6	Senior Resident	0
Reader	3	Laboratory Technician	3
Lecturer	7	Laboratory Attendant	10
Doctor	1	Administrative	2

2) State of Services

The division of cardiology which came into existence in 1962 works not only to give training in cardiology to undergraduates and postgraduates but also to provide clinical services as a part of the Hospital.

Clinical services are being given on average to 20 new patients per day, 30 re-entry patients per day and 8~10 patients per day for echocardiograph.

The major equipment is holter recorder, stress test system and echocardiograph etc., and the division plans to install an angiocardiography system and echocardiograph with colour doppler to cope with cardiovascular surgery in the future.

10. Department of Surgery

1) Staff (person)

Professor	6	Senior Resident	0
Reader	3	Laboratory Technician	3
Lecturer	7	Laboratory Attendant	10
Doctor	1	Administrative	2

2) State of Services

The department came into existence as one of the departments of the College of Medical Science in 1962. The department was expanded when the college was upgraded to Institute of Medical Sciences in 1971.

Three hundred postgraduates have graduated from the department till date. In all there are 24 operating rooms large and small. Most of them belong to respective specialty divisions.

The condition of equipment in the operating theaters is more or less the same although their purposes are different. Most of it is beyond its durable life. Operations are being performed in a situation of insufficient illumination, unreliable anesthesia machines and ventilators, and malfunctioning operating tables a or tables not suited to modern surgery. The operating theaters in the Central Bloc are equipped with oxygen and suction pipes. In the

speciallity operating theaters, however, no special operating tables are installed. The operating instruments are not in satisfactory condition. Though cardiovascular surgery is scheduled to commence this year, there is almost no equipment necessary for the surgery, and the preparation of instruments is also unsatisfactory.

The number of operations performed in 1992 was 32,838 inclusive of neurosurgery, urology, orthopedics, paediatrics and thoracic surgery.

10' Post Operative Recovery Room

There is one recovery room each for the Central Operating Bloc on the 2nd and 3rd floors, and one at the Casualty Operating Bloc.

Each room has 5~8 beds and is used as post operative recovery and ICU room. However equipment installed there is nothing but ventilators more than 15 years old and cardiac monitors etc.. Therefore post operative recovery rooms only exist in name only.

10-1. Division of Plastic Surgery

1) Staff

(person)

Professor	2	Senior Resident	0
Reader	1	Laboratory Technician	1
Lecturer	1	Laboratory Attendant	1
Doctor	0	Administrative	1

2) State of Services

The division started functioning in 1964. The specialist course was started in 1976. So far, 50 candidates have obtained the qualification.

Special areas of therapy are burns, maxillofacial surgery and microvascular surgery. The division has 31 beds in the Hospital including those for burns patients.

The major equipment is operating microscope (1983), operating table (1978), shadowless lamp (1978), high pressure steam sterilizer (1978) and dry oven. All of it excluding the operating microscope is past its durable life and it is functioning with low efficiency.

10-2 Section of Neuro Surgery

1) Staff (person)

Professor	1	Senior Resident	0
Reader	1	Laboratory Technician	0
Lecturer	1	Laboratory Attendant	0
Doctor	0	Administrative	0

2) State of Services

This section is functioning as the therapy division of the X-ray diagnosis Department, and conducts surgical therapy of brain troubles through diagnostic analysis by head CT scanner.

The equipment such as operating table, shadowless lamp, anesthesia machine and instrument table etc. is installed to the extent of being able to perform common neuro surgery. The equipment is, however, superannuated and needs to be renewed.

10-3. Division of Cardiovascular and Thoracic Surgery

1) Staff (person)

Professor	4	Senior Resident	2
Reader	4	Laboratory Technician	1
Lecturer	0	Laboratory Attendant	1
Doctor	1	Administrative	1

2) State of Services

The division has a ward with 16 beds, 6 bedded post operative intensive care rooms, operating theater, library and laboratory.

The major activities are the research and therapy of benign or malignant olsphagus tumor, closed mitral valvotomy, mediastinum tumor, ligation of patent ductus arteriosis, lung cancer, blalock taussing shut and heart trouble caused by accident. At present, the preparation is going on for the introduction of an extracorporeal circulation system to conduct surgery for coronary arteries bypass, valve replacement and congenital heart disease.

The major equipment is operating table, shadowless lamp, suction

machine, spirometer and ventilator etc., but it is superannuated although still functionable. Blood gas analyzer and patient monitor etc. are not functioning.

10-4. Division of Urology

1) Staff (person)

Professor	2	Senior Resident	0
Reader	1	Laboratory Technician	2
Lecturer	1	Laboratory Attendant	1
Doctor	4	Administrative	0

2) State of Services

The division of urology was established in 1970 and a specialist training programme started in 1978. The therapy in which the division is interested is the introduction of ultrasonic lithotripter for stone disease.

Around ten out of fifteen patients who receive consultation in the division usually suffer from stone disease. With the increase of population and frequent use of anticancer drugs, the incidence is bound to rise. In view of these facts, the hospital aims to respond to the needs of the patients as it is the core hospital in the area.

The division plans to research tropical diseases, urine and filaria. The division fulfills a role of fostering medical staff and 10 specialists have been sent out to medical colleges at West Bengal, M.P. State, U.P. State, and Bihar etc..

The division is provided with 40 beds, urethroscopic operating theater and urology operating theater, and conducts surgical therapy of nephrology stone, bladder stone, ureter stone and prostatectomy etc..

The major equipment is operating table, shadowless lamp, uretheroscope uroflowmetry, resectoscope and urodynamic equipment. Most of the equipment was installed in the 1970's and is of low efficiency due to superannuation.

10-5. Division of Pediatric Surgery

1) Staff (person)

Professor	1	Senior Resident	0
Reader	1	Laboratory Technician	2
Lecturer	2	Laboratory Attendant	2
Doctor	0	Administrative	1

2) State of Services

There are twelve centres of pediatric surgery in India. This division is the only centre of pediatric surgery between New Delhi and Calcutta at present, and was the sixth of its kind in India when established in 1967. A specialist teaching course was opened in 1976. The average yearly attendants of old and new cases during the last five years was 2,500~3,700 and 3,500~4,200 per year respectively. There are 22 pediatric surgical regular beds. The routine admission has ranged from 800 to 1,200 per year.

Regular operations are held 3 days a week only, and emergency operations are done daily. There are 500 to 1,000 elective cases and 600 to 1,200 emergency cases per year. On coverage 2~3 surgical emergencies are admitted daily out of which one case is a neonate.

So far 15 students for the speciality have graduated. Thirty nine papers have been published during the last five years of which 22 papers are published in international journals.

The construction of a three storied patient ward building including out-patient, neonatal and operation theatre rooms is in progress and for which the University Grant Commission (U.G.C.) has sanctioned special funds.

The development of pediatric urology is also being planned.

At present, however, there is no prospect for the procurement of equipment. The equipment presently functioning is diathermy (1984), paediatric anesthesia machine/ventilator (1992), oxygen monitor (1992), paediatric cystoscope (1984) and centrifuge (1975) etc.. However, cystoscope (1978), diathermy (1965, 1979) autoclave (1965), large type autoclave (1980) suction machine (1980, 1976), paediatric ventilator (1975), incubator (1965) and spectrophotometer (1975)

etc. are not functioning. Furthermore, most of the equipment in the operation theatre is past its durable life. Its urgent replacement is therefore essential.

10-6. Division of Oncology

1) Staff (person)

Professor	1	Senior Resident	0
Reader	1	Laboratory Technician	0
Lecturer	1	Laboratory Attendant	0
Doctor	2	Administrative	0

2) State of Services

The division was established in 1990, and is the newest Division of the Department. The division engages in the research and therapy by laser mostly for superficial cancer such as skin, stomach, oral and tongue cancers and also engages in the study of clinically applied therapy in cooperation with general surgery.

So far, therapies have been given to about 650 out-patient and in-patients altogether.

The principal equipment is concentrated in the laser operating theatre. The laser operating theatre established two years ago is kept in the best condition within this division. Introduction of an Nd-Yg Laser system and 100W video endoscope with air and water pipes, new operating lamp of combination type, operating table of recent type and laser operation which is effective and safe particularly for the therapy of malignant tumor have led to an increase in the number of the patients for such surgery. There is also a plan to install a CO_2 laser for the upgrade of therapy.

11. Department of Obstetrics & Gynecology

1) Staff (person)

Professor	4	Senior Resident	0
Reader	3	Laboratory Technician	4
Lecturer	4	Laboratory Attendant	8
Doctor	3	Administrative	2

2) State of Services

The number of patients per day is about 90~100. The number of operations per annum is about 3,000. The number of deliveries per day is about 20.

The department has 75 beds, labour rooms, operation theatres and 4 rooms for bio-chemistry laboratories. Being similar to other departments, this department also has a teaching programme. So far, 148 specialists have passed out from postgraduate training.

The department has 2 laparoscopes which are 22 years old, one colposcope used for 22 years and one cardio-tocograph which is 12 years old. They have to, sooner or later, be replaced due to their old ages. The equipment in the operation theatres are also old and needs to be renewed.

Delivery facilities are hardly equipped at all having only iron beds. There is no vacuum extractor. Such being the case, the situation is very poor.

12. Department of Preventive & Social Medicine

1) Staff (person)

Professor	2	Senior Resident	0
Reader	1	Laboratory Technician	0
Lecturer	1	Laboratory Attendant	0
Doctor	0	Administrative	1

2) State of Services

The department was established in 1962 and commenced a postgraduate training system in 1965.

The department engages in its activities with the aim of

improving nutrition, health and social life of the people through the research of epidemiology and medical statistics. So far, the number of the specialists who received the training in this department has reached 105. The department does not conduct clinical services for patients.

Some of the important research projects associated with other international and national organizations are listed below.

1. Pilot project on the control of urban and rural filariasis in collaboration with National Institute of Communicable Diseases (NICD)
2. Research project on cholera carriers in Varanasi a non-endemic area
3. The Ganges water pollution study at Varanasi
4. The impact of development programmes on nutrition in the Banda District of Uttar Pradesh.
5. Feasibility of using a demonstration module for community control of rheumatic fever and rheumatic heart disease in Varanasi.
6. Project on operation research in delivery of primary health care in Varanasi District.
7. National programme on control of acute respiratory infections in Gazipur District.
8. Surveillance for vaccine preventible disease in Varanasi District.
9. Surveillance of leprosy and collaboration for an eradication programme.
10. Surveillance of drug abuse.

The major equipment is computer, microscope, autoclave, centrifuge and other equipment for educational purposes. It is functioning although old.

13. Department of Anesthesiology

1) Staff (person)

Professor	1	Senior President	5
Reader	5	Laboratory Technician	2
Lecturer	7	Laboratory Attendant	2
Doctor	16	Administrative	5

2) State of Services

The Field of anesthesia is wide enough to cover the activities in the operation theatre, the management of patients in post operative recovery rooms, and administration of obstetric analgesia. Cardio-pulmonary resuscitation and pain clinic. The number of the services rendered per annum is about 18,000. The equipment including an anesthesia machine in the department is obsolete and insufficient and therefore needs to be renewed . The major functioning equipment at present is 3 ventilator units, 19 Anesthesia machines, 2 oxygen monitors, 2 defibrillators and 5 ECG. This equipment is just about working, but most of is is prone to become non-functionable at any moment.

14. Department of Skin & Venereology

1) Staff (person)

Professor	0	Senior President	0
Reader	2	Laboratory Technician	0
Lecturer	1	Laboratory Attendant	0
Doctor	1	Administrative	1

2) State of Services

The department has a skin clinic in the Hospital rendering diagnosis and therapy for out-patients and at the same time, conducts research on infectious skin diseases, allergies, gonorrhea and syphilis etc. The types of equipment are few and the major ones are fluorescent microscope, centrifuge, incubator and spectrophotometer. The equipment is comparatively new and in good working condition.

15. Department of Tuberculosis and Respiratory Disease

1) Staff (person)

Professor	1	Senior President	0
Reader	1	Laboratory Technician	0
Lecturer	3	Laboratory Attendant	3
Doctor	7	Administrative	0

2) State of Services

The department was inaugurated as one of the divisions of the Department of Medicine in 1964 and promoted as a department in 1988. The number of out-patients per annum is approx. 30,000 and about 1,500 are admitted as in-patient to receive treatment. The principle diseases to be dealt with are respiratory diseases such as lung tuberculosis and its complications, asthma and phneumonia etc.. The department has a patient ward with 25 beds for lung tuberculosis and diseases of respiratory organs. The O.P.D. and Laboratories are running 6 days a week. The number of postgraduates passed till date is 50. More than 250 research papers have been published in journals. The major equipment assigned to the department is spirometer and electorcardiograph etc.. The equipment is around 5~7 years old and functioning.

16. Department of Radiology (diagnosis)

1) Staff (person)

Professor	3	Senior President	6
Reader	2	Laboratory Technician	11
Lecturer	1	Administrative	3

2) State of Services

The department which was established as a part of the Department of Surgery in 1960 started postgraduate teaching in 1962. The specialist course was added when the Medical College was upgraded to the Institute of Medical Science. The number of the patients per annum is 70,000. The department has expanded its activities for secondary and tertiary care through introducing ultrasound and CT head scanner over

the last ten years. Fifty-six specialists have passed out so far. At present, X-ray unit for diagnosis and mobile type of X-ray etc. are installed but most of this is superannuated.

17. Department of Ophthalmology

1) Staff (person)

Professor	2	Senior President	0
Reader	2	Laboratory Technician	5
Lecturer	1	Laboratory Attendant	5
Doctor	2	Administrative	2

2) State of Services

The department is situated in the building with the Dept. of Otolaryngology away from the main hospital Bloc. This department is operated on the pavilion model and has independent O.P.D., operating theatre and laboratories. The department conducts the therapy of cataract and glaucoma, sight tests and glasses unusual acuity examinations. The number of patients is about 25,000 annually and more than 4,000 cases of surgery are performed. The operation theatre is surrounded by a balcony from where students can observe the operations. Due to the high ceiling above, sufficient illumination can not be obtained from the superannuated shadowless lamp hanging down from the ceiling. The major equipment presently possessed is ophthalmoscope, slit lamp, fundus camera, operating microscope, anesthesia machine and ultrasonography etc., but most of it is superannuated and the lack of basic equipment for modern ophthalmology is conspicuous.

18. Department of Pediatrics

1) Staff (person)

Professor	7	Senior President	0
Reader	3	Laboratory Technician	8
Lecturer	6	Laboratory Attendant	0
Doctor	21	Administrative	5

2) State of Services

In India, children constituting 40% of the total population are said to undergo some sort of medical treatment. This department is the only pediatrics speciality hospital between New Delhi in the west and Calcutta in the east, and regarded as the top referral hospital in the area. The number of beds is 40 including for neonatal ones. This department with the department of pediatric surgery is located in the independent building which is apart from the main hospital building. This department has routine laboratory, O.P.D., operating theatre for the department of pediatrics and neonatal room which accommodates neonatal patients referred from other hospitals. The neonatal room for immature infant and abnormal neonate is located in the main hospital building. There are 2 patients wards each of which accommodates 20 patients. It is inferred that the sanitary conditions may be bad when the ward is crowded with patients due to darkness and insufficient ventilation of the wards. The laboratory is able only to perform blood cell count and to measure Ht. Hb.. The situation of neonatal accommodation is worse with such circumstance as heaters being used for room heating and the windows being opened for ventilation purposes. 203 specialists who were trained in this department have been passed out. The number of research papers published in journals during the past five years is 133. In addition to regular diagnosis and therapy activities, special infant therapy such as high risk neonate, immunity activity including vaccine, medical services for children in remote countryside areas and nursing guidance for mothers are being performed.

This department is very crowded because 40% of all children in India are said to come to the Hospital. Therefore the expansion work of the department has already begun. The construction work began this year and will be completed by the end of the year. Due to this situation, it was noticed during the site survey that 12 beds were placed in the corridor. Furthermore, this department does not have PICU, therefore the patients who should be managed in ICU are accommodated in ordinary wards. The hospital is contemplating the establishment of a PICU of 10 beds (with approval already obtained from the university), however

there is no prospect for obtaining the equipment. The major existing equipment nearly all belongs to the laboratory. High performance liquid chromatograph (1987), spectrophotometer (1966), refrigerated centrifuge (1971), gamma counter, flame photometer (1985), colorimeter (1970) and oxygen monitor (1983) are working normally.

19. Department of Orthopedics

1) Staff (person)

Professor	0	Senior President	0
Reader	2	Laboratory Technician	4
Lecturer	2	Laboratory Attendant	1
Doctor	2	Administrative	0

2) State of Services

This department started as a part of the Department of Surgery, and became independent in 1970. The number of out-patients is 150~200 per day on average and 200~300 in busy seasons. The department has in-patient 64 beds for male and female altogether. The number of operations per week on average is 12, and the number of minor operations per week on average is 18~21. Furthermore, the department has an emergency operation theatre to cope with injury cases for 24 hours. The out-patient treatment room are small and dirty and always crowded with patients. There is a small rehabilitation room. The equipment consists of only simple rehabilitation instruments and a paraffin bath for thermotherapy. The operating equipment such as shadowless lamp, operating table, instrument table etc. is installed in the operating theatre. However, most of it is superannuated and of low efficiency. The surgical x-ray T.V. system which is essential for orthopedic surgery is presently out of order and unable to be repaired due to the fact that it is 20~30 years old.

20. Department of E.N.T.

1) Staff (person)

Professor	2	Senior President	2
Reader	1	Laboratory Technician	5
Lecturer	2	Laboratory Attendant	2
Doctor	4	Administrative	1

2) State of Services

The department is located with the Department of Opthalmology in the building apart from the main hospital building. The department is a kind of independent hospital having O.P.D. patient ward, operating theatre and laboratory. The department has 25 in-patient beds and receives the consultations of 100~150 patients per day. There are four out-patient consultation rooms having no E.N.T. treatment chairs and ordinary chairs are used for the treatment. Ordinary electric light stands are used for illumination purposes. There are 2 audiometers in the hearing test room. The department has a workshop where plastic hearing aids are manufactured independently. Sixty-two specialists have been passed out to the training programme. More than 160 research paper have been published in reputable domestic and international journals. The equipment in the operation theatre is superannuated. The operating table has a worn-out floor mattress and malfunction of vertical movement and the shadowless lamp does not provide sufficient illumination which hampers surgical activities greatly. On the other hand, the laryngoscope (1990), bronchoscope (1985) and refrigerated operating instruments (1983) are not old and in good working condition. Two operating microscopes are installed in microsurgery theatre.

21. Department of Radiotherapy

1) Staff (person)

Professor	2	Senior President	3
Reader	2	Laboratory Technician	2
Lecturer	2	Laboratory Attendant	6
	4	Administrative	3

2) State of Services

The department was established in 1967, and provided with deep X-ray machine and cobalt needle in 1969. A cobalt unit was introduced under Colombo Plan in 1969. A second cobalt unit was introduced in 1976. Brachy therapy for cervical cancer was installed in 1987. This department is the only one in Uttar Pradesh and Bihar states imparting specialist degrees (Radiotherapy). Twenty-three specialist degree students have been passed out till date.

The main existing equipment is 1 stationary cobalt unit (1969), 1 rotational cobalt 60 teletherapy unit (1976), 1 manual after loading system, 1 automatic after loading system (1987) and a treatment planning computer system (1990), etc.. However, the existing cobalt 60 teletherapy units are out of date and obsolete and thus cannot obtain accurate amounts of irradiation and correct angles. Thus, they are not appropriate for the modern therapeutic levels. Furthermore, it is considered essential that such deteriorated equipment be replaced from the viewpoints of higher medical education and the ever increasing number of patients.

22. Department of Dental Surgery

1) Staff (person)

Professor	6	Senior President	7
Reader	0	Laboratory Technician	0
Lecturer	0	Laboratory Attendant	0
Doctor	0	Administrative	0

2) State of Services

There are four dental treating rooms in one corner of hte OPD, and therapeutic treatment is given for about 120 patients per day with 5 dental units. The treatment is mostly tooth extractions. Therapy such as amalgam filling, crowning and prosthodontics covers only 10~25% of all treatment due to the inability of patients to pay and the inadequacy of equipment. The major existing equipment is 13 dental chairs out of which only 5 units are serviceable, one dental X-ray unit, centrifuge and electric furnace, etc. in the laboratory. Most of them are obsolete and of low efficiency and need to be replaced soon. This department which receives about 100 patients per day has several diagnosis/treatment units, but most of them are not functioning satisfactorily and are apparently superannuated. In addition, only one dental X-ray unit is functioning and therefore diagnosis efficiency is low. This department has a dentistry workshop but equipment there is insufficient and superannuated.

23. Department of Psychiatry

1) Staff (person)

Professor	3	Senior President	0
Reader	1	Laboratory Technician	3
Lecturer	0	Laboratory Attendant	2
Doctor	8	Administrative	5

2) State of Services

The facility of this department is independently located at a site 300 meters from the main hospital building. Basically the department does not have in-patient ward and is mainly engaged in the research of psychiatry. The major existing equipment is E.C.G., flame photometer, PH meter, polygraph and spectrophotometer, etc.. These items are old and some of them were not functioning.

24-3. Institute Workshop

1) Staff (person)

Electronic Engineer	3	Machine tool Mechanic	2
Electric Engineer	4	Lathe Mechanic	1
Mechanical Engineer	2	Telephone Mechanic	1
Glass Mechanic	1	Plumber	2
Carpenter	1	Others	3

2) State of Services

This workshop is in charge of the maintenance of facilities and equipment of the departments and the Hospital. Electric, electronic, wood working, metal, mechanical and glassware engineers are assigned to the shop. Their jobs are concerned in general with the maintenance of facilities and equipment. However, the maintenance of equipment which requires high grade of technology is entrusted to specialists from outside. The major existing equipment is 2 oscilloscopes, 2 testers, 1 digital tester, 4 units of D.C. power supply, lathe machine, grinder, radial drilling machine, pipe bending machine and wood working machine, etc. and most of this is out of date.

24-8 Blood Bank

1) Staff (person)

Professor	1	Senior Resident	0
Reader	1	Laboratory Technician	0
Lecturer	1	Laboratory Attendant	0
Doctor	0	Administrative	1

2) State of Services

In the Hospital which has a vast beneficiary population, this division is required to function as its largest blood bank and as the administration centre of AIDS. However because of insufficient facilities, the activities of the bank are confined only to blood gathering and decision on blood type. The bank entrusts the examination of HIV and hepatitis to the clinical pathology laboratory. The blood collected from donors is transfused to HIV patients on the

same day. With the equipment which is a large refrigerator of common type, the bank is not in a position to perform the role expected of it.

24-9 CSSD

1) Staff (person)

Worker	8	Boiler man	2

2) State of Services

CSSD carries out the sterilization of all materials and instruments in the hospital. High pressure steam sterilization is conducted on 700 sets of linen for surgery, eight sets of operating instruments and 100 sets of instruments for ward use. Out of the 4 the electric type steam sterilizers, 2 units are not functioning and CSSD presently performs somehow the sterilization with the remaining of 2 units. Therefore the situation makes it necessary for C.S.S.D. to do 16 hours work by 2 shifts. This also places a heavy burden on the sterilizers. These two sterilizers are already 10 years old and undergo frequent malfunctions. There is a fear of contact between the sterilized materials and the un-sterilized materials due to the use of the same corridor as entrance and exit for bringing-in and taking-out, and handling of them at the same place. In view of this fact, flow lines of the materials should be carefully taken into consideration together with the replacement of equipment.

24-10 Laundry

1) Staff (person)

Worker	10	Auxiliary Worker	5

2) State of Services

Washing of linen before the sterilization is done in the laundry room which is the next door to CSSD. Drainage is prepared according to the layout of the equipment. Two washing machines and hydro water extractors respectively are functioning but they are more than ten years old. One dryer is working somehow. The sterilizer which

previously used heat from the dryer now uses electricity as a heat source due to the damage of the boiler. The press machine cannot be used now because steam is used as the heat source.

24-11 Clinical Pathology

1) Staff

(person)

Professor	2	Senior Resident	0
Reader	0	Laboratory Technician	2
Lecturer	0	Laboratory Attendant	1
Doctor	0	Administrative	3

2) State of Services

The laboratory of clinical pathology serves as central laboratory for the Hospital, and conducts emergency blood test and special tests requested by each of the clinics concerned. The number of examinations per annum is more than 110,000. Items of examinations are general chemical examinations, examinations of medullary fluid, urinalysis, sperm examinations, examinations of abdominal dropsy and the fluid in the thoracic cavity and analysis of urinary protein, etc.. Two automatic chemical analyzers are more than ten years old and one of these is out of order. The consideration of the repair cost which is estimated to be 100,000 rupees, the state of breakdown and the anticipated level of use in the future do not justify its repair. The other one which is being maintained under the maintenance contract (17,000 rupees or about 85,000 yen per year) is prone to breakdown and its current annual working rate is less than 60%.

25. Nursing School

1) Staff

(person)

Principal	1
Nursing teacher	3
Instructor	4

2) State of Services

This facility was established in 1980 as an annex to the Institute of Medical Sciences and renders nursing education. First year class presently consists of 24 female and 3 male students. The education is now being given to 102 students from all parts of India for three years and a half. Education fees are exempted. However, it is obligatory to work for five years in the hospital after the graduation. The state government manages the financial matters of the Hospital. 562 nurses have been passed out so far. The education is divided into two parts. One is classroom lectures and the other is training in the local medical facilities. The training is a programme which combines education of the students with cooperation in primary health care. The existing equipment is dummies and nursing kits only. In particular it does not have a vehicle necessary for field work, which causes inconvenience to the training programme. Therefore the procurement of a vehicle is desired.

25-2 Molecular Biology

1) Staff (person)

Professor	1	Senior Resident	0
Reader	2	Laboratory Technician	0
Lecturer	0	Laboratory Attendant	0
Doctor	0	Administrative	0

2) State of Services

This is an independent department separated from the Department of Pathology which works on research of molecular biology requested by the University and the Hospital. This department is given financial assistance by organizations other than the University. The facilities and equipment of this department are quite substantial compared with the other departments. The department aims to maintain its stable function with its independent power generator, automatic voltage regulator and boiler air conditioning system. The equipment is installed by category in a single room, and research is done in such a way that the man in charge attends each room concerned. Existing

equipment at present is spectropolarimeter, atomic absorption spectrophotometer, DNA synthesizer, gas chromatography, laminor flow and centrifuge, etc., all of which is in good working condition.

(10) Operating Budget

The operating budget of the national universities is made up of an establishment budget and non-establishment budget, and is granted every year to each university from the Ministry of Human Resource Development via the University Grants Commission (UGC). The grant made to the B.H.U. is distributed to each department including the Institute by the University.

The University plays a big role in the running and control of the IMS, and it undertakes operations of the whole facility and depending on type and scale of expenditure, projects, which the Institute can control independently, whereas the Institute is responsible for controlling and running small scale maintenance. Fixed costs such as salary are directly borne by government funding. Moreover, the University is aware that the IMS possesses its sole source of income (the Hospital) and that it provides a service to the public, and so its income generation is being admitted. The Institute is attempting to stabilize its balance of payment for maintenance of equipments by the establishment of a revolving fund and the setting up of a charged inpatient ward.

The normal operation costs of each department are known as the Maintenance Grant. Excluding salaries, the Maintenance Grant allowed an annual amount of 6,000 rupees per bed in 1991 and 12,000 rupees in 1992 (total of 11.12 million rupees: about 39 million yen) in regard to costs.

(11) Outline of the site

There are about twenty ward blocks having one six floor ward block as a center, making it a wide and sprawling kind of hospital. The oldest parts have been consecutively built on since 1960 and among those areas

targeted by this project, the OPD Block was built in 1977, the OT Block in 1978, and the CSSD and Laundry Block in 1984. Excluding a few areas (Eye Hospital and Workshop in the Medical College), the construction is of pillars, steel reinforced concrete floor (Rahmen structure) and brick walls. As a result, walls are not so strong and partitioning should be easy so long as the pillars and girders are not altered. Walls in the Eye Hospital and Workshop are made of steel reinforced concrete and can not as a rule be repositioned. There are no traces of maintenance work on the ward buildings since they were first built. Each ward is connected by open corridors and there is evidence of rain leaks at many of the joining sections.

The inner part of hospital is dark due to the small window space and large numbers of verandas and eaves which were made according to Indian custom and traditional architectural methods. Added to this is the fact that dark lighting due to breakage, rust, and overused fluorescent lamps and instrument transformers is being left unrepaired. As well as this, the floor, ceiling and wall coatings are almost left unrepaired since the time of construction. Many of the water taps in front of the operating theatres and in the toilets are in a broken state with water leakage continously, and in some areas, this water can be seen seeping wall through lower floor pipe shaft. The drainage gutter running through the central yard is uncovered and dirty. Outbreak of mosquito is feared.

The operating theatres and Radiology diagnosis Department are fitted with air conditioning. Air conditioning is central system and the main generator capacity is 80 frozen tons, and for the ventilation air in the operating theatres, a 13 micron filter is attached to the air handling unit. Air blasted from the central generator room is discharged through small windows fitted with a wire mesh on the outer walls of each room, however some of the wire meshes on the air vents in some of the laboratories have been left in a broken state. Overall, the building is not airtight and air inside the rooms is not separated from air in the corridors and outside. Air conditioning in the Opthamology OT and the ENT's OT is done by window type cooler and cannot strictly be referred to

as air conditioning. Contamination of germs and entry of dust into the buildings is an issue for concern.

Water is taken from three deep wells within hospital grounds, stored in an elevated water tank and supplied to the entire faculty. Water hardness is slightly hard at 250mg per liter, and the water contains few bacteria and is drinkable.

Power is 11kv/6MVA electricity supplied from the state power corporation. The power supply condition, however, is not favorable and power failure occurs two or three times a day. Two 180KVA and one 200KVA power generators are available for emergency, and the operating theatres, water pumps, outpatients and emergency departments which need a constant power supply are given priority. Terminal voltage in the rooms is stable at between 230V-242V or ±3% of the officially set value of 235V. However generator supplied power during power cuts is between 196V-244V or a drop to more than 20% below the set value. In consideration of these factors, it may be necessary to procure RVS or UPS.

Incinerator

One large incinerator is in place, but due to breakdown due to obsolescence and poor fuel cost performance, it is not frequently used even at the best of times. There is a need to procure an efficient incinerator capable of handling small mount of medical waste.

The following table shows the state of buildings and facilities in each department.

Table 2-25 State of Each Department Buildings and Facilities

Item / Bldb.	Year built	Structure Floors;area	Facility installations	General state of facilities	Air conditioning lighting, medical gas, medical piping etc.
C.S.S.D. Laundry	1984	RC (Rahmen) Brick walls Single story 1 part double	Single story block next to central blocks with corridor.	Linked to six floor main block by open corridor. No evidence of building maintenance. Much rust.	No A.C. Some broken & detached lighting. Some broken, detached ceiling fans. Water supplied to equipment via sterilizer
Central ward block 6F main building	1978	RC (Rahmen) Brick walls 6 stories	All modern depts. except Pedriatrics, Opthamology and E.N.T.	Five elevators	No central A.C. Much evidence of unleft broken lighting and ceiling fans
Surgery block	Late 1970	RC (Rahmen) 3 stories. Standard story -1,550m²	1F-X-ray related 2,3F-O.T's. 2F-emergency O.T., C.D.S.D. room	Unattended outer wall dirt, corridor joint leaks, broken taps, leaking pipe shafts etc. Water blockage on roof, weeds on roof. OT's quite clean	Central A.C. is installed to O.T's and some of the laboratory
Outpatient block	1977	RC (Rahmen) 3 stories. Standard story-2,700m²	2F-Dept. of Neuro Surgery 3F-Dept. of Dental Surgery	Not much maintenance done. Dirt is conspicuous. Areas of roof waterproof block are loose.	No central A.C. Some window type air conditioners are installed.
Emergency outpatients (Renal Dept.)	1977	RC (Rahmen) 3 stories Standard story -810m²	1F-emergency outpatients examination room. 2F-emergency outpatients treatment room 3F-artificial dialysis room	Separated from central ward block. Old but comparitavely well maintained.	No A.C. or medical gas facilities.

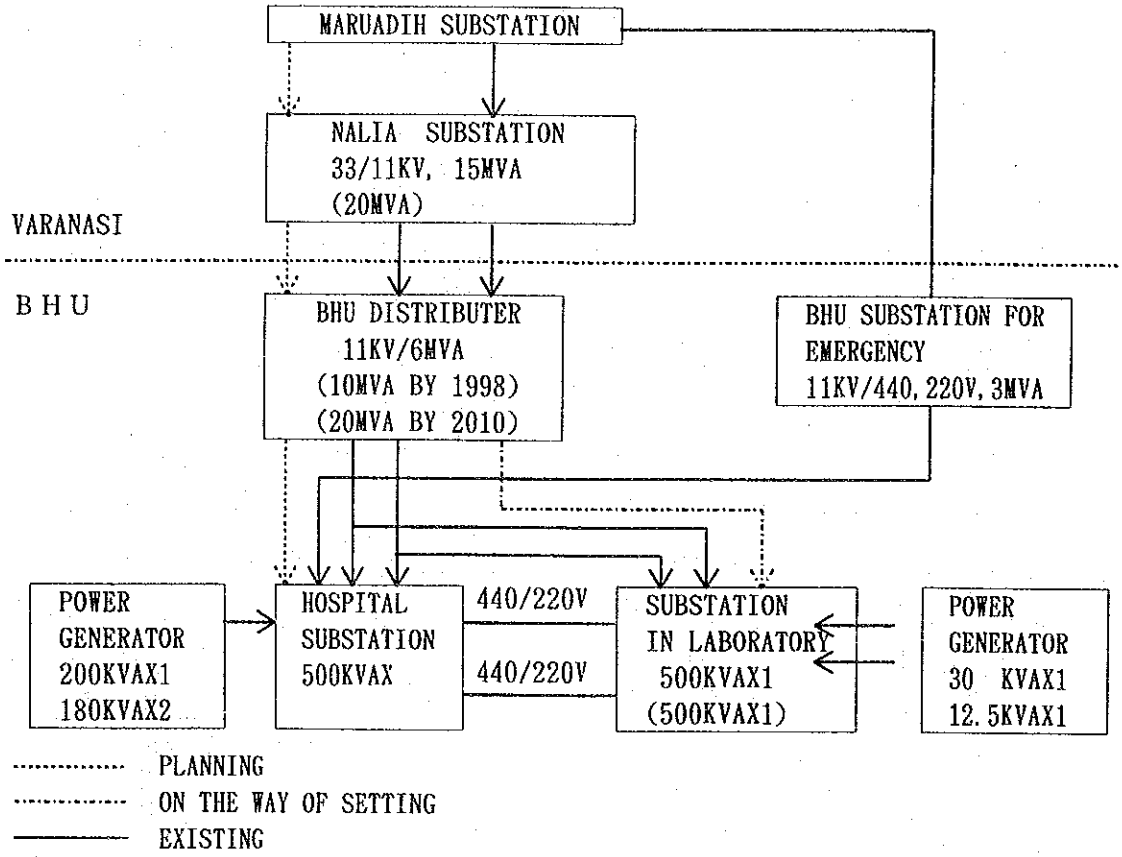
Item / Bldg.	Year built	Structure Floors;area	Facility installations	General state of facilities	Air conditioning, medical gas, medical piping etc. Equipment
Faculty of Indian Medicine block	1960's	RC. (Rahmen) 2 stories O.T.	Two wards and O.T.S. joined by corridor	All rooms face to south so brighter than others. Peeled paint conspicuous. Old but well maintained.	No AC facilities.
Dept. of E.N.T. & Opthalmology block	Late 1960's	RC walled. 2 story. Standard story-1,280m²	1F-Dept. of Opthalmology dept. 2F-Dept. of E.N.T. rooms.	Dirt in rooms conspicuous. Some lighting left broken. Inside of O.T's well kept	No AC. Window type air conditioners installed in some O.T's.
Dept. of Pediatrics block		RC. 2 stories. Standard story-1,330m²	1F-outpatients 2F-wards & O.T.s New O.T. is under construction next to main block	Old and many interior fittings falling apart. Many patients and corridors with beds used as ward.	No AC but O.T's have window type air conditioners fitted.
Maintenance workshop	1970's	RC 2 stories.	Building next to Institute of Medical Sciences	Facilities hardly completed. Breakage conspicuous.	Window type air conditioners are fitted in a some rooms.

(12) Current State of the site

(1) Electricity

Electricity is supplied from the state power corporation and distributed to each facility through the university receiving facility. University power is given high priority and as such is not a problem, however because the voltage variations are large, almost all the expensive medical apparatus and research apparatus are fitted with voltage adjustment devices, and all equipment with computer circuitry is fitted with UPS although small capacity types. This power receive system also receives emergency power through a separate system. Emergency power is supplied by two 180KV, one 200KV and other generators to the Hospital and Institute. The order of emergency power priority is first, the operating theatres followed by the water pumps and then lighting. In the future, the University is planning to increase to 20 MVA from the present 15MVA of the state power corporation substation. It also plans to increase the campus receive capacity from 6MVA to 10MVA by 1998 and 20MVA by 2010. The following figure displays the power system for the facility in question.

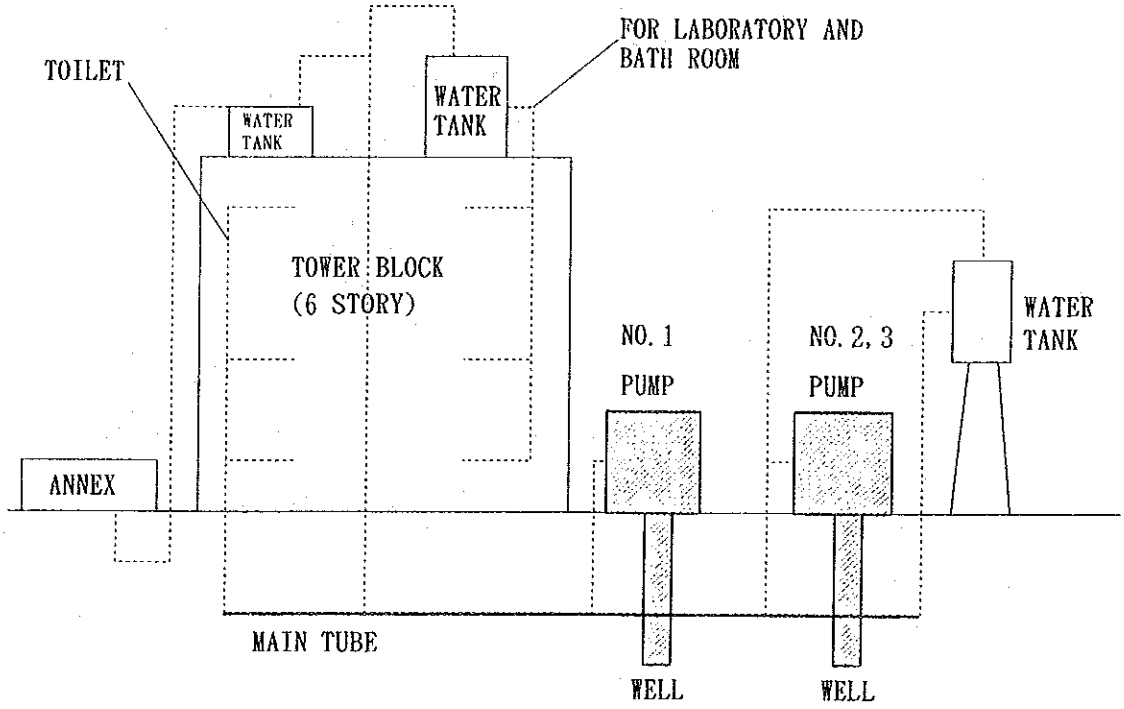
Figure 2-8 Power Supply System



(2) Waterworks

Water for the University is pumped from 16 wells scattered within the campus and distributed to all areas through elevated tanks and distribution towers. Three of the wells supply water to the Hospital. The following figure outlines the system of water supply to the wards. The Institute is supplied by one of the wells. Water supply tends to be on the insufficient side, and in order to overcome this, one more well is planned to be dug close to the Hospital.

Figure 2-9 Water Supply System



(3) Drainage

There are two drainage pipe systems in the University, one of which is only for the six floor ward block. There are no sewage treatment facilities on the campus, so the first pipe system is connected to the Varanasi Central Sewage Works and the untreated water is released into the Ganges. The second pipe system drainage is disposed of by a drainage pump located near the nurse's dormitory in hospital grounds, which is connected to the city controlled main sewerage pipe. This drainage is treated at the sewage treatment facility located about 2km from the campus, and 80% of the treated water is used for irrigation and the remaining 10% is released into the Ganges.

(4) Gas Fuel

There is no gas fuel piping installed, and in those areas in need of it, propane gas from cylinders is used.

(5) Air Conditioning and Ventilation

Cool air is supplied through ducts to the operating theatres and part of the Radiology Department. Clean air is supplied to the operating theatres through micro filters. The clinical laboratory is partly fitted with window type coolers, but the wards have to rely on natural ventilation and fans attached to the windows.

(6) Medical Gas Equipment

Three central style piping systems are installed for oxygen, laughing gas and suction and they supply the operating theatres and Central ICU For oxygen, there are two collection machines of which only one is needed and used. The suction piping is maintained by the Hospital and Indian Oxzen Limited carries out supply and maintenance for the oxygen and laughing gas piping.

(7) Waste Material Treatment Facilities

There is an incinerator within hospital grounds, but it is not in usable condition. Waste materials are thus buried in three places outside of the campus but within hospital grounds. However medical waste materials are not sterilized and only inflammable medical waste is separated.

(8) Radiology Facilities

All radiology related facilities are under the control of the Atomic Energy Committee (AEC), a governmental organization of India by which design, construction and installation is carried out. Two AEC authorized technicians are stationed at the institution and sufficient care is taken to prevent radiation leaks through film batch control and radiation measurements of radiological equipment. AEC carries out collection of used radiation sources.

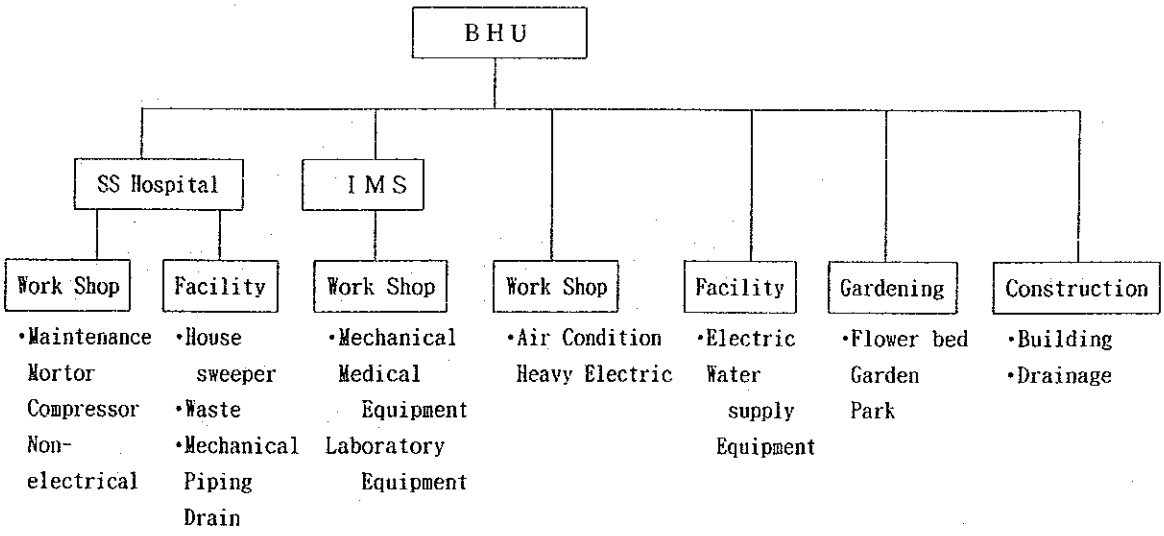
2.4.3. Maintenance Setup

(1) Organization of Maintenance Department

As the following figure shows, maintenance systems (maintenance workshops) are organized within the University according to

activity. Fifty maintenance staff are involved in the work, six of which are attached to the University, nineteen to the Hospital and 25 to the Institute.

Figure 2-10 Organization Chart for Maintenance Service



Three workshops are responsible for maintenance of materials depending on the variety. The main activities and staffing of the workshops are as follows.

1. University Workshop (6 members)
   Responsible for maintaining the whole institution's air conditioning, deep freeze, air cooling and heavy equipment.

2. Institute Workshop (25 members)
   Responsible for maintaining the electronic, wooden and glass materials of the Hospital and Institute.

3. Hospital Workshop (19 members)
   Responsible for maintaining suction devices, medical electrical equipment such as operating lamps, patient beds and terminals in the Hospital.

Table 2-25 Staff of Work Shop

University		I.M.S. Work Shop		S.S. Hospital	
Chare of duty	No.	Chare of duty	No.	Chare of duty	No.
Mechanical Eng.	1	Chief	1	Chief	1
Coil Eng.	1	Assistant Chief	1	Mechanical Eng.	2
Mechanical Electrican	1	Electronics Eng.	3	Mechanical Eng. Assistant	2
Refrigerator Mechanic	1	Electric Eng.	4	Electrican	3
Assistant Worker	1	Mechanical Eng.	2	Refrigerator Mechanic	3
Sweeper	1	Glass Eng.	2	Carpenter	1
Total	6	Machine Worker	1	Assistant	7
		Carpenter	2	Total	19
		Mechanical Electrician	2		
		Coil Eng.	1		
		Lathe Worker	1		
		Gass Welder	1		
		Warehouse Keeper	1		
		Telephone Eng.	1		
		Plumber	2		
		Total	25		

Source : I M S

(2) Maintenance Budget

Repair of equipment is settled with each department on the basis of 'material's cost to be charged'. Moreover, each department is expected to pay from its budget for costs incurred in maintaining facilities and improving surrounding condition. As a result the workshops are not allotted a budget for parts and so on necessary for maintenance work. However, a total of 200,000 rupees is allowed for purchase of tools ever year. Each department runs a revolving fund and such like in order to raise money for these repair costs.

As for equipment that requires high level maintenance technique, the Hospital has bound maintenance service contracts with local agents.

(3) Current State of Equipment Maintenance Contracts

The Institute has concluded maintenance service contracts with local agents for some of its medical equipment. The contracts are basically for technological cooperation and include an annual number of periodic inspections and an on-call service when equipment is out of order, however, parts needed for repair must be paid for. Therefore the maintenance contract charges are relatively inexpensive.

Table 2-26 Maintenance Service Contract fee for Medical Equipment

Equipment Name	Quant.	Contract Fee
Cobalt 60 Teletherapy Unit fixed Type	1	Rs. 15,000
〃 〃 〃 Rotation Type	1	Rs. 60,000
Remort After Loading	1	Rs. 45,360
Treatment Planning System	1	Rs. 59,000
Head CT Scanner	1	Rs. 150,000
Diagnosis X-ray Unit	1	Rs. 80,000
Ultrasound Scanner	1	Rs. 40,000
EKG, EEG Unit	1	Rs. 55,000
Autoclave	1	RS. 32,000
Auto Chemistry Analyzer	1	Rs. 35,000

Source : I M S

2.5 Background and Details of the Request

2.5.1 Background of Request

The BHU Institute of Medical Sciences was originally established in 1960 as a medical university, and was reorganized into an institute of medical sciences in 1971. The Institute's SS Hospital provides medical service to the 100 million people who live in Bhihar State, eastern Uttar Pradesh and eastern Madhya Pradesh as the only institute of its kind in north east India. It possesses ten specialist high level examination departments and deals with 2,000 outpatients per day as well as carry out some 100 operations daily. It is also an educational

institute on carrying out post graduate training for 340 doctors annually. However, most of the medical equipment in the Hospital was procured in the 1970's and is markedly obsolescent as well as being insufficient in quantity. Despite the fact that this institution has a huge responsibility for providing a high level specialist medical service to the east of India, and carrying out education for medical staff, it is currently in state of being unable to carry out the work expected of it.

In view of this situation, the Government of India devised and promoted a project for the improvement of medical equipment at the Institute within its 8th Five Year Plan, but due to financial difficulties, this had become difficult to execute. The Government consequently approached Japan on seeing the results of Japanese cooperation in the medical field in India as symbolised by the SGPGI Project, and requested grant aid for the project. India requested grant aid for those areas of the project where equipment was most urgently needed and difficult to procure in India. The requested equipment is largely composed of basic, essential items necessary for supporting diagnosis and therapy activities.

2.5.2 Details of the Request

The request is for equipment improvement for basic medical service departments and equipment proposed for procurement is all fundamental such as investigation instruments and even washing machines necessary in supporting the supply of a medical service. The following table lists the requested equipments and the applicable divisions.

Table 2-28 Main Required Equipment List by Division

Division	Main Equipment List
Operation Theatre Block	
General Surgery Operation Theatres	Operation Theatre Shadowless Lamp, Operation Theatre Table for General Surgery, Operation Theatre Diathermy, Anaesthesia Apparatus with Ventilator, Defibrillator, Patient Monitor(with P.O.Temp.ECG.Co2 Nerve Stimulator, Laparo-fiberscope, Gastor-intestinal Fiberscope, Colono Fiberscope, Video Endoscopy set (with Camera, VTR Monitor)
Orthopedic Surgery Operation Theatres	Operation Theatre Shadowless Lamp, Operation Theatre Table for Orthopedic, Operation Theatre Diathermy, Anaesthesia Apparatus with Ventilator, Defibrillator, Patient Monitor (with P.O.Temp. ECG, Co2 Nerve Stimulator), Surgical Image Intensifier C-Arm X-ray, Surgical Instrument set, for Orthopedic Surgery
Plastic Surgery Operation Theaters	Operation Theatre Shadowless Lamp, Operation Theatre Table for Plastic Surgery, Operation Theatre Diathermy, Anaesthesia Apparatus with Ventilator, Patient Monitor (with P.O.Temp. ECG CO^2 Nerve Stimulator), Operating Microscope for Micro-Surgery, Dual Head
Gynecological Surgery Operation Theatres	Operation Theatre Shadowledd Lamp, Operation Theatre Table for Gynecological Surgery, Operation Theatre Diathermy, Anaesthesia Apparatus, Defibrillator, Colposcope with camera
Cystoscopy Surgery Operation Theatres	Operation Theatre Shadowless Lamp, Operation Theatre Table for Cysto Surgery, Anaesthesia Apparatus with Ventilator
Urological Surgery Operation Theatres	Operation Theatre Shadowless Lamp, Operation Theatre Table for Urolo Surgery, Urological Examination & Treatment Table, Operation Theatre Diathermy, Anaesthesia Apparatus with Ventilator, Operating Microscope for Urological-Sugery, Surgical Scribe Station
Cardiothoracic Surgery Operation Theatres	Operation Theatre Shadowless Lamp, Operation Theatre Table for Cardiothoracic Surgery, Operation Theatre Diathermy, Anaesthesia Apparatus with Ventilator, Defibrillator, Operating Microscope for Micro-Surgery, Instruments for Cardiothoracic Surgery

Division	Main Equipment List
Neuro Surgery Operation Theatres	Operation Theatre Shadowless Lamp, Operation Theatre Table for Neuro Surgery, Operation Theatre Diathermy, Anaesthesia Apparatus with Ventilator, Patient Monitor(with P.O.Temp ECG, CO^2 Nerve Stimulator)
Emergency Surgery Operation Theatres	Operation Theatre Shadowless Lamp, Operation Theatre Table for Emergency Surgery, Operation Theatre Diathermy, Anaesthesia Apparatus with Ventilator, Defibrillator, Patient Monitor (with P.O.Temp.ECG, Co2 Nerve Stimulator), Surgical Instrument set, for General Surgery
Post Operative Recovery Room, etc.	Ventilator, Patient Monitor (with P.O.Temp.ECG, Nerve Stimulator), Infusion Pump. with IV stand, Defibrillator, Blood Gas Analyzer, Na, K. Analyzer, Glucometer
Central Sterilization and Supply Department	
Central Sterilization and Supply Room	High Pressure Sterilizer, Ultrasonic Instrument Washer, Drying Cabinet, Surgical Glove Washer & Dryer, Water Softening Plant
Laundry Section	Washing Machine, Breaching Machine, Automatic Hydric Washer Extractor, Drying Tumber, Electric Press Machine, Linen Supply Trolly
Incinerator Section,	Incinerator, Electric Type
Central Clinical Lab	
Pathology Laboratory	Full Automatic Chemistry analyzer, Binocular Laboratory Microscope, Trinocular Microscope, with Fluorescent, Phase Contrast, Whole Blood Platelet Aggregometer, Deep freezer, Flame Photometer
Microbiology Lab.	Deep freeze, -35°C, Deep freeze, -80°C, Binocular research microscope, Inverted microscope, Trinocular microscope, Centrifugal lyophiliser Freez Drier, High Speed Cold Centrifuge
Immunology Laboratory	Turbidimeter, ELISA Platlet Reader
Pathology Laboratory	
Histopathology and Cytlogy Laboratory	Automatic tissue processor, Automatic staining machine, Sledge microtome, Cytocentrifuge, Binocular Research Microscope

Division	Main Equipment List
Haematology Lab.	Haematological analyzer, Research Fluorscent microscopy, Video System for Microscopy, Multi Type Coagulometer, Whole Blood Platelet aggregometer, LKB Rock beta liquid scientillation counter, Spectrophotometer.
Blood Bank, etc.	Blood storage refrigerators, Refrigerated centrifuge, Deep freezers, Croyobath, circulating
Maintenance Workshop	Lathe Machine, Radial Drilling Machine, Double Ended Grinding Machine, Oscilloscope, I.C.Tester, Digital Multimeters, Pulse Generator, Vacuum Cleaner, Automatic Coil Winding Machine
Department of Ophthalmology	Argon or Argon/Krypton Leaser Unit, Slit Lamp with Tonometer, Operating microscope, Operation Table for Eye Treatment, Ultrasonograph Unit for Eye Diagnosis, Fundus Camera
Department of E.N.T.	ENT Treatment Table, CO^2 Leaser ENT Treatment Unit, Operation Microscope, Dual Head, Instruments for Laser surgery, Endoscopic sinus surgery
Department of Dental Surgery	Dental Unit, with Compresser, Dental Instrument Set with Cabinet, Dental Laboratory Module, High Speed Sterilizer, Dental x-ray Unit
Dept. of Obstetrics & Gynecology	Delivery Table, Spot Examining Lamp, Ultrasound scanner vaginal probe, Cardio-tocograph/Fetal Monitor, Fetal Heart Detector, Vaccum Extractor, Infant Warmer
Dept. of Pediatrics	Operation Theatre light-twin system, Treatment Table for Pediatric minor Surgery, Laminar Airflow Micro-filter system, Peripheral Nerve Stimulator, Bronchofiberscope for pediatric, Gastrointestinal-DuodenoFiberscope for Pediatric, Laparoscope for Pediatric, Cysto-Rectoscope for infant and pediatric, Jacson Lee Resuscitator, Video System for fiberscope, Blood gas analyser, Incubators, open type, Ventilators, for infant and child, Infusion pumps, Syringe pump, Phototherapy unit, Osmometer and luxmeter, Electronic blood pressure apparatus, Apnea monitor, weighing scale for new-born baby, weighing scale for old children, Emergency cart with resuscitators

Division	Main Equipment List
Nursing School	Vehicle, Mini-Bus, Chase doll of adult size, Obstetrical training kit, Teaching models, Teaching charts, Human skelton, V.T.R. and color T.V.
Dept. of Radiology	Whole Body Computer Tomography X-ray Equipment, Ultrasonography Scanner, Cobalt 60 Teletherapy Machine
Dept. of Endoscopy	Esophago Fiberscope, Gastrointestinal Fiberscope, Colono Fiberscope, Choledoco Fiberscope, Video Endoscopy set with Camera, Lecture Scope for Fiberscopes, Endoscopic Illluminator, Electro Surgical Unit for Endoscope, Suction Unit, Endscope and Proctoscopic Table, Endoscopic Cabinet, Fiberscope Cleaning Machine, Endoscopic Trolly, Endoscopic Ultrasound Scanner
Section of Nephrology	Hemodialysis Machine, for acute dialysis, Revers Osmosis water plant for the hemodialysis, Plasmaphrisis Apparatus
Dept. of Cardiology	Echocardiograph, Color Doppler, Cardiac-angiography x-ray unit, Polygraph for Cat. Lab.

Chapter 3 Outline of the Project

Chapter 3 Outline of the Project

3.1 Objective of the Project

The object of this project is to carry out a complete improvement of the medical equipment necessary for the most basic medical aid, and in both qualitative and quantitative terms rejuvenate the medical operations at the Hospital. As well as this, it aims to encourage the fostering of medical staff such as doctors and nurses through the renovation of the equipment and other medical hardware.

3.2 Examination of the Request

3.2.1 Examination of the Necessity and Appropriateness of the Request

Most of the residents of the Varanasi district belong in the low income bracket and consequently are reliant on cheap and public bodies for their medical services. There do exist public medical institutions which offer a high level and specialist medical service such as the Sanjay Gandhi Post-Graduate Medicine Laboratory and the King George University Hospital in the province of Uttar Pradesh. However these are located some 300-400 kilometers away from Varanasi and due to the poor state of public transport in the area it is very difficult for patients to reach them. The Institute of Medical Sciences, SS Hospital is operated as the top referral hospital out of all the public health centers and institutions in the area, and contains a comprehensive range of therapy departments. Therefore this is the highest standard medical institution in the area, offering high quality treatment ranging from the surgical to the physical. The Hospital also plays an important role in the education and fostering of medical staff and is the teaching hospital for students of the Banaras Hindu University medical department and nursing school. However due to economic difficulties, the Hospital is facing both staff and equipment shortages and thus its medical functions have been declining. This plan is designed to help in the raising of medical equipment within "the 8th government sponsored Health Development Five Year Plan" and so aims to contribute to the rejuvenation of the Hospital's medical operation functions and its overall restructuring, and thus provide support for the achievement of the objectives of the national health development

plan. Through an improvement of the Hospital's medical equipment, this project will be able to ensure the effective supply of services necessary in a general and educational hospital. It is therefore believed that in light of the purpose and level of objectives, this project is right in terms of both necessity and appropriateness.

3.2.2. Study on Project Components

This project will improve the medical equipment and machinery in those areas of the Hospital which require urgent need of qualitative and quantitative improvement so that the departments concerned are able to deal with the most common illnesses in the area. The state of operations concerning the departments which make up this project are studied in the following way.

(1) Department of Surgery

Around 16,000 cases per year of minor or major surgery are conducted in the 24 operating theatres provided in the hospital. This comes to over 700 operations per day or 20 cases in each operating theatre. Excluding the general surgical section which deals with a wide range of cases, operations in the emergency surgery section, urology section, opthamology department and obstetrics and gynecology department are especially common and consequently these sections/departments are seen to be extremely active. However as stated previously, all the surgical departments are having difficulties due to the shortage of equipment excluding the laser surgery department. This project sees the improvement of basic equipment as a priority in light of the level of activities of the departments concerned. The project components for each of the departments are as follows.

Table 3-1 Services of Department of Surgery

Name of the Unit	1990			1991			1992		
	Major Ope.	Minor Ope.	Total	Major Ope.	Minor Ope.	Total	Major Ope.	Minor Ope.	Total
General Surgery	2,075	2,086	4,161	1,831	1,848	3,679	1,365	1,375	2,740
Emergency	1,401	1,622	3,023	1,270	1,343	2,613	1,360	1,350	2,710
Plastic Surgery	457	362	819	402	316	718	359	240	599
Orthopedics	547	01	548	477	03	480	390	04	394
Urology	318	776	1,094	307	1,069	1,376	277	1,334	1,611
Ophthalmology	1,870	965	2,835	2,265	725	2,990	2,110	355	2,465
E.N.T.	269	192	461	195	199	394	137	388	525
Obst. & Gyne.	1,392	774	2,166	701	285	986	1,181	840	2,021
Neuro Surgery	122	19	141	108	86	194	18	41	59
Thoracic Surgery	190	665	855	101	676	777	58	683	741
Laser Surgery	—	—	—	—	—	—	800	400	1,200
Shalya & Prasuti	492	403	895	348	455	803	158	116	274
Ped Surgery	383	101	484	425	74	499	375	30	405
Grand Total	9,516	7,966	17,482	8,430	7,079	15,509	8,588	7,156	15,744

Source: BHU

1) General Surgery Section (Major operations)

Table 3-2 shows statistics of operations carried out over the last three years in the four general operating theatres of the Hospital. Approximately 200 cases, mainly GI surgeries, are carried out each year.

Table 3-2 General Surgery
(Major+Moderate) Operations Done in 1990, 1991 and 1992.

Name of Operation	1990	1991	1992	Average
Cholecystectomy with or without choledocholithotomy	514	450	372	445.3
Exp. Laprotomy	166	152	101	271.6
Appendicectomy	140	133	125	139.6
Mastectomy Redical/Simple	98	85	62	132.6
Herniorraphy	294	280	241	81.6
Gastro-Jujonostomy+Vagotomy	62	57	36	55.6
Thyroidectomy	64	52	39	51.6
Pylolithotomy+Ureterolithotomy	62	69	36	51.6
Ovarian Cyst/Tumor	17	15	9	29.6
Abdomino-perineal resection	9	8	6	28.6
Spleenectomy	13	11	5	24.6
Total Amputation Penis	45	24	17	24.6
Rehidectomy	28	26	6	20.0
Nephrectomy	2	2	1	18.6
Prostatectomy	32	25	17	17.3
Cleft Palete-lip	35	32	22	17.0
Pylolithotomy+Cystolithotomy	20	15	5	16.0
Parotide Tumor/Ca Oral Cavity	24	16	7	15.6
Colectomy	26	23	3	13.6
Hypospedias	22	18	8	13.3
Gastrectomy Parcial	7	3	1	11.6
Block dissection Neck	10	4	1	10.6
Below Knee Amputation	18	8	2	9.6
Hysterectomy	13	12	10	9.3
Verucose Vain	24	22	10	7.6
Ca Stomach Falliative Resection	25	19	7	5.0
Urethroplasty	33	30	10	3.6
Lumbar Sympethectomy	16	12	4	1.6
Misc.	256	228	202	229.3
Total	2075	1831	1365	1757

Source: BHU

(2) Department of Orthopedics

The following table shows statistics of patients admitted into this department over the past three years. Numbers have been increasing in recent years, especially cases of trauma. This is largely due to traffic and industrial accidents caused by recent social changes. This project sees the improvement of operating theatre equipment, surgical X-ray machines and orthopedic surgical

instruments necessary for patient therapy as appropriate.

Table 3-3 Statistical data of patients seen in the Dept. disease-wise

Disease-wise	1990	1991	1992
(A) Trauma:	8,000	11,000	12,000
1) Fresh	5,000	7,000	8,000
2) Neglectea	1,500	2,000	2,100
3) Post traumatic defomity	1,500	2,000	2,100
(B) Infected condition	1,000	1,700	1,800
1) Pyegenic	350	500	400
2) Ostecarticular tuberculous	380	400	560
3) Spinal tuberculous	110	210	300
(C) Tumours:	200	180	220
1) Benign	150	125	180
2) Malignant	50	55	40
(D) Ostee-arthritis	2,650	2,175	2,560
1) Hip	100	75	80
2) Knee	550	600	780
3) Spine	2,000	1,500	1,700
(E) Polio	110	78	69
(F) Rickets, Osteemalncia Backach	5,000	4,800	7,000
(G) Congenital	500	570	620
(H) Rhemateia	800	1,100	1,200
Statistical data of Rehabilitation Section Number of patients	54,000	55,000	58,000
Total	72,260	76,603	83,469

Source:BHU

(3) Section of Plastic Surgery

The section examines on average 5,400 patients per year and carries out around 800 operations. Over 25% of this figure consists of emergency surgery with many cases of traffic and industrial accidents. Despite such activity, the section's equipment is lagging behind and

the number of patients admitted over the past five years has shown a slight fall. It is judged that an improvement of the equipment in the section centered on equipment in the operating theatres is essential.

Table 3-4 Plastic Surgery

Year	Outpatient	Inpatient	Operations	Casualty
1987	6,140	447	876	238
1988	7,055	516	708	246
1989	5,491	524	887	177
1990	4,080	505	819	206
1991	4,299	501	718	192
Average	5,413	498	802	212

Source : BHU

(4) Department of Obstetrics and Gynecology

This department consists of an outpatients division, a delivery division and a surgical division and the table 3-5 displays its level of activities.

Table 3-5 Statistical Profile of Division OB & GYN

O.P.D Patients	20,000~30,000 persons (90~110/day)	Miscarriage	60~70 cases
		GYN Operation	1,400~1,500 case
Sterility (O.P.)	10 persons/day	Caesarean Section	400~500 cases
Delivery	60%	Abortion	800 cases
Abnormal Delivery	5~10%	Cytoscopy	1,000 cases
Caesarian	25~28%	Eclampsia	100~150 cases

Source: BHU

The table 3-6 illustrate the numbers of OPD patients, obstetrical and gynecological operations within the department over the past three years. Over 10% of the OPD patients receive operations and 30% of all deliveries are abnormal illustrating the importance of the operating theatre. This project views the improvement of equipment in the extremely busy operating theatres and delivery rooms as necessary.

Table 3-6 Statistical Profile of OPD Dep of OB & GY

1. O.P.D.

Year	Antenatal Cases	Gynaecological Cases		Postpartum Unit	TOTAL
		Follow up	New		
1990	1558	6209	13113	5138	26018
1991	1452	4338	15201	3978	24969
1992	2197	6301	12573	4192	25263

Source: BHU

2. Obstetrical and Gynecological Operations:

Year	Major Gynaecological Operations	Minor Gynaecological Operations	Caesarean Section	Minor Operations Post Partum	Total
1990	567	184	452	2415	3618
1991	563	278	589	2383	3813
1992	563	203	461	1797	3024

Source:BHU

3. Statistical Profile of Obstetrical Cases

Year	Spontaneous Vaginal Delivery	Caesarean Section	Breech Delivery	Forceps Delivery	Ventouse Delivery	Twin Operation	Destructive	Total
1990	1324	452	13	143	2	13	4	1,951
1991	1326	589	5	101	-	6	1	2,028
1992	1277	461	15	60	-	4	5	1,822

(5) Section of Urology

The table 3-7 displays the state of activities in the urology division over the past five years. Despite the fact that the number of patients within the whole hospital is increasing, activity in this section excluding laporotomy cases has been falling. This indicates the aging of the equipment available and the consequent drop in capacity. The section is planning to introduce an ultrasonic stone crushing device, however this project views the improvement of equipment necessary for therapy such as endoscopes, cystoscopes and urological examining equipment as a more pressing issue.

Table 3-7 Activity of Division of Urology

Year	New cases	Old cases	Total	In-Patient	Release	Opera-tion	TUR/OIU	Cysto-scopy	Total
1988	3,868	2,730	6,598	418	418	861	304	562	1,727
1989	3,295	2,411	5,706	453	453	536	182	370	988
1990	3,505	2,736	6,241	397	396	589	164	351	1,094
1991	3,901	2,339	5,430	401	396	794	180	373	1,347
1992	2,982	1,810	4,792	318	311	863	238	526	1,627

Source : BHU

Table 3-8 Examinations Done (1988 ~ 1992)

Examination Item	1988	1989	1990	1991	1992	Total
Chyle test	112	93	89	44	54	392
Semenogram	279	228	164	99	71	841
Stone analysis	66	69	49	27	51	262
Uroflowmetry	-	199	154	26	9	388
Cystometry	26	6	12	17	21	82
Grand total	483	595	468	213	206	1,965

Source : BHU

(6) Section of Cardiothoracic Surgery

The table 3-9 shows the state of activity over the past three years. Although the number of patients in 1992 increased more than 60% over the previous year, due to deficiencies in the equipment in the operating theatre, the number of major operations halved. The section is aiming for equipment necessary for open heart surgery such as heart valve replacement and coronary bypass operations, however this project sees the procurement of operating theatre equipment such as operating lighting, operating tables and anasthetic instruments which are in most need as more important.

Table 3-9 Statistical data of patients & Operation Performed in Cardiothoracic Surgery O.P.D from 1990-1992

Year	New	Old	Total	Major Op	Minor Op	Total
1990	1,429	3,199	4,628	190	665	855
1991	919	2,132	3,051	101	676	777
1992	1,548	3,448	4,996	58	683	741

Source : BHU

(7) Section of Neurology

With the advancement and growing complexity of society, India also has seen an increase in the number of patients with neurological disorders. The table 3-10 displays the number of cases over the last five years. The number of cases due to accidents have been especially rising. This section is equipped to a certain degree with some old type equipment, however the shortage of surgical equipment necessary to cope with traffic accident cases is stark. It is therefore seen as appropriate to carry out a revamp of equipment necessary for neuro surgery operations and investigative purposes.

Table 3-10 Statistics of Yearly EEG studies, Division of Medical Neurology

Year	Cases	Numbers
1987	7,595	2,749
1988	8,558	1,663
1989	,270	1,515
1990	9,382	1,862
1991	8,602	2,082

(8) Department of Anesthesiology

This department is in charge of the 24 operating theatres and the post surgery recovery rooms within the hospital, and as the following table 3-11 illustrates, conducts over 16,000 cases of anesthetic and over 1,000 investigative cases per year. This department is vital for the support of the basic medical activities

department is vital for the support of the basic medical activities of the hospital and an improvement of the obsolescent equipment it possesses is essential. Such an improvement of operating theatre related equipment will contribute to the higher quality of medical activities within the hospital.

Table 3-11 Activity of Department of Anaesthesology

1. Statistical data of operations/anaesthesia services:

Surgical Units	1990	1991	1992
General Surgery	4161	3679	4000
Emergency	3023	2613	3000
Plastic Surgery	819	718	850
Orthepaedic Surgery	548	480	900
Urelegy Surgery	1094	1376	1550
Eye Surgery	2835	2994	3500
Otelaryngelegy Surgery	461	394	450
Paediatric Surgery	484	499	650
Obst. & Gynaecelogy	866	986	1150
Neuro Surgery	141	194	100
Theracic Surgery	855	777	900
Post Partum	900	1000	1200
Dental Surgery	50	90	90
Radiotherapy	50	55	50
Radiodiagnosis	40	40	50
Total	16327	15895	18440
No. of patients admitted in ICU	15	30	61
No. of Patients seen OPD	-	-	400
No. of Patients seen in Pain OPD	195	303	296
No. of Patients seen of Neurolytic Block	54	52	42
No. of patients given in Obst. Analgesia	-	200	250
Total	264	585	1049

2. Number of examinations or other tests performed in the Dept.

Investigations	1990	1991	1992
E.C.G.	25	32	32
Pulmonary Function	500	550	650
Blood Test(TLC,DLC,Hb,PVC)	300	400	500

Source: BHU

(9) Clinical Pathology Laboratory

This section, responsible for carrying out the whole Hospital's clinical examinations, currently holds over 200,000 such examinations annually. The main activity is biochemical analytical examinations of blood samples and its work provides support to the surgical, internal medicine, pediatric and obstetric and gynecology departments and cardio thoracic section. This project sees an improvement of mainly apparatus for biochemical analysis and blood sample analysis as necessary for the progress in efficiency of its examining functions.

Table 3-12 Clinical Laboratory (1991)

Examinations	Cases
Blood Urea, Urinary Urea	28,400
Blood Sugar	36,590
Total, Diff. cell count: sugar, protain, chroride	9,985
Hematological Test: TVL, DLC, Hb, ESR, PCV, GBP	64,120
Van, bilirubin, protain, alubumin, choresterol, alkaline phosphatase, acid phosphatease, calcium, phosphorus, total diff. bilirubin, amylase	68,400
Reaction, sp. gravity, albumin, sugar, acitone, oocult blood, bile salt, bile pigment, urobilinogen	20,876
Seminal fluid examination: total count, motility	1,428
Ascitic, pleural and other fluids	2,259
Urinary proteins	862

Source: BHU

(10) Department of Pathology

This department deals with over 27,000 specimens per year of more than twenty varieties concerning histopathology, cytology and hematology. The main examinations are stain types in histopathology, however due to the fact that old equipment is used and material is

arranged by hand, the department is unable to deal with the demand for examinations. This project views the improvement of essential equipment for histopathological examination which forms the root of basic clinical examination, as a matter for urgent attention.

Table 3-13 Activity Statistics of Dept. of Pathology (1992)

Examinations	Total No. of Specimens	Total No. of Examinations
Histopathology	15,000	4,275
Special stains		
Reticulin Stain		500
Amiloid		75
AFB for Tuberculosis		1,000
AFB for Leprosy		
Giemsa		500
Toludine blue		1,000
Alcian blue		1,200
Cytology	5,000	5,000
Gynaecologic pathology		1,200
Sputum cytology		373
Breast cytology both bronchoscopic & endoscopic		250
Fluid cytology(Pleural, pericardial, Ascitic)		525
Urine cytology		112
FNAC		2,613
Hematology	7,175	7,335
1. Coagulation profile	(1,300)	1,300
(a) bleeding diathesis	(500)	
(b) Prothrombin Time (To guid the anticoagulant therapy)	(800)	
2. Leukaemias	840	1,000
each case requires complete Haemogram and special stains		
(a) 120 new cases		400
(b) Follow up cases 300		600
3. Anaemias	4,435	4,435
(a) Iron Deficiency		3,200
(b) Haemolytic Anaemias		
(i) Thalassaemia		700
(ii) Haemoglobrnopathies		400
(c) Enzyme Deficiency		60
(d) Spherocytosis		75
4. Miscellaneous	600	600
(a) Malarial Parasite		
(b) Kala azar		
(c) Rh. Antibody titre		
(d) Codmbs test		
Total No. of Examination per year	27,175	16,610

Source : B H U

(11) Department of Microbiology

This department deals with 43,000 specimens each year mainly in such fields as bacteriology, serology, immunology and parasitology, and it is one of the most important departments in the Hospital dealing with examinations for the surgical, internal medicine, obstetric, pediatrics and opthalmology departments. Despite the great activity of the department, this project views the serious shortage of equipment as detrimental to its daily functions and sees the improvement of equipment in the area of microscopes and freezers as necessary.

Table 3-14 No. of examinations & tests performed, Dept. of Microbiology (1992)

Examinations	Total No. of examinations
(A) Bacteriology (Mycobacteria, Anerobic infections)	20,600
Blood culture	2,000
Urine culture	2,000
Sputum concentration method for AFB culture/smear	
Urine for AFB (smear & culture)	
Stool culture for pathogenic organism	
Sputum culture	
Miscellaneous	15,000
Throat ear and eye swab culture Throat swab smear & culture for Diphtherin Pus culture for pyogenic organism Pus for AFB (smear & culture) Culture/smear of pus from urethra for Conococci CSF culture CSF culture on guineapig inoculation (for Tuberculosis) Culture for anaerobic bacteria	
(B) Serology/Immunology	8,000
Widal agglutination Brucella agglutination Aldehyde test for kalazar Rose-waler Antistreptolysin V.D.R.L. Antisperm antibody Paul - Runnell Blastogenic response Macrophage migration inhibition T & B cell percentage	

Examinations	Total No. of examinations
(C) Parasitology	9,000
Blood smear for parasitos (MP & Mf) Stool culture for amoeba Stool examination for ova & cyst Blood for filarial serology Casoni's skin test Blood for amoebic serology Blood for toxoplasmosis	
(D) Mycology	600
Skin scraping and hair etc for Microscopic and cultural examination of Dermatophytea Pus culture for fungus CSF culture for fungus Animal inoculation for different fungal isolation & identification	
(E) Virology	2,067
O.P.V. potency check up	580
Viral serology (ELISA) CMU	160
Isolation/serology for genital mycoplasma	450
Urine culture for GBS	236
Urine culture	236
Urine culture	45
HBs Ag	600
Rubella	130
Herpes	80
(F) AIDS Serology	3,228
AIDS (HIV a,ntibody detection)	
Grand Total	43,853

Source: BHU

(12) Maintenance Workshop

The main responsibilities of this section include maintenance and repair of all types of equipment including medical apparatus. This work is an important factor in the maintenance of good condition of medical equipment. This project deems it is necessary to improve machines and tools needed for the maintenance and repair of medical equipment.

(13) Department of Ophthalmology

The department admits around 25,000 outpatients a year and carries out therapy through surgery, refractive correction and eyesight correction. About 2,500 patient are suffered from vitreo-retinal disorders such as diabetic retinopathy, hypertensive retinopathy and retinal detachments caused by hypertension and diabetes. It seems appropriate for this project to install chiefly the equipment such as spectacle examination equipment and opthalimic surgery apparatus for the common diseases. It seems not necessary, judging from the present activity, to install high grade equipment such as opthalimic supersonic diagnosis apparatus kerotometer and specular microscope etc..

However, installation of argon laser treatment apparatus and its related surgical equipment is necessary to cope with cataract, vitrectomy and retinal disorders etc. which occupy 60% of the total number of operations.

Table 3-15 Patient Record of Eye OPD, OT, Refraction & Orthopedic Clinic

	1991	1992
OPD Attendance:		
Old Cases	3,768	3,045
New Cases	21,519	21,926
Total	25,287	24,971
Operation theatre:		
Cataract	2,462	2,500
Glaucoma	106	100
IOL	503	602
Squint	286	189
Retinal Detachment	31	34
Pterygium	287	201
Chalazian	250	206
Perforating Surgery	364	295
Vitrectomy	8	10
DCR	216	153
Total	4,513	4,290
Refraction cases:	14,067	14,512
Orthopedic cases:	16,902	17,163

Source: BHU

(14) Department of ENT

The department deals with around 26,000 patients per year of which 1-2% are in need of surgery and hospitalization. The most common cases of surgery are for tympanitis, antrochoanal polyps and chr. max. sinusitis and nine other varieties. This project views the improvement of examination equipment and operating theatres equipment needed for the treatment of such ailments as necessary.

Table 3-16 Service Rendered to the Patients, Dept of Otolaryngology

	1988	1989	1990	1991	1992
OPD Patients	28,680	24,471	25,742	27,374	28,016
Admitted in ENT Wards	509	551	567	303	266
ENT OT	475	403	475	462	460

Source: BHU

Table 3-17 Disease wise breakup of various operations performed in ENT Department

Disease	1990	1991	1992
1. Otitis Media	118	105	98
2. Antrochoanal Polyp.	45	36	41
3. Ethmoidal Polyp.	7	7	6
4. Hypertrophic Rhinitis	19	23	43
5. Deviated Nasal Septum	23	19	20
6. Chr. Max. Sinusitis	36	34	29
7. Maxillary Tumours	18	10	13
8. Foreign bodies Nose	3	13	5
9. Chr. Tonsillitis and/or Adenoids	36	25	21
10. Tumours of tongue	26	17	12
11. Laryngeal Tumours	83	93	132
12. Others (including tumours of oral cavity & pharynx, oesophageal tumours, cervical adenopathy etc.)	61	44	40
Total:	475	426	460

Source: BHU

(15) Department of Dental Surgery

The annual number of patients is around 20,000 of which half receive surgical treatment. The main forms of surgery are oral surgery on malignant tumor held in the central operating theatres and tooth extractions done in the dental therapy section. This project views as valid the upgrading of equipment in the dental therapy section, especially of dental units and false tooth manufacturing equipment.

Table 3-18 Statistical Profile of Dept of Dental Surgery

Dental OPD & Minor OT's.	No. of patients attended 1991～92	Session. 1992～93
Oral Medicine/Diagnosis including oral hygiene clinic.	20,722	21,8,40
Oral Surgery (Minor OT No.1)	10,4,10	7,7,25
Operative Dentistry (Minor OT No.2)	5,2,25	4,8,45
Prosthodontics (Minor OT No.3)	4,2,32	3,0,17

Source:BHU

(16) Department of Pediatrics

This department is in charge of neonate to children of up to fourteen years old. It deals with over 2,000 neonate of which 15% are underdeveloped and in need of care. Because such cases are kept in an incubator for on average three to four days and receive therapy, the department needs from at least three to four incubators in order to cope with a daily average of one to two cases. This project views an improvement of equipment necessary for basic pediatric health care, mainly for neonate, as needed by the department.

Table 3-19 Department of Pediatrics

Activities	1988	1989	1990	1991	1992
No. of patients seen in the outpatients department	32,785	35,556	36,350	38,789	40,377
No. of patients admitted in the Pediatric Medicine Ward	2,940	3,290	3,356	3,472	3,522
No. of children immunized	16,895	18,740	20,400	21,205	23,356
Total births	2,050	2,190	2,156	2,200	1,800
Admission to Neonatal Unit	295	325	347	350	360
Rural Child Health Services	4,650	4,800	5,102	5,200	5,642

Source:BHU

(17) Section of Pediatric Surgery

As the following table shows, this section carries out roughly 350 operations per year. The range of work is very wide with cases of meningomyelocoeles the most common, followed by cases of hydrocephalus shunts, hyspospadias and epispadias, post, urethral valve and up to twenty more types. As stated previously, despite the fact that this is the only pediatric center in the area, the backwardness of equipment is hindering its activities. The above mentioned cases are the most common in the pediatrics field and in recent years have been increasing, and so this project sees the improvement of surgical instruments and other equipment necessary for treating such cases as necessary.

Table 3-20 Statistical Profile of Operation, Division of Pediatric Surgery

Name of the Operations	Number
Oesophageal Atresia	47
Colonic transplantation for oessophageal Reconstruction.	03
Cong. Diaphragmatic Hernias	16
Major omphalocoele and Gastroschiasis	37
Anorectal Pullthrough Operations	88
Hirschsprung's Disesase	95
Choledochal cysts/Biliary atresias	21
Atresias of small bowel	29
Duplication gut and mesenteric cysts	23
Neuroblastomas	31
Wilm's Tumours	67
Pyeloplasties for hydronephrosis	63
Urinary Diversions and bladder extrophy repairs	27
Post. urethral valves	115
Rhabdomyosarcomas Urinary Bladder	17
Hydrocephalus shunts 40-50/year	203
Meningomyelocoeles	257
Cleft lip and palate	36
Hypospadias, Epispadias	130
Sacrococcygeal Teratomas	53
Misc. - Cystic Rygromas	48
Soft tissue dysplasias	
Haemangiomas	
Total	1406

Source: BHU

(18) Nursing School

The nursing school carries out practical guidance in such primary health care as mother and child health (vaccination, family planning and delivery care), health education, sick person nursing and nutritional guidance and uses such teaching materials as human and delivery dummies. However because only a bare minimum of nursing items are provided and those few are old, it is impossible

to provide a satisfactory level of education.

The school has the responsibility of providing nurses not only to the Hospital but also the surrounding facilities, and it is seen as essential that the school is provided with the equipment necessary for the basic nursing training and education. This project therefore sees as appropriate the supply of nursing educational materials and vehicles necessary for the movement involved in carrying out outdoor training.

(19) Department of Radiology (Diagnosis Division)

This department carries out precise diagnosis through X-ray and ultrasonic examinations, and in the same way as the other central clinical examination rooms and operating theatres, plays a central role in supporting basic medical activity. The department carries out over 60,000 X-ray examinations per year and from 1000 to 1,800 X-ray strata examinations plus around 4,500 ultrasonic examinations.

The following table shows the numbers and contents of X-ray, ultrasonic and CT scanner examinations over the past three years. Over 90% of all X-ray examinations are routine types for chest and abdomen. Due to the insufficiency of equipment, only a handful of specialist examinations using a contrast medium are conducted. Over 40% of the CT scanner examinations have been for head trauma indicating the frequency of traffic and industrial accident cases. The next most common case is brain damage due to infection which accounts for over 20% of the cases. It is therefore fair to say that examinations by CT scanner help provide service directly related to the primary medical activities of the hospital. Cases in the categories of secondary or tertiary health care are in the minority. Moreover, as can be seen in Table 3-24, over 65% of the ailments are infectious in nature further indicating the importance of diagnosis through X-rays and so on.

Table 3-21 Statistics Profile of X-ray Examinations

Examinations	1990	1991	1992
*ROUTINE Radiography (Chest; Abdomen; Limbs; Skull; Spine & Joints)	49,729	53,748	46,453
++ Specialised Investigation	2,201	2,823	2,150
- Barium Studies	1,716	2,020	2,150
- Urological study	120	424	376
- Hysterosalpingography	40	60	50
- Venography	46	48	35
- Angiography (Abdominal; (thoracic & peripheral)	121	112	110
- Carotid Angiography	20	24	17
- Myelography	24	40	35
- Others(eg Sinogram;Sialogram)	72	80	77
TOTAL	54,089	59,379	51,453

Source: BHU

Table 3-22 Statistics Profile of CT-HSF (Head Scanner)

Disease Detection Data	1990	%	1991	%	1992	%
Brain Tumors & Allied Lesions	120	12%	209	11%	243	15%
Head Trauma	469	47%	860	48%	652	42%
Cerebrovascular Accidents (stroke)	196	19%	338	19%	298	19%
Brain Infections (including tubercoloma)	217	22%	402	22%	363	24%
Total	1,002	100%	1,809	100%	1,556	100%

Table 3-23 Disease Detection Data by Conventional and Special Examinations

(Barium Studies, IVP, Myelograms, Angiograms, Venograms, Ultrasound and others).

Examination Type of Disease	Total Numbers of cases in year wise 1990		1991		1992	
(1) Chest Plain X-rays						
(a) Tumours	60		71		65	
(b) Infections	3,600	3,804	3,860	4,093	3,570	3,767
(c) Others	144		162		132	
(2) Fit Hepatobiliary System (USG-Barium)						
GIT						
(a) Tumours	214		286		361	
(b) Infections (TB & Crohn's)	825		944		771	
		2,280		2,494		2,244
Hepatobiliary						
(a) Tumours	626		528		473	
(b) Infections	615		736		639	
(3) Renal (IVP, USG, ANGIO)						
(a) Tumours	120		240		215	
(b) Others Lesions Infections,		200		402		361
Cong. anomalies, Trauma	80		162		146	
(4) Pelvis (USG)						
Uterus, Cervix & Adnexa						
(a) Tumours	626		724		673	
(b) Infections	466		162		557	
Bladder Tumours	400		272		326	
Prostare		1,820		1,980		2,050
(a) Tumours	10		24		37	
(b) Infections	17		26		33	
(c) BPH	301		470		424	
(5) Spine (Plain X-ray and Myelograms)						
(a) Tumours	110		118		104	
(b) Infections	350		382		346	
(TB & Pyogenic)		1,012		1,074		1,003
(c) Prolapse disc	140		148		132	
(d) Trauma	180		188		176	
(e) Arthritis	102		114		107	
(f) Congential defects including cranio-vertebral anomalies.	130		124		138	

Source: BHU

Despite this, all the equipment (see Table 3-25) has exceeded its durability life and as well as becoming more and more difficult for use through repeated failure, it is not possible to repair due to the difficulty of obtaining parts for such old models.

Table 3-24 Main Existing Medical Equipment

Equipment Name		Quant.	Installed	Condition
X-ray apparatus	500mA	2	1970	Partially good
〃 〃	300mA	2	1970	〃
Diagnostic X-ray apparatus	725mA	1	1980	No good
X-ray apparatus for chest	100mA	1	1980	Partially good
Mobile X-ray	60mA	3	1980	Partially out of order
Head CT scanner		1	1986	Good
Ultra sound scanner		1	1986	Good
Diagnostic X-ray apparatus	500mA	1	1993	Under installation
Simple X-ray apparatus	300mA	1	1993	Preparing

SOURCE:B/D Study

The hospital is currently in the process of purchasing two relatively inexpensive X-ray machines with its own funds, however due to the deterioration of the hospital's financial situation, it is unable to buy expensive equipment such as CT scanners or ultrasonic diagnostic devices. For this reason, the breakdown of and inability to repair existing equipment will cause all activities to come to a halt and lead to the abolition of a part of the basic diagnostic division. The current CT scanner is already seven years old and has carried out approximately 100,000 examinations, and is thus close to its limit for use. Moreover the device in question is designed for head scans only which means the number of patients for diagnosis is severely limited, and in general, the precise and general diagnosis provided by CT scanner necessary for primary medical service is insufficient. The CT scanner is an extremely effective means of diagnosing ailments including bone problems caused by accident and infection which form the basis of primary

medical care; it causes minimal impairment to patients, and judging from the content of activities in the hospital, is seen as an essential item.

If a whole body CT scanner was to be introduced under this project, as well as conducting the types of diagnosis done by the old equipment, the precise and speedy diagnosis of accident caused ailments, prolapse disc, spinal tumor, main pelvic damage, renal, pancreatic and hepatic ailments, GI ailments or infections, and thoracic ailments diagnosis would become possible. This would increase the number of patients which the department could deal with from the current 2,000 head cases to some 3,500 per year by adding around 20% of the cases (i.e. approximately 1000 -1,500 cases) which until now had been examined by X-ray only and thus would contribute to the striking improvement of the department's activities.

As the following table shows, there are currently ten CT scanners in operation in the public and private hospitals of Uttar Pradesh and their use is becoming common as an item of X-ray diagnostic equipment. The private hospital of Varanasi is equipped with a whole body CT scanner and patients in need of thoracic and abdominal scans are sent there. However the price of a single CT scanner examination is between 3,000 and 4,000 rupees (between 11,000 and 14,000 Japanese yen) which is far beyond the reach of ordinary residents of the area. Public institutions such as those in Lacknow and Allahabad which do provide relatively inexpensive CT scans are around five or six hours drive away from Varanasi and so extremely inaccessible for serious patients. It is therefore seen as essential that the Hospital be equipped with a whole body CT scanner.

Table 3-25 Current Situation of CT Scanners in Uttar Pradesh

Sites	Private Hospital	Public Hospital
Varanasi	1 (Whole body)	1 (Head)
Lackow	1 (Whole body)	3 (Whole body)
Allahabad		1 (Whole body)
Agra	1 (Whole body)	
Gorakpur	1 (Whole body)	
Aligarh	1 (Head)	
Moradad	1 (Head)	

SOURCE: B/O Study

As for ultrasonic diagnostic equipment, the existing devices are obsolete and thus inefficient, and with over twenty patients a day is at the absolute limit of its capacity. For this reason, it is necessary to make reservations for ultrasonic examination and there is a waiting period of two to three months which means that many cases proceed to become critical due to the lack of timely treatment or patients who cannot wait are forced to choose expensive care at private hospitals.

As for the running cost of the equipment, a revolving fund is under operation and as with the head CT scanner, between 80 and 85% of the patients excluding the poorest are paying for the service. Due to this, around 3,540,000 rupees (about 12,400,000 Japanese yen) is raised annually and excluding expenditure on expendables and maintenance, around 1,320,000 rupees (4,630,000 Japanese yen) is reserved for future major repairs and equipment renewal.

Table 3-26 CT Scan X-ray Revolving Fund

Amount collected from patients	
Head : Rs, 1,200/scan x 1,600 patients	Rs 1,920,000
Whole body : Rs, 1,800/scan x 900 patients	Rs 1,620,000
	Rs 3,540,000
Expenditure	
Consumables(film, contrasts, developing solution)	
Pay ward patient :@600 x 2,500 patients	Rs 1,500,000
Free ward patient:@600 x 700 patients	Rs 420,000
Maintenance contract (excluding parts cost)	Rs 300,000
	Rs 2,220,000
Net balance	Rs 1,320,000

Source:BHU

The equipment which the department is requesting is thus the renewal or supplementing of already existing items, and in terms of technology, operation and maintenance, the department staff are sufficiently experienced and should have no problems. Therefore, the introduction of one CT scanner and one ultrasonic diagnosis device is seen as a basic, urgent and essential factor in the upgrading of the primary medical activities which is the project objective.

(20) Department of Radiotherapy

The activities of this department are directed at cancer therapy. The occurrence rate of cancer in Uttar Pradesh is extremely high and the death rate is the worst in all India, and so cancer therapy is seen as a vital part of medical care activity. The area is located in a belt where occurrence in the thyroid gland is high and these kinds of cancer are one of the local common diseases. This hospital covers a wide service area and admits cancer patients from as far away as Nepal, as a leading referral hospital. The department deals

with around 1,200 patients a year and because therapy is done periodically from one to three times a week, its daily number of patients is between 80 and 100.

Table 3-27 Population and Patients Coming for Treatment from Different Areas (1969-1991)

State	Population(1981)	Patients
Uttar Pradesh State:District		
Varanasi	3,689,908	6,949
Azamgarh & Mau	3,541,261	2,097
Ghazipur	1,941,665	1,826
Mizapur & Sonbhadar	2,040,561	1,761
Jaunpur	2,527,492	1,744
Balia	1,925,633	1,520
Deoria	3,477,350	1,362
Allahabad	3,781,306	935
Gorakhpur & Maharajgang	3,795,735	634
Fizabad	2,369,487	414
Surlanpur	2,037,974	245
Pratapgarh	1,806,833	187
Bihar State		5,285
Nepal & States		419
TOTAL		25,387/21 years

(Total number of patients treated during the period 1968-1991)

The following table displays the therapeutic results of this department over the past 22 years. As is the case in institutions all over India, cases of cervical and throat cancer are overwhelmingly common accounting for over half the total. Furthermore, cases of deep malignant tumor unable to be dealt with by surgical methods account for 20% of the total and it is in such cases as these where radiotherapy is particularly effective, that the need for such apparatus can be gathered.

Table 3-28 Frequency Pattern of 25,378 Cases Seen During 1968～1991

Malignancy	Number of Cases	Percentage (%)
Cervix	9,722	38.31
Oral	3,368	13.27
Breast	1,769	6.97
Lmphoma	1,057	4.17
Skin	950	3,74
Larynx	937	3.69
Bone	882	3.48
Gastrointestinal Tract	756	2.98
Paranasal Sinuses	667	2.63
Female Genitalia (others)	604	2.38
Central Nervous System	477	1.88
Oesophagus	455	1.79
Lung	368	1.45
Urinary Bladder	351	1.38
Testis	322	1.27
Eye	318	1.25
Unknown Primary	290	1.14
Penile	284	1.12
Soft Tissue	218	0.86
Nasopharynx	188	0.74
Thyroid	171	0.64
Leukaemia	150	0.59
Kidney	124	0.49
Salivary	117	0.46
Mediastinum	64	0.25
Miscellaneous	604	2.38
Non Malignant	165	0.65
TOTAL	25,378	100%

The number of patients at the hospital currently in need of cobalt irradiation therapy is around 100 per day, but with the two machines the hospital presently possesses, it is only possible to treat between 60 and 70, and a four month reservation wait is necessary. For this reason, many patients in urgent need of therapy are not being seen and by the time therapy does start, it is often too late. As can be seen in the following table, the two cobalt irradiation machines at the hospital are 24 and 17 years old and obsolescence is startling. Problems such as the patient couch not moving or the cobalt head not revolving are hindering the health care service. The limit of use for such equipment is normally 10 to 12 years and it will not be surprising if the current apparatus becomes totally unusable in the near future.

Table 3-29 Condition of Existing Radiology Equipment

Equipment name	Year of Installment	Condition
Eldrad－6 Cobalt 60 (Canada)	1969	Head movement out of order, only simple dosing available.
Gamma Rex-R Commerex Cobalt 60 (Canada)	1976	Head rotation and collimator out of order.
Portable X-ray Equipment	1984	Good
Remote After Loading (Holland)	1986	Good
Remote After Loading Sesium 137 (Holland)	1987	Good
Treatment Planning System	1990	Good

India is being particularly active in its measures against cancer and sees this Hospital as a center for cancer treatment. Recently, such cancer treatment equipment as a therapy planning system and positioning device have been installed. As well as this, a Dutch made Secium 137 for treating cervical cancer among other things was installed six years ago and is proving most effective.

As for cases of malignant tumor treated in the department, some cases could be avoided through early examination and detection, and judging from the state of health and living conditions in the area, equipment necessary for this is seen as necessary. There does exist such equipment as linear accelerators and cobalt irradiation devices which do not use nuclearic substances in the treatment of cancer, however in view of the fact that maintenance and control costs of such equipment is so high and that this project values a renewal of existing equipment which the staff are able to operate, such apparatus is not considered appropriate. Due to the fact that the Hospital has plenty of experience in handling the cobalt irradiation equipment, and that maintenance and running costs are low, and that its frequency of use is high, plus the fact that the Hospital has introduced a revolving fund and is attempting to improve its financial standing, the introduction of such equipment is seen to be most appropriate.

It is therefore viewed as an urgent necessity for the Hospital to replace its cobalt irradiation equipment in order to maintain its radiotherapy on cancer patients.

(21) Section of Gastroenterology (GI)

The following table displays the yearly average for cases of endoscopy diagnosis and therapy over the past four years. Upper GI endoscopies number around 3,500 per year or over 400 cases per month. Table 3-31 shows cases of upper GI malignant tumor discovered by endoscopy. The figure of about 200 cases per year represents roughly 10% of all the patients examined and gives an indication of the high number of cancer patients in the hospital. Table 3-32 indicates cases of GI hemorrhaging. Around 300 cases are reported annually - over 10% of all the patients subjected to the endoscopy. Around 400 endoscopies are carried out each year or over 30 per month. However, this figure merely represents the number of patients examined whereas the number of those in actual need of

diagnosis and therapy is more than twice the size. This is due to the fact that in this section there are only one lower GI and two upper GI endoscopies. This means the equipment is not enough. As well as this, because the equipment is not up to date, it is not possible to offer sufficiently effective diagnosis and therapy. In particular, the annual number of patients in need of pancreotographic diagnosis and therapy is somewhere between 500 and 800, but supply of the necessary machine attachments is not taking place which means that an accurate medical service is not being provided. The section possesses sufficient endoscopy facilities in terms of both staff and technology and believes that through the raising of the proper quantity of endoscopes under this project, a sharp improvement in medical activities should be possible.

Table 3-30 Procedures of GI on Endoscopy

Items of cases	No. of cases (per year)
1. Upper GI	Aprox. 3500
A. Diagnostic Upper GI Endoscopy	2000-2500
B. Therapeutic Upper GI Endoscopy	
- Sclerotherapy (626 cases enrolled)	800-1000
- Esophageal Dilation	60-80
- Foreign body retrieval	25-30
- Balloon dilation (Medical Myotomy)	5-8
2. Pancreatobiliary	Aprox. 140
A* Diagnostic ERCP	80-100
B* Therapeutic	
- Sphincterotomy & Stone extraction	30-40
- Periampullary carcinoma	2-5
3. Lower GI	Aprox. 400
A. Diagnostic	350-400
B. Therapeutic (Polypectomies)	3-5

Source: BHU

Table 3-31 Profile of GI Malignancies on Endoscopy

Main sites of involvement	No./year
Esophageal	45-60
Gastric	30-45
Duodenal	2-4
Colorectal	20-25
Pancreaticobiliary (on ERCP)	50-60

Source: BHU

Table 3-32 Profile of GI Bleed on Endoscopy

Number of GI Bleeds	250-300/year
- Variceal	150
- Ulcer	80
- Erosive mucosal disease	70

Source: BHU

(22) Section of Nephrology

This section is currently equipped with two hemodialysis machines, however due to obsolescence one of them is in a non-functioning state and the other should soon become the same way. The following table displays the number of ARF cases for last year. Given that each patient receives therapy for from four to five days, the average daily number of patients is ten. However with the state of equipment as mentioned above, the section can treat only two or three cases a day, and there are many occasions when patients are brought to the hospital only to die. There is an urgent need to increase the number of hemodialysis machines to at least three and maintain levels for treating ten patients daily.

Table 3-33 Causes of ARF (1992)

causes		No. of Patient	Percentage %
Medical		291	68.3
	Diarrhoeal diseases	150	35.2
	Acute GN	44	10.3
	Nephrotoxins	37	8.7
	Infections	36	8.5
	Acute TIN	17	5.8
Surgical		76	17.8
	Obstruction	56	13.3
	Post-operative	14	3.3
Obstetric		59	13.8
Miscellaneous		13	3.3
Grand Total		426	100.0

Source : BHU

(23) Section of Cardiology

As the following Table 3-34 shows, the section is very busy with just under 9,000 cases admitted per year. Because over 30% of the patients suffer from rheumatic heart disease such as valvular disease, an upgrading of examining equipment for open heart surgery is desired. However as well as such examining equipment, artificial heart and lung, artificial respiratory organs, thoractomy instruments and cryogenic layers necessary for surgery plus infrastructure such as LAFR and the securing of sterile water are all in urgent need of overhaul and judging from the state of activity in the department, is seen as difficult in implementing.

Table 3-34 Patients seen in Cardiac OPD (Cardiac Clinic)

Disease	Year		
	1990	1991	1992
Rheumatic Heart Disease	2,532	3,264	2,901
Ischaemic Heart Disease	2,416	2,792	2,492
Hypertension & hypertensive heart disease	2,023	2,042	1,502
Pulmonary hear disease	502	1,140	710
Cardiomyopathy	214	510	336
Miscellaneous	700	1,104	523
TOTAL	8,387	10,762	8,464

Souarce : BHU

Table 3-35 Statistics Profile in Cardiology Ward

Patients Profile	Year		
	1990	1991	1992
Patients admitted in Cardiology Ward	581	576	411
Patients admitted in CCU	592	516	

Source : BHU

As can be seen in Table 3-36, most of the examinations consist of echocardiogram, and as Table 3-37 shows, a system of service charges has been introduced and the state of ultrasonic diagnosis equipment and plural recorder equipment is satisfactory. It is considered that the supply of new equipment to the section should not be necessary for some time yet.

Table 3-36 in Cardiology Ward

Examinations	Year		
	1990	1991	1992
ECG done in the Hospital	11,828	11,400	9,332
Treadmill test done	423	335	373
Echocardiogram	—	116	947
Holter recording	—	7	69

Source : BHU

Table 3-37 Details of service charges from patients

Specialized Investigations	Amount
ECG in general ward	10 rupees
ECG in special ward	60
Treadmil testing	400
Echocardiogram	400
Holter recording	600
Vectocardiogram	300

Source : BHU

3.2.3 Examination of Operating Plans

(1) Plan of Necessary Staff

The projected site currently possesses 549 doctors and 491 nurses and in light of the fact that it is currently under operation and that the equipment planned for procurement is the renewal or supplementing of presently installed items, there is no need to supplement technicians or increase the current number of staff.

(2) Institution Operating Budget

The operating budget is composed of the normal budget of personnel costs and facility and equipment maintenance costs plus the special budget for equipment purchase costs and construction costs under the development plan. The Hospital is also operating a revolving fund to raise funds for the smooth and continuous maintenance of equipment.

1) Establishment

The following table displays the itemized expenditure under the normal budget over the past three years. The total expenditure for fiscal 1992 showed a 38% increase over fiscal 1990 which indicates the degree to which the Central Government values the health care sector in the time of economic recession. The personnel cost and running cost proportions of the Hospital and University are relatively low at 7% and 24% respectively, however professors and doctors who belong to the University also work in the Hospital and the laboratories and examination rooms run under the University budget are also utilized by the Hospital, so it is fair to think that a large proportion of the University budget (especially the running budget) is actually used in the running of the Hospital.

Table 3-38 Normal Budget (Establishment) for BHU & Hospital

Category	1990~91		1991~92		1992~93	
	Amount	%	Amount	%	Amount	%
Expenditure	448,525		486,173		617,985	
Personnel Cost	330,424	100	378,293	100	461,949	100
BHU	246,216	74.5	280,777	74.2	354,384	76.7
SS Hospital	84,208	25.5	97,516	25.8	107,565	23.3
Modern Medicine	49,262	(14.9)	58,589	(15.5)	63,266	(13.7)
Indian Medicine	5,045	(1.5)	4,558	(1.2)	5,226	(1.3)
Others	29,901	(9.1)	34,369	(9.1)	39,073	(8.3)
Running Cost	118,101	100	107,879	100	156,036	100
BHU	110,563	93.6	99,947	92.6	140,808	90.2
SS Hospital	7,538	6.4	7,932	7.4	15,228	9.8
Modern Medicine	2,176	(1.9)	2,546	(2.3)	3,230	(2.1)
Indian Medicine	657	(0.6)	188	(0.2)	281	(0.2)
Others	4,705	(3.9)	5,198	(4.9)	11,717	(7.5)

Source : BHU

The next table shows the breakdown of grant expenditure on maintenance and management in the Hospital over the past three years. The budget for each department shows a slight rise over the previous

year. After fiscal 1992, the annual grant per bed in the Hospital increased from 6,000 to 12,000 rupees indicating a major rise in maintenance and management costs of the Hospital excluding the University. Around 30% of the extra grant was spent on maintenance and management of equipment.

Table 3-39 Grant Expenditure on Maintenance and Management

(UNIT:Rs.1000)

	1990~91	1991~92	1992~93	Add. Grant
Grand Total	7,538	7,932	15,228	5,250
Modern Medicine Total	2,176	2,546	3,230	0
Laboratory	1,395	1,729	2,000	
Training	32	32	50	
Study Worry	14	2	45	
Transport	158	208	210	
Others	127	211	155	
Report	9	13	20	
Field Study	138	76	200	
Maintenance	134	154	200	
Seminar	104	81	205	
Research	19	-	50	
SPA Biochemical	46	40	95	
Indian Medicine Total	657	188	281	0
Drugs	1	1	1	
Laboratory	147	128	185	
Extra Expenditure	25	29	39	
Animals	10	7	30	
Seminar	1	10	6	
In-patient	460			
Study Trip	10	10	15	
Garden	3	3	5	
S.S.Hospital Total	4,705	5,198	6,467	5,250
In-patient	647	675	800	250
Medical Materials	1,937	2,161	2,400	300
Equipment	40	415	600	150
Ambulance	77	77	150	50
X-Ray Equipment	222	285	350	50
Others	1,370	1,221	1,700	250
X-Ray Protection	412	364	467	100
Maintenance	-	-	-	4,100

Source:BHU

2) Special Budget

The special budget is given for the Development Plan designed to further activities at the Institute under the Five Year Plan. The development plan includes the reconstruction of buildings, the purchase of equipment and the training of personnel. The following table shows the grants made to the Institute under the 7th and 8th Five Year Plans.

Table 3-40 Special Budget by Grant

(UNIT:Rs. 1000)

Development Plan	5 years	1 year
7th Five years Plan	26,100	5,220
8th Five years Plan	60,000	12,000

Source : BHU

The Institute applied for about 1.2 billion rupees (about 4.2 billion yen) for major improvements and renewal of equipment under the 8th Five Year Plan, however was only able to receive 5% of the above figure or 60 million rupees (0.21 billion yen) due to the tight financial situation at that time. Because of this, the large scale development plan was cancelled and the money is being allocated to those areas in most urgent need of upgrading. The following table displays the allocation plan for that budget. The Hospital has been forced to allocate 10 million rupees (approximately 35 million yen) over a five year period or an annual figure of 2 million rupees (approximately 7 million yen) for the purpose of purchasing equipment which in terms of the size of the Hospital is practically null.

Table 3-41 Distribution of Special Budget

(UNIT:Rs. 1000)

Grand Total		60,000
Modern Medicine		38,000
	(1) Facility	10,500
	(2) Equipment	10,000
	(3) Hospital	10,000
	(4) Library	1,000
	(5) Laboratory	6,500
Indian Medicine		12,000
	(1) Facility	4,000
	(2) Equipment	1,800
	(3) Library	200
	(4) Personnel Cost	3,000
	(5) Animals	3,000
Others		10,000

Source:BHU

3) Revolving Fund

Due to the fact that the University is unable to carry out maintenance of some equipment with the technicians it possesses, it conclude contracts for maintenance service with manufacturers, and in order to pay for the service and the periodic replacement of parts and consumables necessary for operation of those items which the University has deemed necessary, it collects a service charge from patients. Of this money, 80% is used to pay for consumables and maintenance service and emergency repairs, at the discretion of each department concerned. As for the remaining 20%, it is paid to the University which saves it for the purchase of expensive necessary equipment in the future so that it will not become a burden on other medical services. This is referred to as the Revolving Fund System.

The radiology department initially introduced a revolving fund with X-ray film followed by a fund with CT scanning. Due to the

success of these funds, other departments are also pursuing the introduction of revolving funds. The radiology charges raise an annual income of between 3.5 and 4 million rupees, and from 1991 to 1992 each department of the Institute started their own such funds. Due to the introduction of this system, not only the maintenance of equipment but also the qualitative and quantitative sides of the medical services in the departments concerned have improved drastically. The following table demonstrates the state of the revolving funds in each department.

Table 3-42 Revolving Fund

Department	Test/Medical Treatment	Year	Amount (Unit:Rs)	Revenue		
				1990~91	1991~92	1992~93
Radiology	1. X-Ray fund	1982	450	1,918,436	2,123,069	1,883,668
	2. CT Scan	1989	825	1,980,640	1,949,770	1,772,525
Cardiology	1. Treadmill Test	1991	400		271,700	480,575
	2. Echo Cardiography	〃	400			
	3. Holter Monitoring Test	〃	600			
	4. Vector Cardiography	〃	200			
Gastroente -rology	1. Diagnostic Endoscopy	1992	200			222,100
	2. Theraputic Endoscopy	〃	500			
	3. Theraputic Biliary Duct	〃	1,000			
Endocrino -logy	1. Thyroid Hormone/ Adrenal Hormone Profile	1992	300			10,200
	2. GH Dynamic Test	〃	200			
	3. Gonadal Hormone Test Profile	〃	400			
Nephrology	1. Hemodialysis	1992	1,000			125,750
	2. Peritoneal Gialysis	〃	1,200			
Dental Surgery	1. Crown & Sridge	1920	400			7,200
	2. Complete Centures	〃	400			
	3. Root Canal Treat	〃	400			
	4. Maxillo Facial Prosthesis	〃	400			
Neurology	1. EEG/EMG/NCV/EP	1992	150			90,100
Psychiatry	1. EEG	1992	150			1,650

Source:BHU

3.2.4. Examination of State of Infrastructure

(1) Supply of Electricity

As a result of measuring the variations of voltage in each department with an automatic voltmeter, it was found that the variational value was a small ±6% and that there is no problem in the use of medical equipment. However, for the purpose of preventing any unexpected trouble, it is thought that voltage stabilizers and UPS be installed for equipment that includes electronic parts, computers and so on.

Table 3-43 Power Supply

Department	Date Time	First	Second	Third	Average	Ratio
O.T.	Jul. 1, 93' :00:34	230.4V	234.1V	234.3V	232.9V	-0.9%
Recovery Room	Jul. 1, 93' :02:33	232.7V	242.3V	242.7V	239.2V	+1.8%
Laboratory	Jul. 1, 93' :03:45	221.6V	220.9V	220.9V	221.1V	-6.0%
Dental	Jul. 2, 93' :00:12	228.8V	230.8V	226.2V	229.9V	-2.2%
Laundry	Jul. 2, 93' :03:04	244.5V	244.2V	242.2V	243.6V	+3.6%
Ophthalomology	Jul. 2, 93' :03:21	214.4V	228.8V	225.6V	222.9V	-5.2%
Radiology	Jul. 2, 93' :15:45	248.0V	246.9V	-	247.4V	+5.2%

Source:B/D Study

(2) Quality of Water

The following table displays the results of tests made on water samples taken from the central supplys room and operating theatres. Iron content and pH levels are close to standard and do not cause any trouble, however because the water is taken from a deep well, it is hard and therefore needs water softening plant for use in high pressure steam sterilizing instruments and surgical hand wash.

Table 3-44 Results of Water Analysis

Sample date	2, July, 1993 2.00pm		
Sample source	Operating theatre hand wash		
Item	Measure method	Quantity limit	Analysis result
Total hardness	JIS K0101 15.1	0.25 mg	140 mgCaC0a/1
Total iron	JIS K0101 60.2	0.03 mg/1	0.03 or less mg/1
coloid sylica	JIS K0101 44.2	0.05 mg/1	28 mgSi02/1
pH	JIS K0101 11		7.8 measured temp 22℃

Sample date	2, July, 1993 2.05 pm		
Sample source	Central supply room		
Item	Measure method	Quantity limit	Analysis result
Total hardness	JIS K0101 15.1	0.25 mg	270 mgCaC0a/1
Total iron	JISK0101 60.2	0.03 mg/1	0.03 or less mg/1
Coloid sylica	JISK0101 44.2	0.05 mg/1	28 mgSi02/1
pH	JIS K0101 11		7.4 measured temp 22℃

Source: B/D Study

3.2.5. Examination of the Relation with Similar Projects

In 1986, Japan carried out a Grant Aid Porject for Improvement of Medical Equipment at the Sanjay Gandhi Post Graduate Institute (SGPGI) in Lucknow about 400 kilometers to the west of this projected site, and that technological cooperation project is still being continued today. However SGPGI is an institute for research into high level, specialized medical care and therapy consisting of the six surgical and internal medicine departments of neurology, angiocardiology, GI, endocrinology, renology and hereditary immunology and the back-up departments of radiotherapy, diagnosis and radioisotopy, and thus it does not offer a general service for the treatment of patients. Moreover, even though SGPGI is a public facility, it runs a chargeable system for diagnosis and is basically a social middle class patient facility. In contrast to this, the projected site under this project carries out a wide range