Title Page

GENERAL HOSPITAL BAUCHI
(A REDEVELOPMENT SCHEME)

BY

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DECLARATION

I hereby declare that this thesis has been written by me and that it is a record of my own research work. It has not been presented in any previous application for a higher degree.

All quotations are indicated and the sources of information are specifically acknowledged by means of references.

DEDICATION

Dedicated to those who strive in the way of Allah with their wealth and themselves.

CERTIFICATION

This thesis entitled General Hospital Bauchi (A redevelopment Scheme) by Mohammed Sulaiman Kumo, meets the regulations governing the award of the degree of Master of Science (Architecture) of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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ABSTRACT

The presence of an efficient health delivery-system in any part of the world ensures its well being. Health Care is as important to man as food and shelter. Infact the three could be said to be married together.

Society's needs are influenced by many factors among which knowledge (in terms of technology) and population (growth rate) could be said to be overriding. These factors are dynamic and therefore during planning stage, due consideration should be given to them.

Medical care could be said to be as old as man himself. Since then a lot had been and is being done to improve on the type of medical care that is btain in different parts of the world.

In Nigeria today, many hospitals are not well equiped to cater for the populace it was intended for. This is because most of them were built during the colonial period when proper studies were not conducted, and forecast of the future not considered.

The Bauchi General hospital was built during the then Northern Nigerian Government under a scheme called "COUNTRY HOSPITAL" all over the region. Bauchi now a State Capital sustains the one and only "COUNTRY HOSPITAL".

One can thus envisage the need of the populace vis-a —vis the available facilities. In an effort to improve the situation, extensions have been haphazardly carried out. That finally culmulated into a "site filled" with buildings"- for a hospital. Therefore space organisation and proper circulation are alien to that hospital.

There is also a proliferation of private hospitals and clinics which is not a surprise. these are for the rich, which the poor can not get access to.

This thesis therefore, aims at achieving the following:

(a) Providing adequate health care facilities using the most up to date scientific equipment

(b) Providing a human atmosphere for the sick

(c) Solving the problem of over congestion and overcrowding existent in the hospital. (By creating more space)

(d) Improving the circulation pattern which is very important factor in a hospital.

(e) Giving it a better space organisation to the extend possible.

The population growth rate would be considered in the replanning process.

The research methodology therefore, involves among others, interviews with the Hospital Management, Staff and Patients. It also involves visiting the various units and appraising their fitness in serving the Functions for which they were meant.

Main sections in the hospital are two. These are the:

(a) OUT -PATIENT DEPARTMENT

(b) IN - PATIENT SECTION

Departments of the above include:

1. MEDICINE
2. ENERGY
3. ORTHOPAEDICS
4. OBSTETRICS & GYNAECOLOGY
5. RADIOLOGY
6. P/THOLOGY
7. PSYCHIATRIC
8. E.N.T. (Ear, Nose and Throat)

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INTRODUCTION:

The presence of an efficient health delivery system to a people ensures its well being since health care is as important to man as food and shelter. Infact without good health, food and shelter do not mean a thing to man because they come next.

Health care is thus achieved through hospitals. These are social institutions utilizing combinations of different scientific equipment and functions and manned by a team of trained medical, para-medical, and non-medical staff, who provide service to the patient.

It is the duty of the Architect to plan or replan (as the case may be) a hospital complex designed so that it utilizes effectively the talents and time of the employees and provide an efficient and safe service to the patient for whom the hospoital is made.

Hospitals, as they exist today, are classified into categories. These categories are according to the level of sophistication of services they render.

1. Teaching Hospitals:

These are the most sophisticated in the hospital categories. They provide training for undergraduate and post-graduate medical students and invariably contain significant research facilities.

A hospital with such facilities is what is termed a teaching hospital. In these hospitals, number of beds does not indicate level of sophistication.

2. Specialist Hospitals:

These hospitals deal with a specified category of patients that is, patients with a particular tyoe of ailment e.g. Skin diseases, Gastro-intestinal diseases, opthalmic, E.N.T., etc. uch hospitals provide some of the leading centres for post-graduate teaching and research in their specialty. Specialist Hospitals are usually scarcely beded (about 50-150 beds) due to limitation of services offered.

3. General Hospitals:

The third in the categories of hospital are the General Hospitals. These are hospitals that cater for all patients with various illnesses. Such hospitals are refered to as General Hospitals because they are large enough to provide medical services for all but the few requiring specialist services. They at times refer patients for a completion of treatment to Specialist Hospitals. Their sizes, measured in terms of beds, range from about 200 beds to well over 1000 beds. Many general Hospitals are planned for 500-800 beds, though they are usually phased out for development.

This is the category that this Thesis is concerned with.

Community Hospitals:-

This is the last category of hospitals. It is also refered to sometimes as Health Centres. These are smaller hospitals of between 50 and 150 beds intended to be staffed by Local Governments, or sometimes, the State Governments. They usually cater for patients transfered from village dispensaries.

BRIEF HISTORY OF HOSPITAL DEVELOPMENT

THROUGH THE AGES

Hospitals today epitomise the struggles of our forefathers from time immemorial to cure themselves of different types of illnesses.

The art of healing is not a recent one in human history. Man has always tried to heal himself and is ever persevering in that since health cannot be divorced from life (life and health are complimentary). Thus, the pace of development in the field of medicine, has been a source of surprise to man himself because of the advances in technology which is being undergone.

Archeological findings show that man attained a surprisingly high level of medical knowledge at certain periods of his history. For example, the art of plastic surgery was known to the Hindu Societies in ancient India. The art was employed to cover up the amputation of the nose, which was then the punishment for adultery.

Ancient Greeks and Egyptians were in the habit of laying their sick by the road sides for passers- by to see and give their advice as to how to go about the cure. Such pieces of advice were based on experiences of the passers- by.

Later, the art of healing became linked with gods and temples became places for the sick.

As early as 226 BC., the need for area-wide planning of medical facilities was known to king Ashok of India. This idea was also used by Duthagamini of Ceylon. King Ashok built 18 institutions and employed attendants to man them. The attendants were instructed to be clean and wear white clothes. They were also told to provide the patients with food and medicines. Prior to this time, Hippocrates (the father of medicine), born 460 BC, had already written a lot on moral obligations of members of medical team both to each other and to their patients. His writings, were however, not compiled until 3BC. At about this time, many temples became centres for medical practice. The sites of the temples were usually alongeside mineral waters or warm healing springs. In addition to the temples, there were "Iatreia", or medical clinics, in which Greek Physicians, who were free citizens, held consultations and treated their private patients. These buildings marked the beginning of out-patient services that are common to modern hospitals.

In Rome, similar institutions came to being. These were temples to Aesculapius and iatreia for private physicians and their wealthy patients. The temple of Aesculapius was on a small island in the Tiber, located there as a divine portent. Sick, worn out and dying slaves were dispatched to this island and left there. The Emperor claudius, appalled by this vicious practice, decreed that all slaves who recovered were henceforth freemen. This resulted in the temples development into an infirmary for the sick poor and hence a forerunner in Society in the hospital as it is known today. These infirmaries were termed "Valetudinaria". Military valetudinaria were built at the frontiers, and civilian valetudinaria were built for the use of imperial civil servants and their families stationed in provincial capitals. The "Valetudinaria" took the form of porticoed court onto which opened rooms for the sick, and as such, a distinct architectural form was beginning to emerge.

As christianity started getting a strong foothold in the minds of men, new concepts of charity and care for the poor and the sick asserted themselves in the community. It was during this era that charitable organisations within the roman empire.

opened what were called "Xenodochium", where the sick and ill travellers were cared for. These buildings were erected in all the big cities. An example of these, built in 398A.D. was excavated in Ostia in 1875. The excavation revealed a defined sense of organisation in the planning of the "Xenodochium". There were well planned corridors linking the various units of the building. The interior courtyard was made to be pleasing to the eye, and the courtyard was bounded on one side by basilica and on the other by patient rooms.

Hospital at Abbey (St. Gallen) in switzerland was built in 820 A.D. At that time, this was the most up to date Hospital known in recorded history.

Another step forward in hospital building came in 829 A.D. when the "Hotel Dieu" was built in Paris. This hospital had sixwards, four for general cases at different stages of diseases, one for convalescents and the sixth for maternity cases. By the 17 Century, the hospital contained 5000 patients, housed in large halls with several patients to one bed. Attention was not paid to hygiene, sanitation or ventilation. Later, attempts were made by the academy of sciences to alleviate the problems.

Fig. a Greco-Roman latreia.

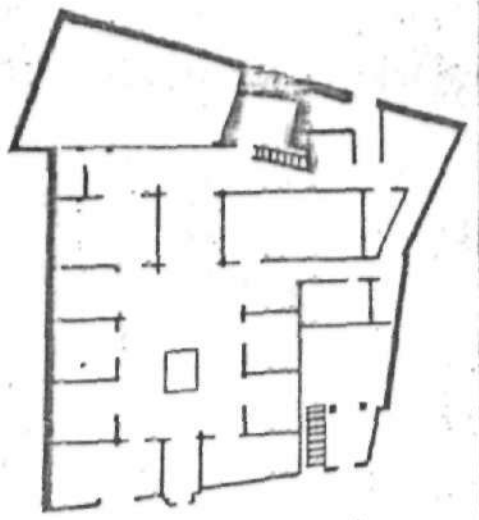
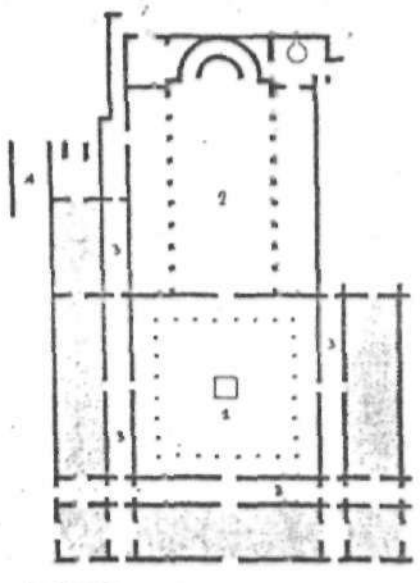
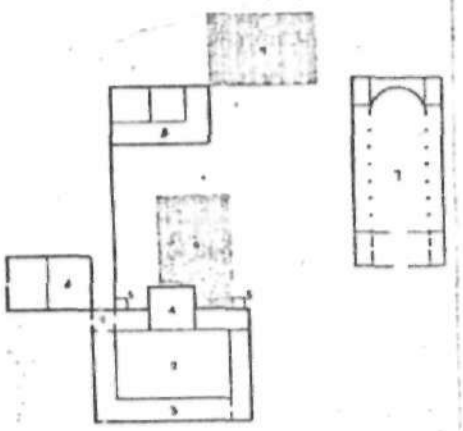


Fig. b Romano-Christian Xenodochium at Ostia, Italy.



Sixth Century Xenodochium
at Turmanin Syria



1 Entrance
2 Hall for sick
3 Portico and corridor
4 Service building
5 Stair
6 Mortuary
7 Basilica
8 Barns and stables
9 Pure water cistern



Hotel Dieu, Paris, France, site plan.



Hotel Dieu, Paris, France, patient ward.

Fig. c Historical Medical Institutions.

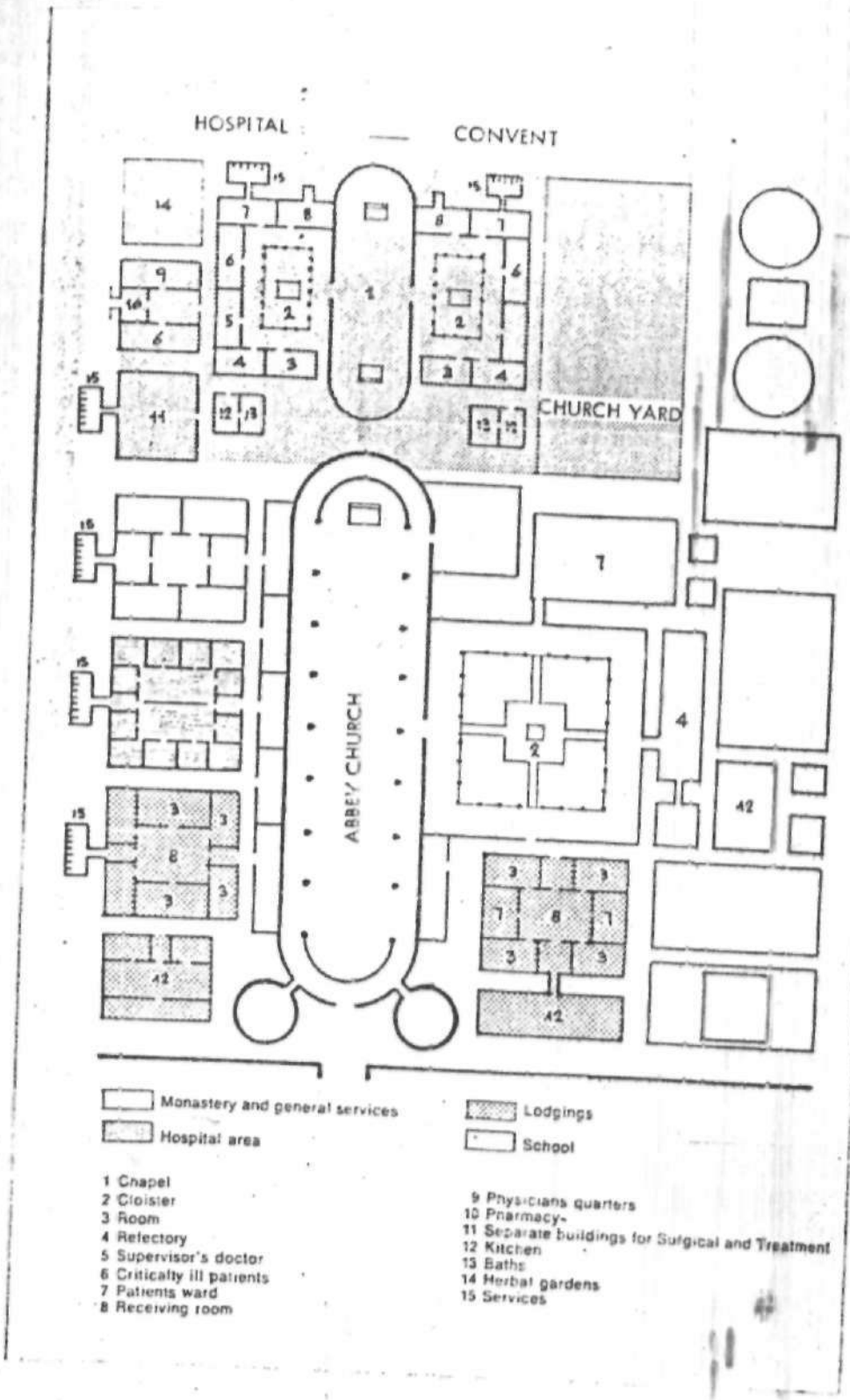


Fig. d Abbey at St. Gallen, Switzerland.

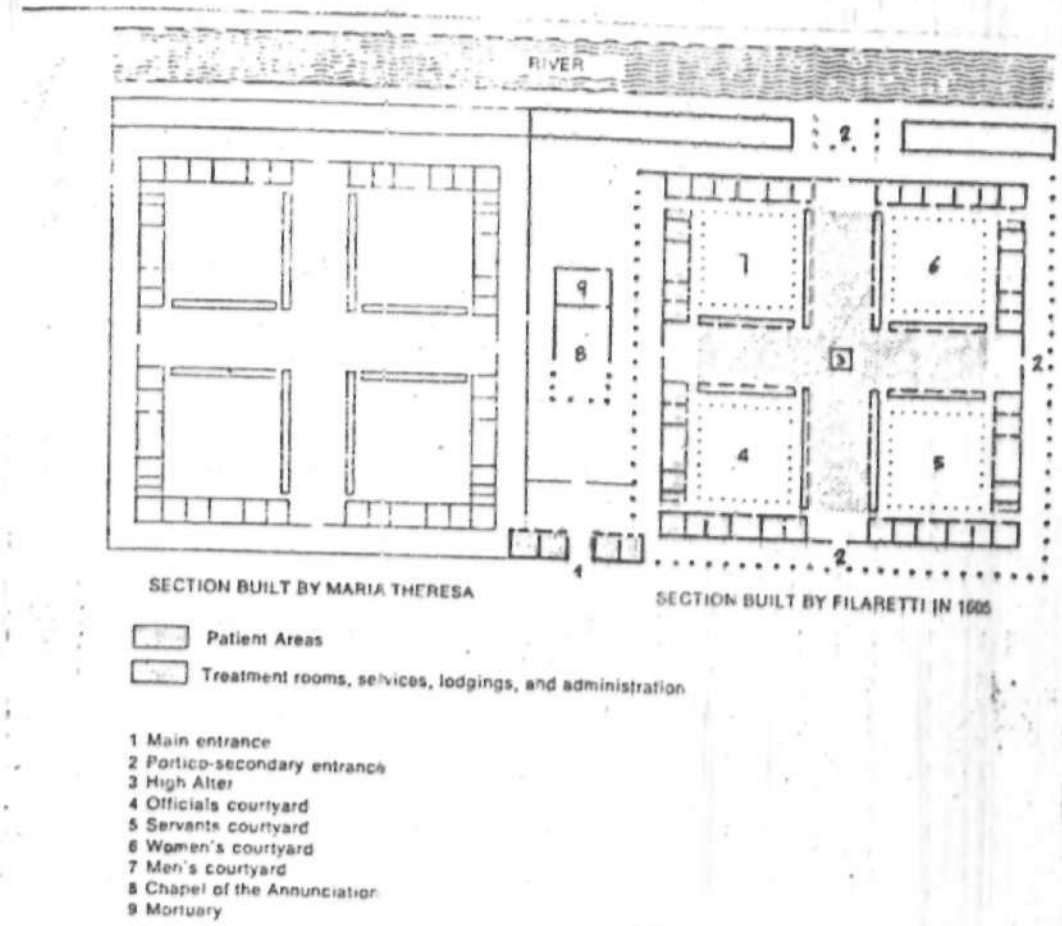


Fig. e Ospedale Maggiore, Milan, Italy

In 1456, the grand Hospital of Milan was built. The plan was basically a cruciform with large patient wards in each of the four segments arranged so that each patient might have a view of the central court. These wards were connected to the other rooms containing services facilities, treatment and administrative areas by corridors.

In the 19th Century, a number of developments, contributed to the development of hospitals and their planning. A one time experienced and outstanding nurse, Florence Nightingale, wrote in her book, notes on Nursing, that bad Nursing situation is not brought about by nurses themselves, but by bad sanitation, bad Architecture and bad administrative arrangements. These situations often make it impossible to Nurse. Her rule of Nursing is to keep the air within as pure as the air without.

She also brought the idea that the sickest patient in any ward should be placed in the bed nearest the nurses' station and the convalescent patient be placed further away from the nurses (nursing station). This gave rise to what is now known as progressive patient care in hospitals.

Other ideas and discoveries that revolutionized hospital planning include:

(a) The discovery of anaesthesia ,

(b) The discovery of how diseases spread,

(c) The discovery of X -ray ,

(d) The understanding of the principle of asepis, and

(e) The introduction of steam sterilization.

The use of X -ray necessitated large and elaborate equipment which the average practitioner could not afford to install individually. It then became necessary to build big hospitals were such equipment can be kept for the use of all. These discoveries of new diagnostic and therapeutic methods necessitated building new hospital departments capable of accommodating their apparatus and a conducive room climate for undertaking the new diagnostic and the therapeutic proceedures.

CHAPTER ONE

1. HOSPITAL MODERNISATION (REDEVELOPMENT)

"Many large hospitals in urban areas are becoming obsolete and increasingly inefficient to operate. Yet these hospitals provide specialized services, set standards of quality care, conduct research, apply the latest advances in medical science, and train future health specialists"[1].

Hospital buildings, because they are complex, tend to become obsolete sooner than many other types of buildings. Physical obsolescence of a hospital is caused by deterioration of the structure, including materials and finishes, and by deterioration or overtaxing of the mechanical and electrical plants. If maintenance has been poor, physical obsolescence is accelerated. Functional obsolescence on the other hand, results from changes in (i) medical concepts and practices, (ii) the use and organisation of hospital departments (iii) the neighbourhood served by the hospital (e.g. the change from residential to commercial or industrial).

1.1 Physical Obsolescence: Any plant however well cared for, will probably lack many physical features that are considered essential in present-day hospitals. Column locations, window arrangement, corridor width, and similar physical characteristics of ex buildings may preclude an ideal rearrangement of space for the needs of a hospital today.

1.2. Functional Obsolescence: Unfortunately, a hospital that has had excellent maintenance and has deteriorated only slightly can still be functionally obsolete. Drastic changes in hospital use are forcing radical changes in the organisation of some departments. Most hospitals find it difficult, if not impossible, to fit the additional services that have become their responsibility into existing envelopes, and additions are usually necessary for the increased functions.

The Architect should make a detailed feasibility survey which will provide the detailed information that will be required so as to know how to go about the redevelopment process.

1.3. Architectural Layout: The architectural feasibility survey should determine exactly how the facility can be modernized to carry out the progam that has been developed. Existing departments and spaces in the hospital should be carefully studied to facilitate the proper functional arrangement of the anticipated remodeling. If available, original drawings will be valuable in the architectural evaluation. If, however, these drawings are not available, it will be necessary to prepare an architectural layout of the existing buildings.

Usually the square metre (M^2) area of the existing space is inadequate and considerable space must have to be added. Consequently, areas such as surgery, X- ray, and laboratories should be housedand in a new wing. This permits the architect to design a better functional arrangement for these areas and also helps in the matter of scheduling the construction so that the existing facilities in the hospital can be used while the new wing is under construction. Alternatively, temporary structures should be erected where allowable, if existing structure must have to be demolished to provide space for erecting the new structure.

1.4 Salvage of Existing Buildings: The process involves at least four seperate but related steps.

(1) Determine the adequacy of the existing space in all departments for serving the present number of the hospital beds and appraise the physical condition of existing buildings for continued use.

(2) Calculate the additional space required to make up present deficiencies thus revealed and to replace space in old buildings which the appraisal indicates should no longer be kept in use.

(3) Calculate the additional space needed in all departments to care for the proposed additional hospital beds.

(4) Calculate additional space for some supporting departments which may be justified (e.g. Kitchen, Laundry, Stores etc.)

It is the duty of the hospital planner and designer to consider the safety and comfort of the patient for whom the hospital is planned. The various departments and pattern of circulation should be assembled in such a way as to reduce the spread of infection and promote an effective nursing care.

1.5. Hospital size

The number of beds in a hospital- especially the General Hospital, determines its size and the provision of other supporting services.

The American commission on hospital care, deviced a method of calculating bed needs from utilization. The commission used a bed-death ratio based on the relationship between the predictability of death rate and an estimation of the proportion of deaths that will occur in the hospital. The most common ratios ranged from 4.5 and 5.0 beds per 1000 inhabitants.

Generally, bed needs vary as a result of community differences such as age distribution, marital status, sex distribution, degree of urbanisation, etc.

Some countries, with the above factors taken into consideration, established standards with which hospital planning is done. In Egypt, the Government had in 1965, made 3 beds/1000 of its population as its standard planning guide. America uses 10 beds/1000 while Nigeria has recently recommended 5 beds/1000 population for its current development period. The procribed Nigerian Medical Association, after considering our local problems of lack of enough medical personal and low technology, as well as people's response to medical care, recommends the use of 2 beds/1000 population and 3beds/1000 population in the urban areas.

World Health Organisation (W. H. O.) recommends the following bed distribution in hospitals:

Medical	24%
Surgical	33%
Obstetric	19%
Paediatric	15%
Others	9%
Total	100%

1.6. Circulation: This is a very important factor in the set-up of a hospital complex. There are basically two types of traffic existent within the hospital. These are :

(a) Internal (pedestrian), and

(b) Vehicular circulations. Any passage should involve crossing the paths of as few people as possible because passers- by are a source of possible cross-infection in the hospital.

> "Seperate all departments, yet keep them all close together, seperate types of traffic, yet save steps for everybody; that is all there is to hospital planning"[2]

Seperate entrances could be provided so that seperation of traffic is achieved starting from without to within. Examples is seperation of patients entrance from Emergency and Maternity, and also seperating services entrance from the rest. Within the hospital, out-patients traffic should be separated from in-patients.

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CHAPTER TWO

2. ANALYSIS OF THE EXISTING SITUATION

Health Care in Bauchi is provided free of charge by the Government, though proposals are underway for introducing hospital charges. In Bauchi Town, Medical Services other than from Private Clinics, are provided solely by the only General Hospital. This hospital was built in the year 1955 under the then regional Government of Northern Nigeria under a scheme called country hospitals.

After the transformation of Bauchi into a State Capital, still that 'Country Hospital' is the only source of medical services. So due to demands by growing population, expansions have been disorderly carried out and reassignment of functions encountered. In its present State, many structures are either obsolete completely or grossly inadequate in meeting desired services.

The bed population is now 439 divided by services into the following:

Medical	81
Surgical	87
Gynaecologic	59
Maternity	51
Paediatrics	78
Orthopaedics	20
Psychiatric	33
Total	439beds

Source: Physical survey by the author

2.1. Patient Care Units

There are three types of patient care units in the General Hospital. The three sum up to nine wards comprising medical, surgical, paediatric, psychiatric and obstetrical nursing units.

Figure 2.1. shows the plan of the oldest ward type which was the ward type originally built for the hospital. The ward originally planned for 30 beds now accommodates as many as 45 or more beds. Infact some patients are accommodated in the corridor due to lack of space. This has lead to overcongestion of the wards- being the Nightingale type so cross- infection is promoted and privacy completely absent. This lack of privacy prevents the patient from giving the doctor a comprehensive medical history.

There is also the problem of the toilets being situated at the end of the ward making the distance of the farthest patient to the toilet 48M when it should be about half of that distance or even nearer.

Provision for relaxation of the convalescent patients in the form of Day Space or Room is absent so the convalescent patient is tied down to his bed until the day of discharge. Thus boredome becomes his or her companion throughout his or her stay in this type of ward.

MEDICAL WARD (CAPACITY = 30 BEDS)

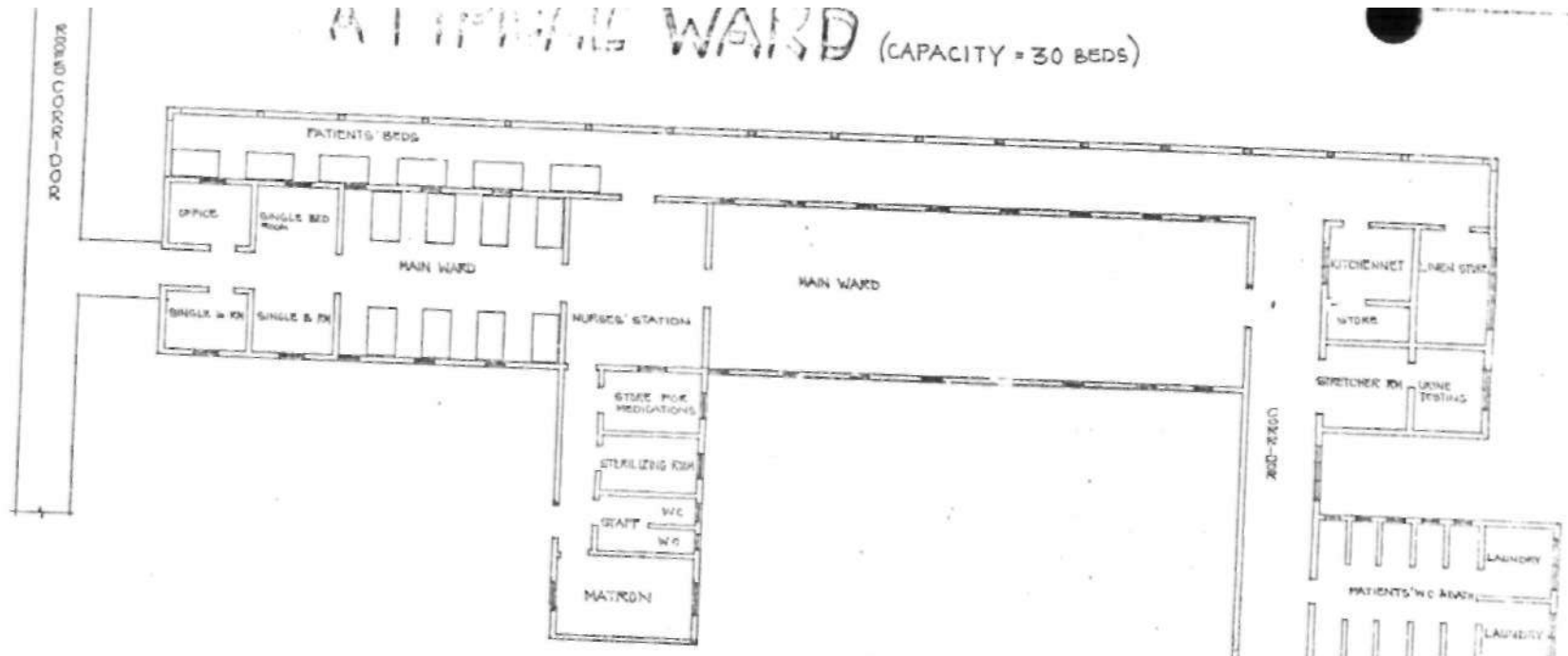


FIG. 2.1

APPRAISAL:-

NEGATIVE POINTS:

1. WARD IS THE OLD-FASHIONED NIGHTINGALE TYPE WHICH PROMOTES CROSS-INFECTION AND PROVIDES NO PRIVACY FOR PATIENTS.
2. TOILETS NOT WITHIN CLOSE WALKING DISTANCE OF SOME PATIENTS. DISTANCE OF TOILETS FROM THE FARTHEST PATIENT = 48 M.
3. ABSENCE OF DAY-ROOM WHERE PATIENTS CAN RELAX AND FIGHT AWAY BOREDOM.
4. NO PROPER VENTILATION AND DAY LIGHT IN MAIN WARD DUE TO SMALL WINDOW SIZE.
5. BED SPACING TOO CLOSE FOR COMFORT
6. NO. OF SINGLE ROOMS = 5 ONLY EVEN THEN THEY ARE NOT PROVIDED WITH TOILETS.

POSITIVE POINTS:

1. NURSES' STATION CENTRALLY LOCATED THUS FACILITATING EFFICIENT OBSERVATION BY THE NURSES.
2. NUMBER OF TOILETS (W.C & BATH) SUFFICIENT (1 W.C & BATH TO 8 PATIENTS)
3. ORIENTATION IS E-W THUS DISALLOWING DIRECT SUN RAYS PENETRATION
4.

For cases needing isolation, the effectiveness of the isolation is not achieved because the single rooms, despite being few in number, are not provided with toilets so as for those who can, use the general toilets and those who cannot, are provided with bedpans.

Figure 2.2. shows the plan of the second type of ward built when the need for expansion arose. The ward is relatively new and contains more facilities than are provided in the one discussed above.

Here the ward is subdivided into smaller wards each capable of accommodating four beds in a semi-private way since the subdivisions are bounded only on three sides leaving the side of the corridor open. However, in terms of privacy, it does not compare with the former.

The number of single rooms provided are fairly okay but the day space has been converted into isolation as well which indicates the need for more single rooms within possible limits. Thus, as in the previously discussed ward, day space for convalescent patients is lacking since it has been transformed into serving an entirely different function from what it was meant for.

Since the single rooms are provided with their own toilet facilities, the place for the general toilets is within an acceptable walking distance for the patient in the farthest corner.

A TYPICAL WARD

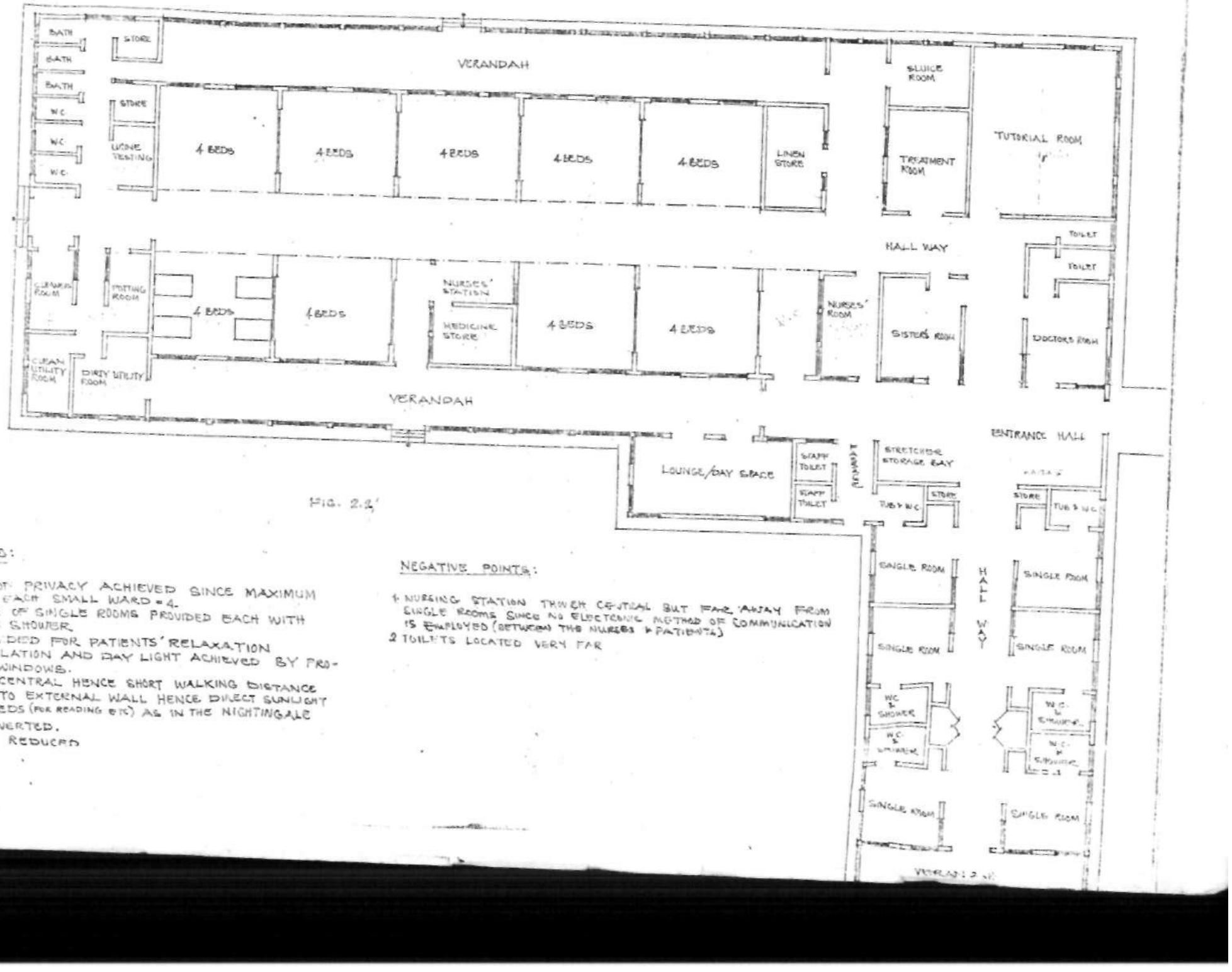


FIG. 2.2

POSITIVE POINTS:

1. HIGH DEGREE OF PRIVACY ACHIEVED SINCE MAXIMUM NO OF BEDS IN EACH SMALL WARD = 4.
2. QUITE A NUMBER OF SINGLE ROOMS PROVIDED EACH WITH ITS OWN W.C. & SHOWER.
3. DAY SPACE PROVIDED FOR PATIENTS' RELAXATION
4. SUFFICIENT VENTILATION AND DAY LIGHT ACHIEVED BY PROVIDING LARGE WINDOWS.
5. NURSES' STATION CENTRAL HENCE SHORT WALKING DISTANCE
6. BEDS PARALLEL TO EXTERNAL WALL HENCE DIRECT SUNLIGHT ONTO PATIENTS' BEDS (FOR READING ETC) AS IN THE NIGHTINGALE TYPE OF WARD, AVERTED.
7. CROSS INFECTION REDUCED

NEGATIVE POINTS:

1. NURSING STATION TWICE CENTRAL BUT FAR AWAY FROM SINGLE ROOMS SINCE NO ELECTRONIC METHOD OF COMMUNICATION IS EMPLOYED (BETWEEN THE NURSES & PATIENTS)
2. TOILETS LOCATED VERY FAR

Also provided are treatment room and Tutorial room for the nursing students since the hospital apart from providing medical care to patients also provide training for nurses and midwifes.

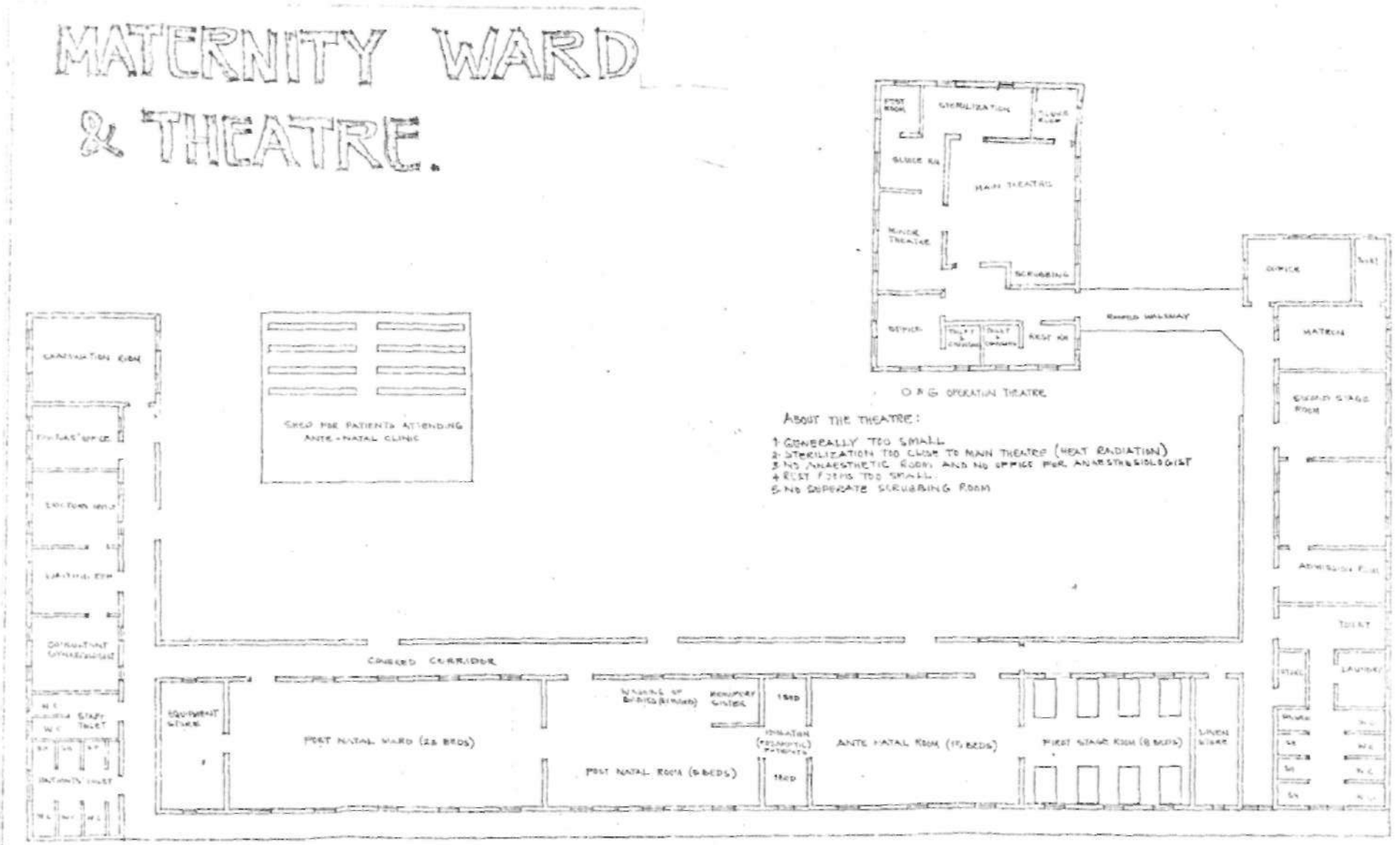
The main drawback of this ward type is in the location of the nurses station which is supposed to be a control centre, as well, for in-coming traffic. Its present location also seperates it from the single rooms which also need the nurses' supervision.

Generally, this ward solves most of the problems found in the old ward.

Figure 2.3 shows the other ward type which is only one of its type and is set aside for the maternity patients.

The main drawback of the ward, is its location. It is located just opposite the out-patient department which is a public area and a very busy one for that matter. For attaching the ante-natal clinic with the maternity wing instead of the out-patient department, makes patients to traverse through the ward. Also patients going to other wards pass through it thus rendering it a noisy and raudy area which is improper since nursing units are considered private and are for the exclusive use of its occupiers other than the staff.

MATERNITY WARD & THEATRE.



O.P.G. OPERATION THEATRE

ABOUT THE THEATRE:

1. GENERALLY TOO SMALL
2. STERILIZATION TOO CLOSE TO MAIN THEATRE (HEAT RADIATION)
3. NO ANAESTHETIC ROOM AND NO OFFICE FOR ANAESTHESIOLOGIST
4. REST FACILITIES TOO SMALL.
5. NO SEPERATE SCRUBBING ROOM

POSITIVE POINTS:

1. SUFFICIENT NO OF TOILETS FOR THE PATIENTS
2. RELATIVELY DIRECT WALKING DISTANCE TO THE TOILETS
3. THEATRE VERY CLOSE

FIG. 2.8

NEGATIVE POINTS:

1. PRIVACY LACKING ESPECIALLY IN POST & ANTE NATAL WARDS
2. ISOLATION (FOR PEDIATRIC PATIENTS) QUITE INSUFFICIENT
3. NO NURSING STATION
4. NO NEO-NATAL ROOM (FOR PREMATURE BABIES AND THOSE WHOSE MOTHERS ARE NOT WELL ENOUGH TO TAKE CARE OF THEM)
5. NURSE CONGESTION (LACK OF SPACE)
6. GENERALLY NOT SUFFICIENT
7. ANTE-NATAL CLINIC DETACHED FROM GENERAL OPD TO MATERNITY WARD THUS EXPOSING THE WARD TO PUBLIC AREA.

Considering the design of the ward, it is also of the nightingale set up whose problems have already been enumerated. Labour-Delivery suite absent and only a theatre is provided for caeserean sections and some complications arising from child birth.

Nursing station is completely absent as this was not considered during the design stage.

No provision is made for nurseries (neo-natal cases) since some mothers are not fit to go back home after child birth. Some are fit to return but the infants may be sick or may be infected by disease. This necessitates the provision of nurseries for both full term and premature (those with low birth weight).

On the position side however, walking distance to toilets fairly short since there are two sets of toilets.

The disadvantages of this ward type outweight its advantages hence it is unfit for a maternity ward.

2.2. Adjunct Diagnostic and Treatment Facilities

2.2.1. The out-patient department (O.P.D.)

The O.P.D. is situated in the centre of the hospital complex. This gives it a good location which is easily accessible to both pedestrian as well as vehicular traffic Considering the nature of growth of the hospital, the o.p.d. has come to be sandwiched between the two sets of nursing units that is the old and the relatively new.

This gives it a good location.

The most important constituents of an out-patient department are the consulting and the examination room. These are however, very insuffient in this General Hospital. For an estimated population of 155, 090 (1985) of Bauchi and an annual attendance approximately 513,000 (sample), the number of consulting rooms available is just five (5) with only one examination room. This is totally out of proportion considering the tremendous out-patient attendance.

The second most important thing in an out-patient department is space (s) for waiting prior to consultation. This is practically absent but for the new children's o.p.d. This has lead to utilizing the corridor as waiting area since the consulting rooms open onto the corridor, which has lead to heavy traffic in the corridor and this has inhibited the circulation to the wards and the pathology department.

There is also no provision for patients toilets which compells one to exercise patience untill he returns back home even if the need for easing one's self arises. Even the staff are not provided with proper toilets. Figure 2.4 shows the plan of the O.P.D.



OUT-PATIENT, LABS & PHARMACY DEPARTMENTS

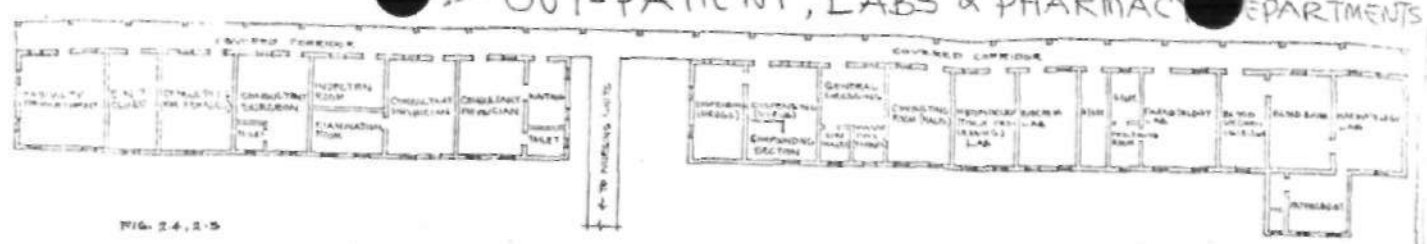


FIG. 2.4, 2.5

NEGATIVELY:

1. GENERAL O.P.D LACKS WAITING AREA FOR PATIENTS
2. CONSULTING ROOMS TOO FEW (AND EXAMINATION ROOMS TOO)
3. PATIENTS' TOILETS ABSENT
4. CIRCULATION GREATLY DISRUPTED SINCE CORRIDOR IS USED FOR WAITING
5. PHARMACY TOO SMALL AND PATIENTS WAITING NOT CATERED FOR.
6. DRESSING AND INJECTION ROOMS NOT ADEQUATE.
7. STAFF TOILETS ABSENT.
8. LABORATORIES TOO SMALL ESPECIALLY THE BLOOD BANK
9. KNOLE STATION GENERALLY INSUFFICIENT AS O.P.D, PHARMACY & LABS.

POSITIVELY:

1. CROSS-VENTILATION AND DAY LIGHT by FAIRLY ALRIGHT.

EMERGENCY.

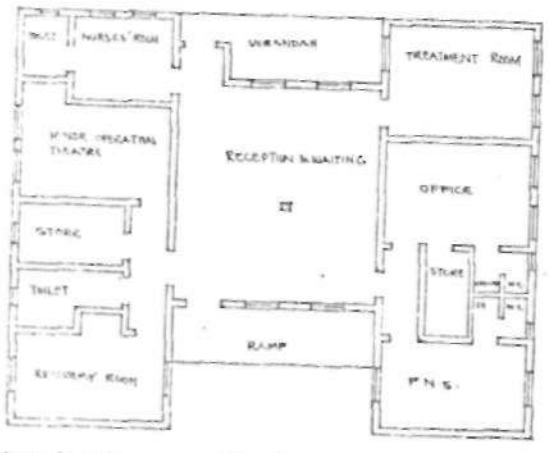


FIG. 2.7

EMERGENCY.
NEGATIVELY:

1. RECOVERY ROOM IS SMALL (CAPACITY = 3 BEDS)

POSITIVELY:

1. SUFFICIENT WAITING AREA.
2. CROSS-VENTILATION PROVIDED WHERE REQUIRED
3. TOILET FACILITIES PROVIDED

KITCHEN & LAUNDRY.

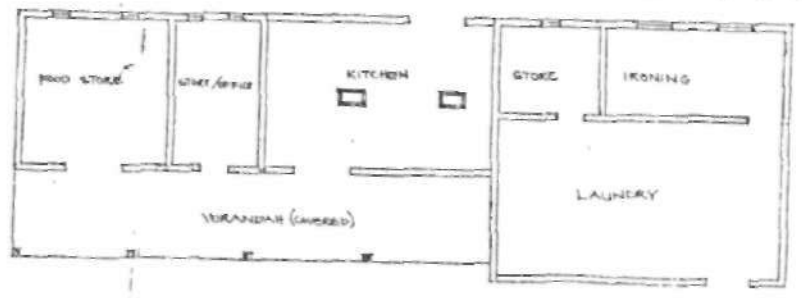


FIG. 2.8

KITCHEN

1. GENERALLY TOO SMALL FOR THE EXPECTED PATIENT LOAD (?300)
2. WASHING AREA FOR DISHES NOT PROVIDED CONSEQUENTLY EXITS OUTSIDE
3. NO PROVISION FOR KEEPING DISHES ON CLEAN SHELVES SINCE FOOD DISTRIBUTION IS CENTRALIZED

LAUNDRY:—
NEGATIVELY

1. ALSO TOO SMALL GENERALLY
2. NO PROVISION FOR STAFF TOILETS
3. NO DRYING ROOM
4. TAILORS' SHOP NOT PROVIDED (FOR MENDING AND DRESSING LINEN)
5. NO PROVISION FOR AN OFFICE.

POSITIVELY

1. HIGH CEILING AND ADEQUATE VENTILATION WHICH ARE ESSENTIAL FOR COMFORT.

General Out-patient annual report (sample)

Department	Male	Female	Paediatric	Total
1. Medical	144573	143277		287850
2. Surgical	24559	1277	(120375)	120375
3. Gynaecology	-	37638	-	37638
4. Opthalmic	9628	5309	3061	17998
5. E.N.T.	5157	7956	17	639
6. T.T.B.	5987	2514	208	8709
Total	190,313	198,184	124,444	512941
Percentage Total	37%	38.6%	24.3%	100%

Table 2.2

2.2.2. The pathology department.

This houses the clinical laboratories for investigating patient's specimen. It is placed adjacent to the out-patient department. It contains four laboratories. The haematology department which is concerned with examining of blood samples, is also responsible for collecting blood from donors and storing it in the blood bank for patients use. Provision is lacking for donors waiting area and no recovery area for them after donating the blood. This discourages people from rendering such humanitarian help.

The staff (mainly laboratory technologists) are not provided with locker rooms where they will change from street clothes to laboratory coats. Toilets for both staff and patients are not provided. Infact even specimen toilets are absent so a patient must have to take his urine or stool specimen from home when required for investigation. This is quite inconvenient.

Waiting area is also lacking so patients can not wait for their laboratory reports within the department.

The pathology department connot be said to be complete since essential activities such as E.C.G, E.E.G. and B.M.R. are not carried out.

Circulation space is also lacking and there is no privacy for the laboratories since they open directly onto the corridor which is filled up with patients awaiting consultation.

Sample annual Laboratory report

Group	Parasitology		Bio-chemistry	Microbiology		Haematology				Blood Bank			Pregnancy tests	Immunology	Histopathology	Post Mortum examination
	Urine	Stool		Culture sensitivity	Ziehl Nelsen Stain	Full blood counts	Antenatal tests	Semen Analysis	Sickle cell tests	Grouping	Cross-match PC	Bleeding of donors				
Out-patients	6570	4526	2276	481	1095/ 199	3816	10623	187	141	609	2299	2015	527	937	98	342
in-patients	1759	1108	1193	642	498/ 107	5695	10433	119	198	344	1007	-	223	470	497	-
Total	8329	5628	3469	1123	1593/ 306	9511	21056	306	339	953	3306	2015	750	1407	595	342

Table 2.3

Total test = 60722
= 234 tests per day
(260 working days)

The existing facilities as shown in figure 2.5 are grossly inadequate for a pathology department.

2.2.3. The pharmacy

This is attached to the laboratories and the consulting room thus rendering it also a very busy area. The department can be described as too inadequate since it consists of only two small rooms. This two rooms are the dispensing and compound sections. The compounding cannot be carried out under high aseptic conditions since it is not seperated from the dispensing area.

There is no provision for a pharmacist's office so the pharmacist sits in the dispensing area thus giving it a dual function. There is no storage for drugs and other chemicals. This is done in a far away building provided out of necessity and named 'the pharmacy store' . This adds more to the difficulty of compounding since the materials are not readily available.

There is also no provision for waiting area not be mention toilets (even for the staff.) Both males and females are issued drugs from the same room which makes the place disorganized since there is high turn out of patients.

Figure 2.5 shows the pharmacy.

2.2.4. The surgical suite

The surgical suite is situated amidst the old nursing units. It contains two operating rooms for both minor and major surgical cases. This number is in fact too low for a hospital of this size since all types of operations are done here except caesarean sections which are performed in the Gynaecology theatre.

The suite was originally not provided with locker facilities and since lockers are indispensable, the waiting room has been transformed to serve that purpose. Infact what is provided is changing room without lockers.

Sterilizing is wholy carried out in the surgical suite due to the absence of central sterilizing supplies department. Even then there is no provision for sterile store hence parts of the operating rooms are used for storage of such goods.

Annesthesia store is also not provided so the operating rooms serve the function of storage.

Recovery room which is an important aspect of a surgical suite is absent in this suite so patients who are operated on are wheeled directly to the nursing units where they recover.

Only one toilet is provided for both male and female staff.

Sample annual surgical report

Type of Operation	General surgical	Gynaecologic	Arthopaedics	Eye&E.N.T.
Number	1524	1211	800	1215
Total	4750	operations		

Table 2.4

Table 2.1

	Number
Normal delivery	3319
Caesarian section(c/s)	208
Born Before Arrival (BBA)	62
Forceps	30
Breech	14
Singles	3729
Twins	98
Males	1839
Females	1998
Still birth	194
Premature	10
Total live births	3643
Total delivery	3827

It could thus be seen that the facilities are generally inadequate and the operating rooms are forced into serving other subsidiary fucntions.

Figure 2.6. shows the existing surgical suite.

2.2.5. Radiology department

The radiology or X-ray department is attached to the surgical suite. The department contains only X-ray room with two changing cubicles (for both males and females).

The department functions only as a diagnostic facility and no therapy is carried out. Fluoroscopy is not performed not to mention the use of radioisotopy.

There is no provision for patients'-waiting area so patients loitre about while the film undergoes processing.

Generally, the unit is inadequately equiped as is the case with most of the facilities.

2.2.6. Emergency unit

This has just recently been constructed. Before, it use to be in the out-patient department where an office was allocate for it.

Its location is in the public area and it is easily accessible.

However, inspite of being relatively new, some of the facilities are inadequate. Most important are the operating room(minor) and the recovery room. The size of the operating room is small (about $17M^2$) since scrubbing is also carried out within the room. The recovery room accommodates a mazimum of three beds and no seperation is made regarding males and femeles. The patients toilets are also grouped together with no seperation as shown in figure 2.7.

2.3. Ancillary Facilities

2.3.1. Kitchen

The existing kitchen is situated at the south-eastern part of the site besides the old nursing units. It serves both wings of the nursing units.

The kitchen utilizes centralized tray service in distributing food to the in-patients. After consumption, the plates are collected back and transported by carts to the kitchen for washing.

The kitchen utilizes wood as fuel. Thus a high degree of asepsis cannot be maintained. It is also open completely on two sides. The food is cooked there and served within the same compartment since there is no provision for distribution room.

When the plates are collected back, they are washed outside in the open because washing facilities are absent.

The dishes are kept in the headcook's office after washing. The office also serves as a resting area for the kitchen staff. Thus the office performs multiple functions.

There is also no space for the storage of the carts so they are kept outside. Both dry and cold foods are kept in the food store for day storage. The main storage is in the General Stores.

The kitchen is thus ill-equiped and lack supporting compartments to enable it discharge its duty effectively. See fig. 2.8 for both kitchen and laundry.

2.3.2. Laundry

The laundry is attached organically to the kitchen. It caters for all laundry services needed by the hospital departments.

It uses manual means of washing and after washing, the materials are dried outside. Then after, they are carried back into an inner compartment for pressing or ironing.

The whole laundry comprises of three elements that is the washing area, the ironing area, and a small store for storing detergents and related materials. After ironing, the cloths are kept within the ironing compartment untill they are collected by the appropriate section of the hospital since no storage space is provided for that and there is no central sterilizing department where the clothes would have been taken to.

Considering the number of patients and departments the laundry is serving, there is the need for a modern laundry which utilizes machines for the whole laundering process.

2.3.3. General Stores

The General Stores is situated alongside the kitchen-Laundry complex forming the service departments. The general stores is a one block building which is compartmentalized to house different items. These include food items (both perishables and non perishables), stationaries and printed forms for use by the hospital staff, linen and bedcloths, instruments for use by the surgical suite, emergency, and all those sections of the hospital requiring their use.

The main problem with the general stores, as with the kitchen, is vehicular access since bulky materials are off-loaded now and then.

The size of the general stores measures about $140M^2$. Considering the need this store caters for, there is the need for a bigger store with offices for supervisor and clerks.

2.3.4. Maintenance shop

There is only one workshop where all repairs for both hospital and staff repairs are done. The shop is a single compart building housing the various tools needed for repairs such as electrical, plumbing,

mechanical etc.

There is the need for larger space to cater for each of the repairs.

It is also situated near the kitchen being part of the service departments.

2.4. Site situation and access.

The site is in the Northern part of the town. The main problem of the site is the means of access. It is approached through two roads which lead to it. Both roads involve manouvres before reaching the main entrance to the hospital complex.

A new road has recently been constructed called the Murtala Muhammed Road. This road passes, adjacent to the site and a new entrance can quite conveniently be located on the side facing the road.

Public parking is provided outside the hospital complex. This compels visitors to park outside and travel all along to the nursing units. If the new entrance is situated along the Murtala Muhammed Road, proper parking for the public can be provided. Another advantage of relocating the entrance by the new road, is that easy vehicular access for both emergency

and delivery suite will be achieved. It will also provide easy access to the administrative area and the out-patient department since these are nearer the new road than the existing ones.

Figure 2.10 shows the existing site and its means of access.

CHAPTER THREE

3. THE PATIENT CARE UNITS

The patient care units, being the place where the patient who is admitted is accommodated from the time of admission to discharge, is considered the most primary or most important in the General Hospital, Seconded only by the diagnostic and therapeutic facilities. The general hospital patient care units are divided by services into:

- Medical Nursing Unit
- Surgical Nursing Unit
- Obstetrical Nursing Unit
- Paediatric Nursing Unit

In the case of the General Hospital in question, for which this thesis is concerned, a psychiatric nursing unit exists totalling to five units of nursing.

3.1 Plan Shape

The most important consideration here, is the distance from the most remote bed in the unit to the Nurses' station for observability and travel.

> "Keep walking distance as short as possible for nurses and ambulant patients. Maximum distance from bed to W.C. 12m and from nurses' working room (nurses' station) to farthest bed approximately 20m"[1].

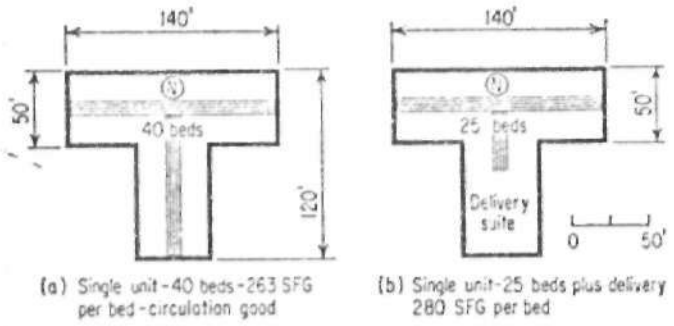


Fig. 3.1. The T-shaped plan.

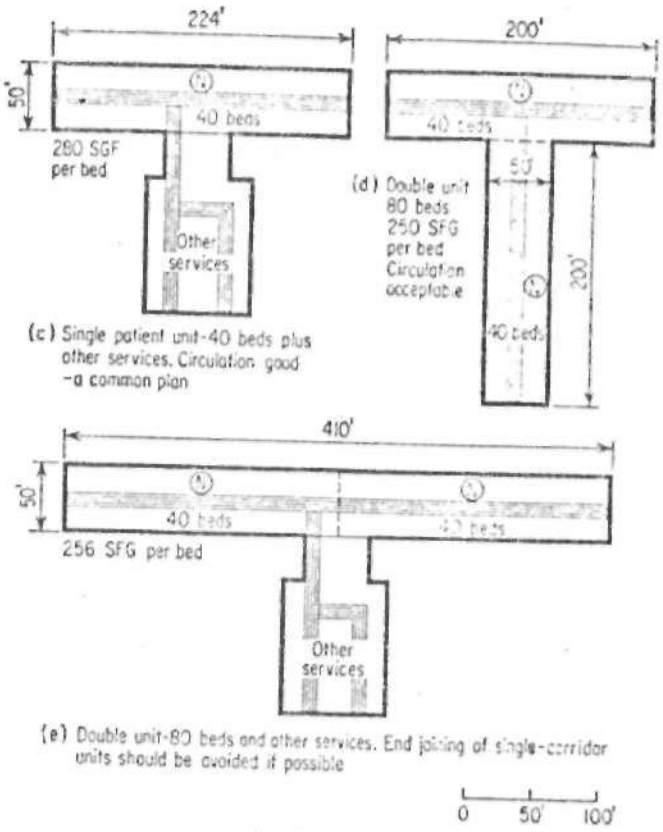


Fig. 3.2. T-plan variations.

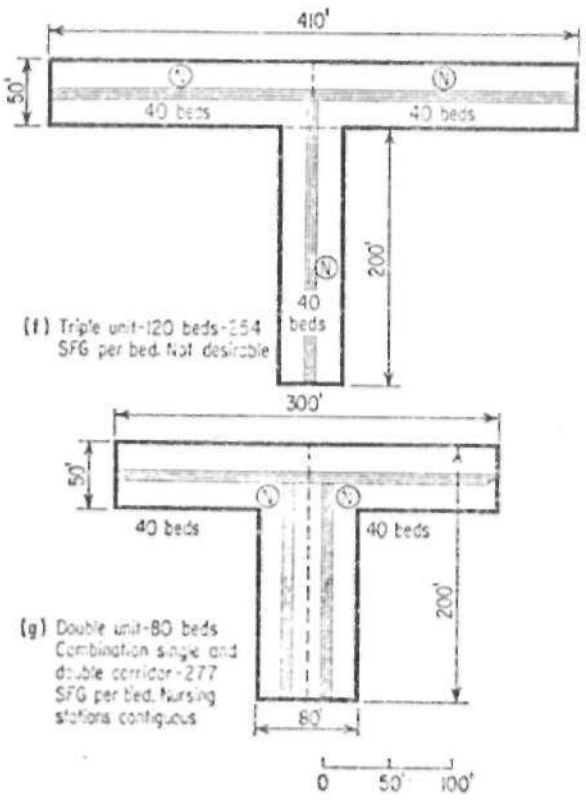
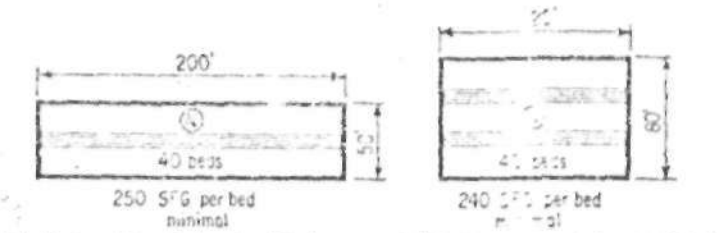


Fig. 3.3. T-plan variations.

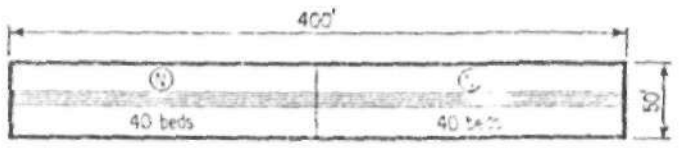


250 SFG per bed minimal

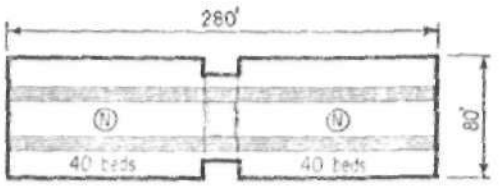
(a) Single corridor - single unit - 40 beds

240 SFG per bed minimal

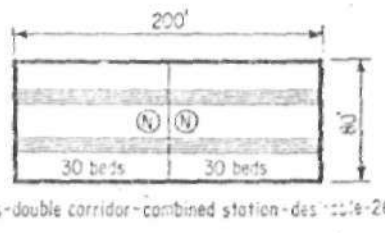
(b) Double corridor - single unit - 40 beds



(c) Single corridor - double unit - 80 beds - separates nursing stations - 250 SFG per bed minimal



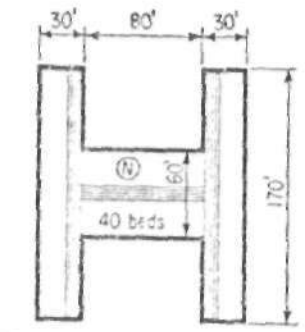
(d) Double corridor - double unit - 80 beds - 275 SFG per bed - satisfactory



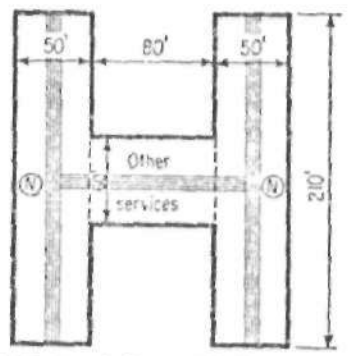
(e) Two 30-bed units - double corridor - combined station - desirable - 267 SFG per bed

0 50' 100'

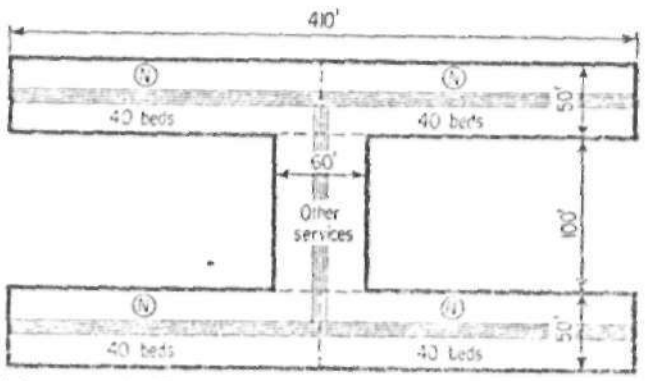
Fig. 3.4. The rectangular plan.



(c) Single unit - 40 beds - 375 SFG per bed. Uneconomical



(b) Double unit - 80 beds - 262 SFG per bed. Economical



(c) Quadruple unit - 160 beds - separates nursing stations widely - 255 SFG per bed - undesirable

0 50' 100'

Various forms have been tried and each shape has its advantages and disadvantages.

See figure 3.1-5 for some of the various shapes.

3. Nursing Units Distribution by Service

3:2 Medical Nursing Units

The medical nursing unit is where patients with cases of medical nature are accommodated. These include dermatology, pulmonary metabolism, cardiology, dehydration etc. A patient in this unit uses the diagnostic aids of the laboratory, X - ray, and therapeutic aids of physical medicine, and X -ray therapy, more often than patient in other units. The patient is often admitted without a complete knowledge of his disease. It is while he is in bed that tests and other investigations are carried out to identify the nature of his disease. Thus the location of this unit close to the diagnostic and therapeutic facilities is very important in order to reduce the distance of travel for both staff and patients.

The patients here have a longer stay in the hospital because of the time required for test or medical examinations. Apart from the normal nursing beds there is need for two or more single rooms each with seperate toilet to be used as isolation.

3.3. Surgical Nursing Unit

Here the case is different in that the patient is diagnosed before admission. The nature of the disease or infirmity is established, therefore treatmentcan commence immediately after admission.

The diagnosis establishes functional disorder as, for example, a broken bone, a severed, torn or cut muscle, ligament, tendons, skin etc.

In the case of patients requiring Surgical operation of a complex nature, there may be a series of radiology and pathology tests prior to the operation.

The unit has strong relationship with the Surgical suite, Emergency unit, central sterile supplies and the diagnostic and treatment facilities. Apart from basic supporting service rooms, this unit requires

- a Surgical treatment room (post-operative treatment)
- a storage space for orthopaedic frames.

3.4 Maternity Obstetrics Nursing Unit

This unit accommodates pre-natal women, mothers and their new born babies.

The unit is most related to obstetrical delivery suite, and surgical operating suite.

There is also the provision of nursery for the infants. The nursery caters for the infants who are diseased, infants whose mothers are not well enough to return home and those that are premature- pre-mature infants are those with low birth weight of 2.5 kg or less - regardless of the term.

> "Because it is one of the areas in the hospital where patients are most vulnerable to infection, the nursery should be planned to provide the best means for the care, safety, and welfare of the infants".[2]
>
> ..... Certain basic recommendations for planning nurseries for full term and premature infants have been developed, based on clinical experience and study. These include: Limiting the number of infants in each nursery, wide spacing of bassinets within each nursery, seperation of bassinets by cubicle partitions; promoting the use of aseptic techniques and individual care by providing, among other things, ample space and hand washing facilities; Limiting the number of bassinets served by one nurses' station; seperating facilities for premature infants and for observing infants suspected of having infections conditions.[3].....

3.4.1 Nursery

There are two types of nursery layouts:

(a) Centralized nursery

(b) Decentralized nursery

Centralized Nursery:

In centralized nursery, all infants are accommodated centrally away from their mothers. The infants here, may be taken to their mothers from time to time in their bassinets.

The provision is that each nursery shall have 2.3 to 2.8M^2 space per bassinet and that not more than 8 infants be place in one nursery[4]

Reasons for this limited number are:

- To discourage spread of infection and
- A nurse can only effectively care for 8 infants.

To avoid cross- infection, only one nurse should take care of a nursery. She should be the only one to enter the unit. An infant can be passed to a doctor through a window made for that purpose. Figure 3.6 shows this type of arrangement.

Decentralized nursery:

Here, the nursery is broken into small groups of infants, with their services immediately adjoining their mothers' rooms. Thus, the infants do not have to be carried great distances through the corridor.

Rooming - in

Sometimes in the decentralized nursery, special arrangements are made for placing the infant with the mother. This is refered to as rooming- in, which the mother has her baby for as long as she desires or is permitted to, returning him to the nursery at times.

Provision should also be made for isolation and premature infants.

Elements of the nursery include:

- Small examination room for the doctor, and
- Small workroom adjoining the examination room accessible from the nursery.

See figure 3.7. for diffrent arrangements for rooming- in.

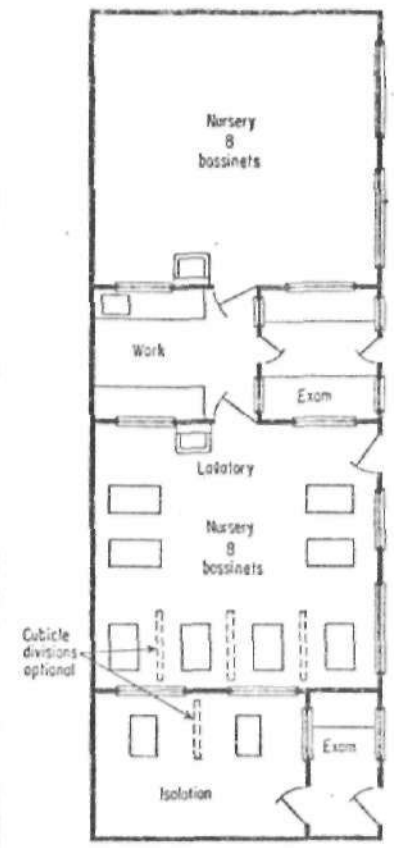


Fig. 3.6. The infant nursery.

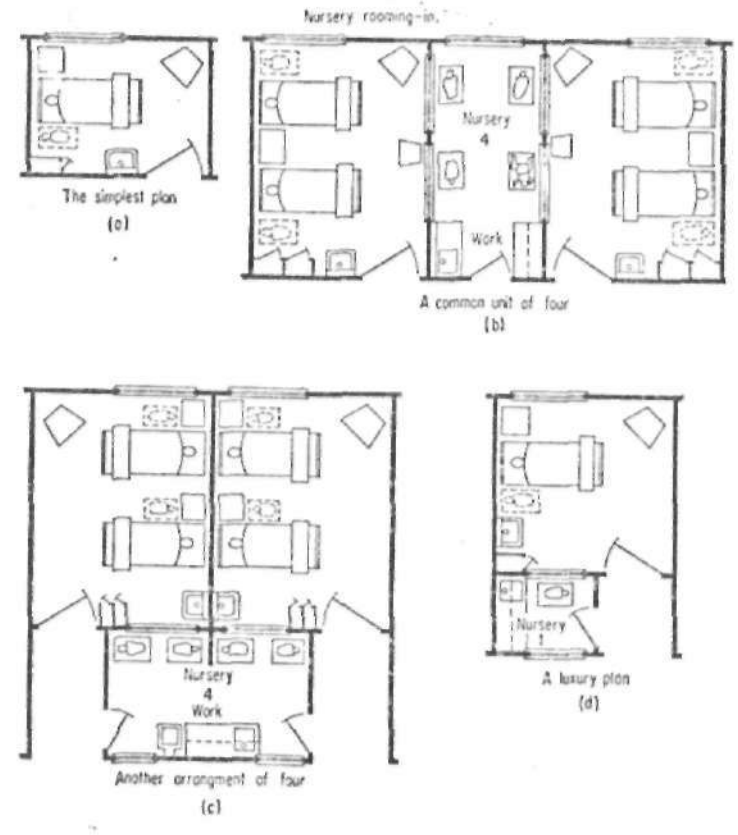


Fig. 3.7 Rooming-in nursery.

3.5. Paediatric Nursing Unit

This is for both medical and surgical cases(age 0-14) subdivision of beds are usually 20 percent bassinets, 40 percent cribs and 40 percent adult- sized beds. Rooms for cribs should be designed to house adult beds alternatively. The problem of housing the parents overnight should be considered since sick children require the presence of their parents.

3.5.1. Planning Principles:

1. The paediatric nursing unit should not be as large as an adult unit since cribs and bassinets out-number adult sized beds.
2. Beds should be partitioned to discourage spread of infectious diseases.
3. All partitions should be glazed
4. A play room and an outdoor play terrace should be provided. These are important for convalescing children.

3.5.2. Location:

The paediatric nursing unit should be located in an area away from possible sources of infection considering the nature of children.

The paediatric nursing unit, being a medical-surgical nursing unit for children, requires the services of all the adjunct diagnostic and therapeutic facilities, and supporting services of the central sterile supplies, General stores, pharmacy, kitchen and laundry.

3.6. Psychiatric Nursing Unit

The psychiatric patient care division is often smaller than is found in medicine and surgery (perhaps 25 to 35 beds against 35 to 45). In general, psychiatric patients, are long term and ambulatory, though there may be occassional patients who are suffering from physical ailments as well as mental.

The nursing unit of the psychiatry is divided into 3 sections:

3.6.1. Open section:

This is occupied by the patients requiring no restraint other than confinement to the hospital or to the nursing unit as may be ordered by the doctor. The open section has the greatest number of beds- 50 to 60 percent.

3.6.2. Quiet section:

This is the second largest of the sections and has total beds of 20 to 30 percent. This section allows complete freedom within it and which in its room fittings resembles the open section. It can be closed for confinement if necessary and should have its own untility room and work desk.

3.6.3. Disturbed section:

This is the final category and represents 15 to 20 percent of the total beds. It consists of single rooms meant for secluding the patients.

3.7. Nursing Unit Elements:

3.7.1. The patient bedroom:

It is the focus of the hospital services and that of the patients' life at a time when his condition exaggerates the effect of every detail of environment. There is no multi-purpose space in the hospital more demanding in its design requirements than the patient's bedroom. For most patients the room becomes a reception space for visitors, a dining room, a library, a television room, treatment room etc.

One -bed room is the ideal interms of privacy, isolation or flexibility. Only one patient is accommodated and this can disregard age or sex. Patients needing isolation can be conveniently accommodated in a single-bed room. Other commonly used bed- rooms are two-bed, three-bed, four-bed, and six- bed, rooms. Each of these has its short comings on the above factors of choice and the social factor of choosing a living partner. The four-bed room is a better social unit since each patient has his corner especially when the door is placed centrally. The room depth of the four- bed room allows sufficient natural light to reach the remotest bed from the window wall.

3.7.2. Beds layout:

Nightingale's open ward layout:

In this open ward, the wards were designed to accommodate 30- 40 patients, with the beds so arranged that the head of the patient is against the external window wall, that is, the bed is perpendicular to the external wall.

It has the following advantages:

- ample visibility of the patients,
- Cross Ventilation,
- Low cost of construction and maintenance.

It also has the following disadvantages:

- Lack of privacy
- Danger of cross infection
- Difficulty in controlling climetic conditions to suit all patients.

.....There is also another form of lack of privacy that is important. It is impossible to take a good medical history from a patient in an open ward. He is aware that the patient in the next bed, with his nose buried in his book, has his ears tuned in to all that is said.....[5]

Rigs ward layout

Many of the difficulties of the Nightingale's ward are overcome by the rigs ward. It is named after the Rigs Hospital of Copenhagen, Denmark, where it originated.

The beds here are arranged such that the heads of the patients are against partition walls, subdividing the open ward into bays.

Time saver standards give bed-room sizes as follows:

1. Single-bed room - 10.87- 15m^2
2. Two-bed room - 14.59- 19.51m^2
3. Four-bed room - 28.61- 37.25m^2

Major differences are found in depths from inside of external wall to room side of corridor partition.

- Single-bed room - 4.420m
- Two-bed room - 4.572m
- Four-bed room - 6.604m

The width of single and double rooms is 3.5m maximum or less depending upon furniture required.[6]

Nurses' station

This is the working and control centre of the nursing unit. In addition to its medical function, the Nurses' Station controls the movement of visitors and handles all patient correspondences while in the unit. The station should be centrally located near the main entrance for control of all public movement into the unit.

Facilities include:

1. Control desk
2. Charting desk
3. Nurses lockers and toilet.

3.7.4.

Medication room:

This is normally an integral part of the Nurses' Station because of the nurses' frequent use: It can be a small alcove with shelves for keeping medication and a counter for preparation of all medicines before they are taken to the patient's room.

3.7.5.

Sister's office:

This is the office of the head nurse attached to the nursing unit. Her function is to supervise all nursing activities and the unit in general. The office could also be used for small group conferences between the staff members.

3.7.6.

Examination and treatment room:

This is necessary for proceedures which cannot be done in the patient's bed room such as surgical dressings etc. The doors should be high and wide and the room size should not be less than $17m^2$.

3.7.2.

Utility room

This is usually divided into clean and soiled areas. Here are disposed all bulky wastes not taken care of in the patient's toilet. Soiled linen and rubbish carts

are stored here before taken out of the unit.
On the clean side are the storage carts or shelves for clean linen or other clean supplies except drugs and food.

3.7.8.

Toilets and bathrooms

Each isolation or intensive care room should have a toilet, wash hand basin and a shower for aseptic reasons. The united states public Health Service recommends as a minimum, one toilet for each four patients and four showers for each patient care unit.

3.7.9.

Floor kitchen or pantry:

A small kitchen (kitchennette) or pantry is provided for handling the patients food service. Food comes from the central kitchen and distributed to patients.

3.7.10.

Test room

This room is for carrying out minor investigations like urine or blood tests. If tests however, are exclusively carried out in the laboratory, then the room can be used as specimens collection room.

Day room:

This is a provision for convalescent patients who would like to ward off boredom. It is also used for receiving visitors by the convalescent patients. Space required is at the rate of $0.75m^2$ per patient.

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CHAPTER FOUR

ADJUNCT DIAGNOSTIC AND TREATMENT FACILITIES

The adjunct diagnostic and treatment facilities render secondary services in that they aid the physician in determining the nature of a disease, confirming, it and treating it. That is to say that the facilities are both diagnostic and therapeutic.

The doctors who direct these services advice the patients doctor and not the patient himself generally.

The adjunct diagnostic and treatment facilities include radiology, clinical laboratories, physical medicine and pharmacy. Supplimentary diagnostic and treatment aids include electrocardiography (ECG), electroncephalography (EEG) and Basal Metabolism (BMR) and are usually grouped with the laboratories.

These adjunct facilities should be accessible to both bed patients and ambulant patients. This is particularly important for radiology, which also serves the emergency.

4.1. The Clinical Laboratories

The busiest and often the largest of the adjunct facilities is the clinical laboratories, where numerous tests furnish aids to diagnosis. Its tests are generally subdivided as follows:

i.	Chemistry	(iv)	Haematology	(vii)	Pathology
ii.	Bacteriology	(v)	Parasitology	(viii)	Virology
iii	Serology	(vi)	Histology	(ix)	BMR, ECG, EEG.

(i) Chemistry:

Chemical analyses are made of samples of blood, urine, sputum, faeces, mucosa and other body elements. These tests require an organic chemistry laboratory with a considerable amount of equipment, including sinks, a fume hood, and a centrifuge .ounters are 0.9m high.

(ii) Bacteriology:

Bacteriological work is almost wholly microscopic, which can be done sitting on a 75cm high counter. For this, there must be space for preparation of culture media.

(iii) Serology:

This involves both microscopic and chemical investigation of the blood seru,.

(iv) Haematology

This is concerned with the count of red and white corpuscles and with blood chemistry.

(v) Parasitology

Here, studies are carried out of parasites commonly found in tropical diseases. It uses , chemistry and microscopy largely on specimens of fa ces.

(vi) Histology:

Histology is concerned with the microscopic examination of the cellular pattern of diseased specimens, usually done with smears on glass slides or paper thin

sections cut from frozen specimens.

(vii) Pathology: As a unit of the chemical Laboratories, it is the corresponding study of gross specimens of diseased elements. As a general term it means the science or study of the nature of a disease.

(viii) Virology: Concerned with disease caused by a virus.

(ix) BMR, ECG, EEG: Incidental tests in the laboratory may include determining the BMR, essentially a volumetric test of inhalation and exhalation measuring the patient's metabolism (Basal metabolism)

ECG - this is employed in measuring resistance to a slight electric current which reveals the patterns of heart behaviour.

EEG - This is a measurement of the electrical emanations from the brain which indicates areas of imbalance or malfunction. The first two tests are simple and can be done at bedside if desired, as the machines are easily portable.

EEG requires the insertion of electrodes into the skull and sensitive instruments for measuring the microscopic currents. This must be done in a special room adequately screened from outside electrical interference.

A blood bank is usually provided in a large General Hospital. This unit requires a space for receiving blood donors and two or three treatment beds. A space is also needed for blood storage and study.

N.B.

Counter height for all standing work as in the chemistry, is 0.9m and for sitting work, is 0.75m.

4.2. Radiology:

This department ranks with the clinical laboratories as a prime diagnostic aid and also offers radiation therapy. It, too, serves patients only upon prescription by the attending physician. The radiologist, like the pathologist, counsels the attending physician on the interpretation of diagnostic films, and on therapy. The department serves both bed and ambulant patients, sometimes the later exceeding the former in number. Because patients generally come to this department, it should be readily accessible to both hospital and ambulant patients.

The essencial function of the diagnostic portion is to take shadow pictures of vital parts of tiie human body. The penetrating X - ray casts shadows on a photographic film, showing the outline of bones and other dense elements. Outline of organs become visible and identifiable, thus revealing ah .ormalitles. Sometimes a barium fluid* opaque to the X - ray# is fed into the gastrointestinal system to sharpen the outlines of the containing parts e.gi •£he oesophagus, stomach, intestines etc.

In addition to exposing fiD-ins for apermanent record, there is a wide use of fluoroscopic screen which, plows under the X -ray, and when substituted for the film holder, permits the radiologist to view the same shadow picture though less sharp, as will be recorded on the film. In this case, the radiologist, wearing protective glasses and in an absolutely dark room, examines the shadow pattern on the screen and moves the patient about untill a meaningful picture is evident. *Me* then slips a film in front of the fluoroscopic screen and takes the picture• This process is repeated several times for different posi±ions or *for* different degrees of penetration by the barium fluid^

Kquipment serving the dual function of radiography fluoroscopy exist. Therefore duplication of accommodation may be done away with*

Diagnosis can also be done by means of a radioisotopic process to measure the gross functional status of certain organs (scaler) and to provide a different kind of diagnostic information (Scanner)

The therapy section is usually integrated with the diagnostic unit for use of common facilities and better utilization of staff. Otherwise it can be independant unit.

The therapy section is divided into two elements:

1. Deep therapy room -where patients are exposed to treatment by means of high voltage X -ray or radioisolopic cobelt - 60 machines.
2. Superficial therapy room - where patients needing less intensity of radioactive radiation are treated.

4.2.2 Planning Consideration:

The radiology department has interdepartmental relationship with the following:

- Out- patient Department
- Emergency
- Surgery
- Laboratories
- Nursing units.

Design elements of the diagnostic unit:

1. Reception and Administration
2. Changing and preparation
3. Radio-Diagnostic Room
4. Film processing and viewing
6. Staff facilities.

1. Reception and waiting:

Space for out - patients and in- patients should be provided adjacent to the main entrance. Consideration should be given to stretcher and wheel chair parking space.

2. Changing and Preparation:

This include the following:-

(a) Changing cubicles where patients change into hospital garment or undress to the requirements of the radiographer prior to diagnosis. The changing cubicles should be adjacent to X - ray rooms for privacy and shorter travel distance.

For the convenience of patients in wheel chars, an outsized dressing room is provided. Instead of a door, it is equipped with a curtain so that the patient can manouvre easily.

(b) A toilet to be provided for use by barium patients undergoing gastrointestinal investigation: It should be adjacent to the changing cubicles.

3. Radio- diagnostic room:

It is the most important element in the radiology department. All diagnostic proceedures are performed here with the aid of the X - ray equipment. See Figure 4.1 showing equipments.

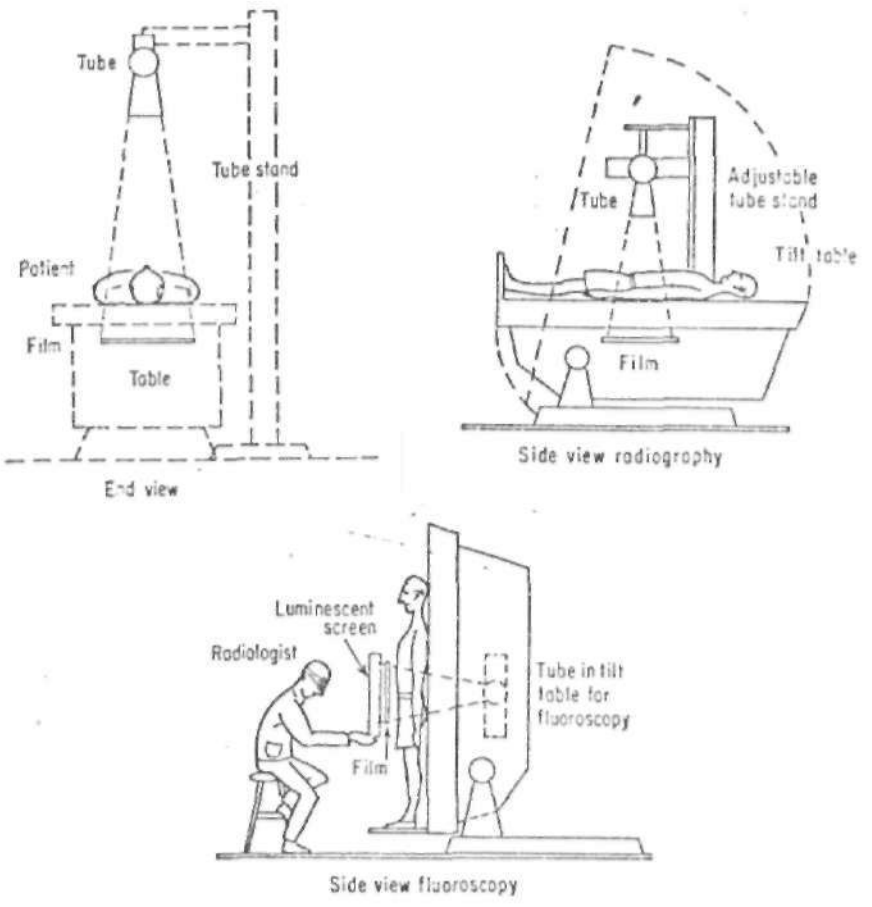


Fig. 4.1. Diagnostic radiology.

Number of rooms - The number of rooms depends upon the out - patient and in - patient load. The United States Public Health Service recommends one diagnostic room for a ~~and~~ 50 bed General Hospital or a minimum of two rooms for a hospital of 150 beds and above.

L. Todd Wheeler, in his book - Hospital Design and function, suggests the use of a formula for calculating the number of diagnostic rooms required in a given hospital considering the following:

(i) Number of Determinations per annum - E

(ii) Days per week in operation - D

(iii) Hours per day in operation - H

(iv) Determinations per room per day - R

(v) Weeks per year in operation - W

The number of determinations per room per day depends upon the ability of the radiographer and the complexity of the determination. However, averagely, an X - ray diagnostic determination takes about 15 minuts.

Survery of the existing hospital will be able to provide the average annual load (E)

Thus the formula gives the number of rooms

$$N = \frac{E}{W \times H \times R \times D} \quad 1$$

4.2.3. Room Size:

The optimum size of the X -ray room is about 4.3 m X 5.5m with a control both of 4-5m^2 in size (width 2.2m)^2. The booth should be located on the right hand side of the patient to permit view of the patient while the operator is in the booth. This is because the X - ray machine is on the left hand side and thus covers the patient. The booth should have a viewing of lead grass opening into the room.

A small barium kitchen should be provided near or in the X - ray room for preparing barium fluids for gastro -intestinal investigation.

4.2.4. Location:

> .....The functional requirements of the department are usually best satisfied by locating the X - ray rooms at the end of a wing. In this location, the activity within the department will not be disturbed by through traffic to other parts of the hospital, and less shielding will be required because of the exterior walls.....[3]

4.2.5. Shielding:

Primary barriers should be provided on all surfaces of the X - ray rooms which are exposed, or which may be exposed to the useful beam between the X -ray tube and occupied areas. Secondary barriers should be provided on all other room surfaces where protection is needed. In determining secondary barriers, consideration should be given to direct or leakage radiation which passes through the tube housing, and also to the secondary or scattered radiation emitted from objects being irradiated by either the useful beam, leakage radiation, or other scattered radiation.

MINIMUM LEAD AND CONCRETE PROTECTIVE INSULATION FREQUENCY REQUIREMENT FOR VARIOUS X - RAY MACHINES .

TYPE OF WORK	X-RAY Generated by peak Voltage	MINIMUM EQUI-Valent Thickness of lead	CONCRETE Equivalent Thickness
Fluoroscopy	75KV	1.0mm	
Radiography	100KV	1.5mm	120mm
Skin Therapy	100KV	1.5mm	120mm
Medium Therapy	150KV	2.5mm	
	175KV	3.0mm	
Deep Therapy	200KV	4.0mm	220mm
"	225KV	5.0mm	
"	300KV	9.0mm	
"	400KV	15.0mm	260mm

Source: Hospitals Integrated Design by Isadore Rosenfield (Extracted by Ahmed M. in his Kano Twonship General Hospital - 1976 Page 63)

Table 4.1.

4.2.6. FILM PROCESSING AND VIEWING:

Exposed film processing is carried out in the darkroom. The dark room could serve two or more rooms if conveniently situated. Automatic processing machines capable of developing 140 films per hour (that is one film in less than half of a minute). its size is about 350mm X 420mm. This has reduced size of darkrooms to small loading cubicles.

A viewing room is required at the output end of the automatic processing unit. Films will be sorted here before distribution to patients and departments.

A film storage alcove should be attached to the darkroom so that frest films could be loaded into cassettes before they are taken to the X -ray rooms.

4.2.7. Staff facilities:

Staff facilities include offices for radiologist and radiographers, a rest room with toilet facilities. There is a need for storage spaces for used films and portable X - ray units used in surgery or emergency departments but under the care of radiology department.

4.3. Physical Medicine

The physical medicine department is a therapeutic facility serving both out -patients and in-patients . It includes both physical and occupational therapy. These services are little used as diagnostic aids but are very important as therapeutic aids.

The treatment in physiotherapy [illegible] unit is through utilizating physical aids of heat, water, electricity etc. Thus the treatment is in the form of exercise, mainipulation, massage, thermal treatment, hydrotherapy and electrotherapy. A patient may be assigned a routine including any or all of these. Each treatment may take considerable time and hence this department does not handle a large number of patients daily.

> "Physical therapy may help a patient motor control of a disabled member of his body; occupational therapy seeks to assist the patient in putting his regained physical ability to some economic or social use"[4]

The foregone is the functional phase of occupational therapy. The other phase is the psychological where

> "an effort is made to arouse a patients interest in certain activities and thereby to help him demonstrate that he still possesses abilities and capacities thought lost" [5].

In some hospitals the department of physical medicine expands into a complete rehabilitation service involving other elements besides physical and occupational therapy. These may include speech therapy; functional training for paralytic and paraplegic (paralysis of the lower part of the body) patients and for others physically handicapped etc.

Some of the physical exercises are shown in Figure 4.2.

4.3.1. Space allocation and location

The location of physical medicine department should be such that it is easily accessible to the patients it serves. The trip from the hospital entrance to the department should be as short as possible since most of the attending patients are disabled.

- The amount of space needed depends on the number of patients treated, the kind of disabilities and treatment required.
- No absolute standard can be recommended as the amount of space needed for physical therapy in a general hospital. The most that can be said is that, if possible, it is desirable to plan for at least a thousand square feet ($100m^2$) of floor space, free of structural obstructions. About half of that should be exercise area.[5]

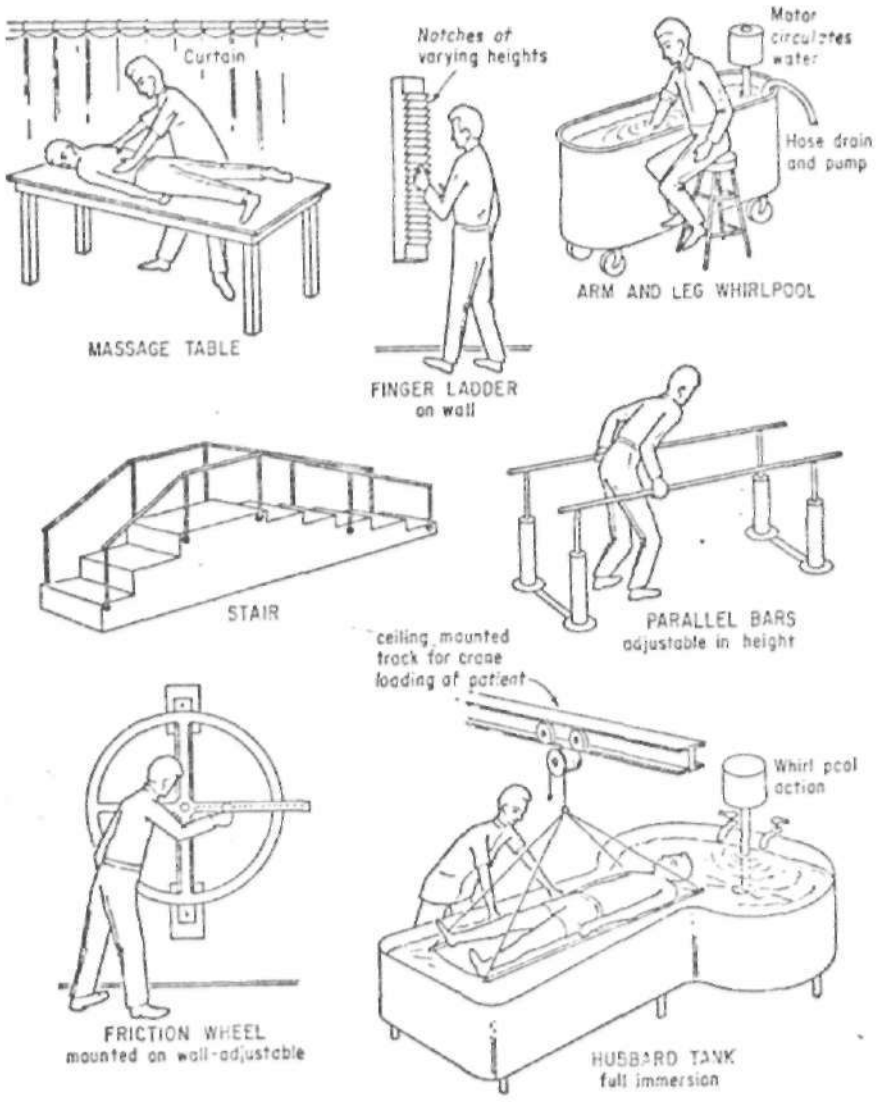


Fig. 4-2. Physical therapy equipment.

Physiotherapy elements:

(a) Patients reception and waiting

(b) Passive treatment area

(c) Changing and active treatment

(d) Staff facilities and storage

Reception space:

Capable of keeping current records of patients should be provided. Adjacent to this space, there should be a small waiting space at the rate of $1.5m^2$ per patient. A small parking space is needed for wheel chairs and stretchers.

Passive treatment:

Requires cubicles for thermal, massage, and manipulation treatment. Cubicles are best subdivided by drapes for easy access by wheel chair or stretcher patients.

A hydrotherapy room for under water exercises should also be provided. This room requires space for underwater exercise equipment, wheel stretcher, and a treatment table.

Changing and active treatment area:

Requires changing rooms for both sexes and a large active exercise hall.

> .....The minimum size of the exercise room, as recommended in British Hospital Building Notes is 7M x 15M x 4.6M high. Maximum size is given as 9.0M x 18.0M x 5.5M high.....[7]

Staff facilities and storage include:

- A general rest room and toilets
- Offices for administrative purposes
- Private room for patient interview and examination
- Storage space for equipment and supplies usually needed in the treatment areas.

4.3.3. Occupational therapy facilities:

The occupational therapy department usually includes a main therapy room with equipment and materials for painting and drawing, dramatics, clay modeling with sometimes a kiln for ceramics, weaving, sewing, and palying games. A smaller space for a woodwork shop, Isolated because of its noise and dust, an office for the therapist, storage for equipment used in the department, and also for carts taken to the patients bedside, and lockers for staff.

4.4. Pharmacy

The hospital pharmacy is the department in the hospital from which all medications are supplied to the various nursing units, where special prescriptions are filled for patients in the hospital, (inpatients), where prescriptions are filled for outpatients, where pharmaceuticals are manufactured in bulk, where biologicals are stored and dispensed, where injectable solutions

are usually prepared and sterilized. And finally, it is the department where the medical, dental, nursing, and other staff members find helpful consultative advice relative to current drug therapy.

The nursing units and the out- patient department receive the bulk of the pharmaceutical service, but it is also extended to practically every department of the hospital. The Surgical department requires germicidal solutions, anaesthetics, and other medications; the Emergency Department receive drugs for emergency conditions; the outpatient Department also requires for medications for use in the clinics; the Laboratory obtains reagent solutions from the pharmacy, the X - ray Department requires radiographic opaques, the Blood Bank, the Dietary and Housekeeping Departments depend on it for chemicals and various forms of medications.

The pharmacy functions as a dispensing, compounding, which requires the services of registered pharmacist, and manufacturing, which is usually found only in largest hospitals or in those connected with schools of pharmacy. Only the dispensing section is open to public. It is more functional to have a seperate dispensary in the out-patients department only to be supplied with bulk medication from the central dispensing unit serving all the departments.

The size of this department depends on the size of the general hospital. The United States Public Health Service recommends $20m^2$ for a 50- bed hospital, $50M^2$ and $110M^2$ for 100- bed and 200- bed hospitals respectively.

Its location should be near the service entrance, easily reached from bulk stores area for bringing in supplies.

The pharmacy department consists of the following facilities:

1. Waiting space for out-patients dispensary
2. Storage for the pharmaceuticals to be dispensed.
3. Distribution room for supplying requests to the hospital departments.
4. Offices (at least one for the pharmacist)
5. Storage for bulk chemicals and drugs
6. Storage for flammables
7. Storage for narcotics
8. Compounding area
9. Manufacturing unit if needed.
10. Clerks and records office.

Other services to come under the Diagnostic and treatment facilities include:

(a) The Surgical operating suite,

(b) Obstetrical delivery suite,

(c) Emergency unit, and

(d) Out-patient department (opd)

4.5. The Surgical Operating Suite:

The surgical operating suite is technically a therapeutic aid in which a team consisting of one or more surgeons, the anaesthetist, and Surgical Nurses operates upon or cares for the patient. The length of time and seriousness of the operation can vary from minutes to hours, which in turn affects both size and number of operating rooms needed. In addition to the Surgeon and the anaesthesiologist, who are in the room, the pathologist and the radiologist may also be called in for consultation. Blood, plasma, drugs, intravenous solutions, dressings, splints, water, cautery etc may be called for. Sometimes electrical recording instruments or special pumps are used, and oxygen and suction are commonly needed. All these must be readily available and many must be sterile.

> "Sugery occupies a unique position in the hospital, clothed in an atmosphere of mystery, pervaded by fear and hope".[8]

4.5.1. Location:

The department should be situated at a dead end location in order to cut off unnecessary traffic to the suite.

Types of operations generally handled in a general hospital include both minor and major cases. Minor operations are those requiring local anaesthesia and major ones are those requiring general anaesthesia.

The operations can be classified into five categories:

1.	General Surgical -	64%
2.	Othopaedic	14%
3.	Eye and ENT	10%
4.	Gynaecologic	6%
5.	Cystoscopic	6%
	Total	100% [9]

It should be decided at the initial stage of the programme where caesarian sections will be performed. That is whether in the delivery suite or the Surgical suite.

It is the view of the author that caesarian sections be performed in the delivery suite since this are natal cases and should be grouped together.

Cystoscopic operations performed by the urologist call for special equipment but only a limited uses of general anaesthesia. Cystoscopic cases are received from both the Nursing Units and the Out-Patient Departments.

Figure 4.3 shows different arrangements for the Surgical Suite.

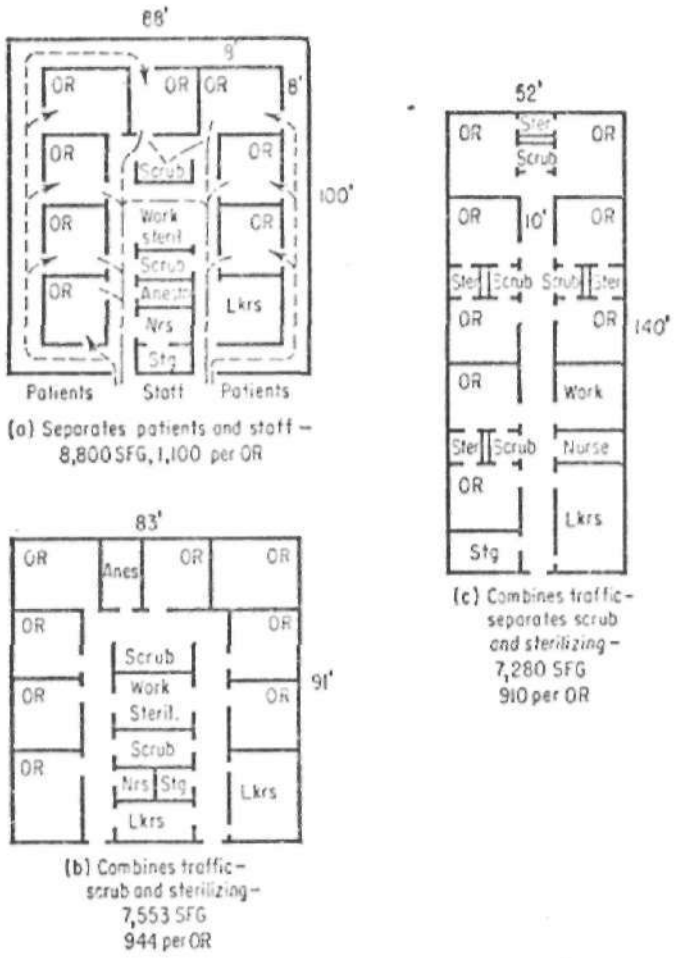


Fig. 4-3. The surgical suite with outside corridors. A comparison of three operating suites, each having eight rooms.

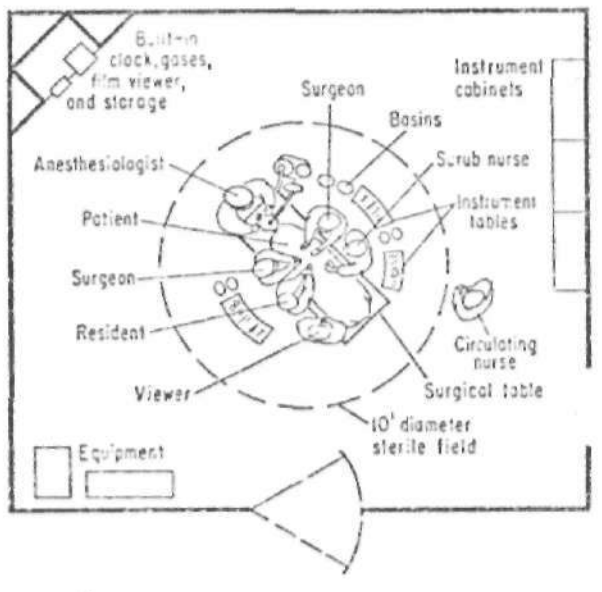


Fig. 4-4 The operating team.

4.5.2. Composition of a surgical suite

The Surgical Suite contains basically three zones: the outer zone, intermediate zone and the inner zone.

The outer zone:

This zone receives all traffic coming to the Surgical suite. A reception space is required at the entrance with a small waiting space for the hospital staff and stretcher patients this zone should be accessible from the emergency and nursing units.

Elements of the Zone include:

1. Reception and Records
2. Clerical Offices
3. Staff Changing and rest room (Doctors and Nurses)
4. Non-sterile store

Intermediate Zone:

This is essentially a work and storage area. Outside personnel deliver services to this zone but do not penetrate the inner zone.

Elements include:

1. Recovery room
2. Sterile Storage Spaces
3. Nurses' Station

The recovery room should be an open ward type to ensure maximum observation by the nursing staff. The requirement is 1½ to 2 beds per operating room.

The sterile store should be near the operating rooms for easy reach and big enough to take the requirements of the suite.

Inner Zone:

The inner zone is the space requiring a careful design interms of flow of patients and operating staff. It requires a high level of aseptic condition. Elements here, include:

1. The operating room
2. Scrub- up space
3. Patient holding and induction area
4. Work room and sterilization space.

The operating Room being the determining factor in sizing the entire operating suite.

4.5.3. Number Of Operating Rooms:

The most fundamental factor to be established in the functional programming of this unit, is the total number and kinds of Surgical operations, and the second most significant is the schedule of operations, by days and hours.

Todd Wheeler in his hospital design and function, gave a formula for determining the number of operating rooms. After establishing the above two factors, annual operation load is determined thus:

$$\text{No of Operations} = \frac{\text{Surgical beds x \% occupancy x 365(days of the year)}}{\text{No of days average stay}}$$

This number is thus subdivided into the five types of operations mentioned earlier, that is,

- General Surgical 64%
- Orthopaedic 14%

- Eye and ENT	10%
- Gynaecologic	6%
- Cystoscopic	6%
-	
Total	100%

For each category of operations, another formula is employed to determine the number of operating rooms required for it.

$$\text{No of rooms} = \frac{OFY}{DY \times OPRD}$$

where OFY= Operations per year (annual load)

Dy= Days per year Surgery operates

OPRD= Operations per room per day

OPRD varies from 1.5 to 3.5 [10]

4.6. Obstetrical Delivery Suite

The delivery suite is also technically a therapeutic aid as is the Surgical operating suite.

The delivery suite includes three areas of activity:

(a) Labour

(b) Delivery

(c) Recovery

4.6.1. Labour rooms:

These are the rooms in which the pregnant women who are about to deliver in a matter of few hours are admitted.

> "Labour rooms should provide maximum comfort and relaxation of the patient and should have facilities for examination, preparation and observation"[11]

Single occupancy rooms are much more preferable as labour rooms. This is because they eliminate the necessity for a patient preparation room, seperate infectious patients, provide greater privacy, and if in accordance to hospital policy, permit the husband to visit the patient during labour.

A toilet and lavatory for each labour room provides privacy for the ambulant patient, and reduces bed-pan services.

One shower and dressing cubide is sufficient for the labour room area.

4.6.2. Delivery room:

This is the room in which the mother actually delivers. In designing and equiping the delivery room, every facility of the welfare and safety of the mother and the new born child should be incorporated. Basic considerations include the immediate availability of equipment and supplies, built- in protection against anaesthetic explosion, auxiliary electrical systems in case of power failure, and adequate air-conditioning system, and finishes that promote aseptic conditions.

Built- in cabinets in the delivery room should be kept to a minimum and used for storage of such supplies as sutures and special instruments.

A view window between the delivery room and the scrub-up area is necessary so that the obstetrician may observe the patient and delivery room proceedures while scrubbing.

4.6.3. Recovery room:

This is the post-partum room in which the mother rests and recovers some of her strength after the ordeal of delivering a child.

The recovery period, after delivery, is critical and may last from 1 to 3 hours. During this period, the mother requires close observation and special care by the labour-delivery nursing staff. Various locations may be used for patients during the recovery period; a delivery room, a labour room, a bed in the maternity nursing unit, or a recovery room used exclusively for this purpose.

A recovery room provides a location for recovering patients, frees the delivery or labour room for clean-up prior to occupancy by another patient, concentrates patients in similar condition, and facilitates the special nursing care required.

Requirements - Provison for easy movement of stretchers or beds

- Seperate entrance and exist advisable
- Space for nurses' desk, instrument cart, clean supply cart, a soiled linen hamper, and a waste receptacle
  a lavatory

Glass view panels between the room and the corridor facilitates observation.

Other component parts of the delivery suite include:

- Nurses' station:

This is the administrative and control centre of the labour-delivery unit.

If patients are admitted directly to the labour-delivery unit, the Nurses' Station may be responsible for admitting proceedures.

- Doctors lockers and lounge:

This contains the following

- a locker room
- a toilet
- shower room
- a lounge and sleeping accommodation.

In hospitals with only one delivery room, a minimum of 6 lockers is recommended; in those with more than one delivery room, a minimum of 5 lockers per delivery room is recommended. The minimum size recommended for a locker is 30.5 x 46 x 152CM[12]

Sleeping accommodation for the attending staff should be provided. Better obstetrical care results when adequate provisions of this kind are made. For flexibility of use by either male or female Doctors, it is preferable to provide single occupancy rooms for this purpose.

Coffee room should also be provided for physicians and nursing personnel.

- Nurses lockers
  with toilets adjoining locker room
- Scrub-up and Substerilization:

  Scrub-up facilities should be provided next to the delivery room through a glass view panel while scrubbing. The scrub-up and substerilization areas may be combined in one room. A door between this room and the delivery is recommended. The area for scrubbing should be deep enough so that persons scrubbing will not interfere with traffic and so that spash water will not constitute a hazard.

4.6.3. No Of Delivery Rooms (And Labour Rooms)

A similar method of calculation as in the Surgical suite is employed to come by the number of delivery rooms and consequently the labour rooms.

In this case, the peak load is used and 24-hour scheduling is assumed.

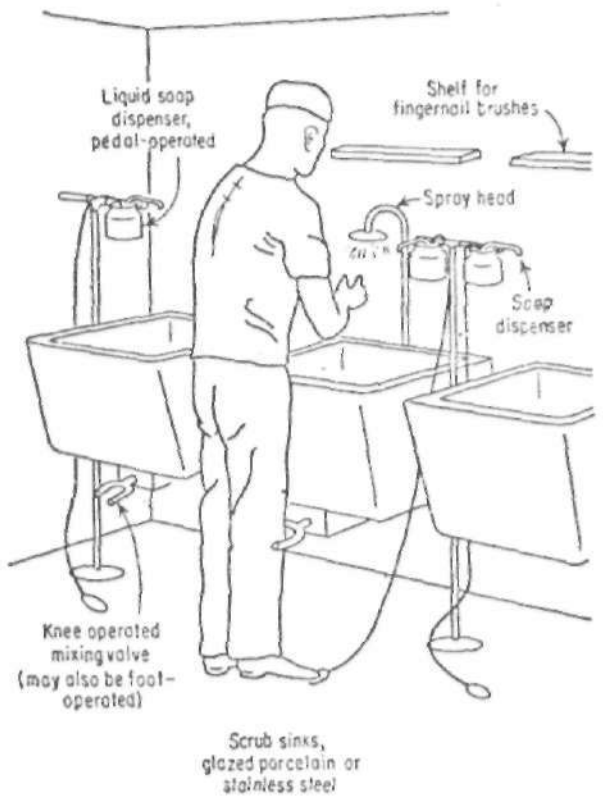


Fig. 4.5. The scrubbing alcove.

$$\text{No of rooms} = \frac{\text{DLY}}{365 \times \text{DLRD}} \quad 13$$

where DLY = Deliveries per year; including caesarean sections

365= Days per year

DLRD= Deliveries per Room Per day.

This can be 4 to 8 for 24- hour operation.

Labour rooms- 2 Labour Rooms per Delivery Room.

4.7. Emergency Unit

This is an out-patient department offering services to emergency cases due to accident or sudden illness; The unit provides life saving services needed immediately upon admission before it can properly be determined which hospital division should receive the patient.

Emergency patients may need immediate laboratory test, x -ray, and at times surgery. Following emergency treatment, a patient may need intensive care or rest.

Thus the department should be within close proximity to the following:

- Surgical suite
- Radiology
- Pathology
- Admissions office.

The unit can be subdivided into the following elements:

1. Reception and waiting
2. Consulting and treatment
3. Minor operating theatre
4. Post-treatment observation beds

Other elements include toilets, nurses' room, store (medicine) etc.

The general rule for determining the number of observation beds, if no experience is available, is that there should be a minimum of 4 in two rooms (for separation of men and women), plus an additional two for each 100 hospital beds over 100.
see figure 4.5 for emergency suite relationships

4.8. Out-patient Department (O.P.D)

The out-patient department is often a patients first introduction to a hospital except where the patient comes through the emergency unit.
Thus the department should be located at the main entrance to the hospital convenient to the hospital approach roads and pedestrian paths. It should be conveniently associated with the diagnostic and therapeutic facilites.

4.8.1. Function

" The chief fucntion of the out-patient department should be to keep patients out of the beds of the inpatient department"[14]

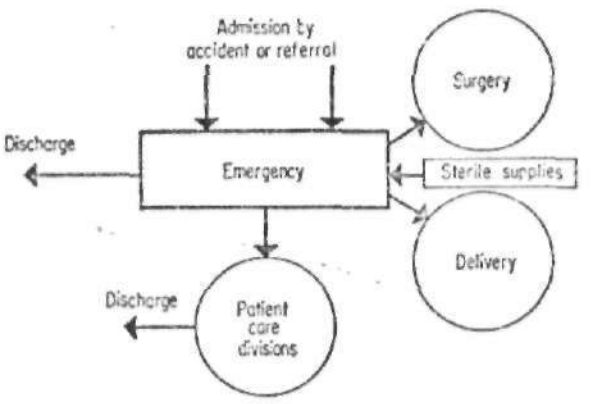


Fig. 45. Emergency suite relationships.

Functions of the opd include:

1. Reception- where patients for admission to the hospital can be examined.
2. Casualty department - where emergency treatment is rendered.
3. The centre at which continuation treatment is provided for patients who had been discharged from the hospital.
4. Consultative centre for specialist investigation and treatment which cannot be given efficiently in the home but does not necessitate the admission of the patient to hospital, and to which patients from the local authority's clinics may be refered.[15]

Other functions include Education(health) and preventive care. These are offered through teaching and taking adequate medical measures towards preventing preventable diseases.

The O.P.D. offers its services in the following Clinics:

(i)	General Medical	(vii)	Ear, Nose and Throat (ENT)
(ii)	General Surgical	(viii)	Gynaecology
(iii)	Paediatric	(viii)	Dental
(iv)	Psychiatric	(ix)	Eye
(v)	Ante-natal	(x)	Immunization
(vi)	Orthopaedic	etc.	

Elements of this department include:

- Reception and waiting
- Consulting and Examination Rooms
- Treatment rooms (dressings and injections)
- Special clinics
- Toilets (For both staff and patients)
- The reception room should be the main entrance hall of the department. All registration and records facilities will be accommodated here. It is better, apart from the main waiting hall, to have decentralized waiting spaces adjoining the various clinics.
- Consulting and examination rooms- these are the actual diagnostic rooms where the doctor attends the patient. Some hospitals provide separate consulting and examination rooms, while others combine both activities in a single room
- Treatment rooms(s) - For surgical treatments and injections are also provided.
- Special clinics- require special equipment e.g. Eye, Ear, Dental etc.

Examination Rooms:

The minimum required is twice the number of the consulting rooms.

Movement:

The cyclic pattern of movement is the most suited for OPD. That is, a movement which brings one back to where he started.(Reception and waiting → consulting and treatment rooms→dispensary waiting room → out.)

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CHAPTER FIVE

SERVICE DEPARTMENTS

The hospitals general service departments, like the adjunct diagnostic and treatment facilities, give secondary service to the patient. These services are no less essential than the professional departments, but are usually considered seperately because litte of their activity involves medical supervision.

5.1. Dietary

The Dietary department of the hospital is responsible for serving food mostly to inpatients and sometimes the hospital employees depending upon the hospital policy.

It relies upon the central general stores for receiving all food items and the storage of non-perishables until drawn for use.

Location of this department, as with its other sister departments is governed by ease of acces to the main service entrance since large vans and lorries convey bulk items for use by the department.

After the food preparation, then follows its distribution. The food is transported from the kitchen to the patients. There are three methods of food distribution the objective of which is to serve palatable food which means hot foods hot, cold foods cold, dry foods dry etc. The three methods are:

5.1.1. Decentralized:

With this method, trays are set up in floor kitchen (or pantry) in the patient care divisions. Hot food comes from the central kitchen in bulk food carts and is served from the floor kitchens.

Trays are carried from kitchen to patient by hand or on carts holding three or four trays.

After meals, trays are returned to the floor kitchens and stripped, the dishes scrapped, and both dishes and trays washed and stored there, ready to be set up for the next meal.

5.1.2. Centralized:

In this, trays are completely assembled in the main kitchen. Food is served into the plates and placed in carts of 16 to 20 trays and taken to the patient are units. This method allows control at one central point and reduces the ward kitchen into a small pantry.

Trays are altogether returned to the kitchen for stripping, scrapping and washing ready for the next set up.

5.1.3. Combined:

This is the third method and combines the advantages of both centralized and decentralized methods. Here, the food service is bedside which uses the floor pantry for making up the plates, short of placing the

food on them. The empty plates are wheeled out and distributed among the patients. When the food is brought in bulk in insulated food carts from the main kitchen, the food is served into the plates infront of the patient. This provides the patient with the type and quantity of food he needs.

5.1.4. Elements of the Kitchen

Kitchen stores for storing foods and equipment. These include:

- Cold stores for meat and fish
- Vegetable cold store
- Equipment store
- General Store

Preparation area for the cooked foods.

Cooking and serving area

Food Trolleys washing and parking

General wash-up space

- Office for the catering officer
- Office for the dietitian
- Changing rooms
- Toilets
- Staff rest room.

Refuse and Garbage disposal.

The size of the hospital kitchen is determined by the number of meals the kitchen is expected to serve at any one time.

The united states public health service recommends 1.4M^2 of space for a 50-bed General Hospital, 233M^2 for a 100- bed General Hospital and 335M^2 for a 200-bed hospital.

5.2. Laundry and Housekeeping

5.2.1. The hospital laundry handles all linen washing, mending, distribution etc.

The process consists of eight major steps: collecting, sorting, washing, extracting, drying, ironing or pressing, folding, storing and distributing. For these functions, the department requires the following facilities:

- Space for collection and sorting
- Office space for supervisor and clerks
- Main washing area
- Mending room
- Drywork area for mending and folding
- Clean linen store
- General store
- Distributing area.

The laundary can functionally be divided into two work areas:

- Dirty work area where the dirty items are received and sorted out. Here, therefore, requires a number of sorting compartments. After sorting, the items are fed into washing machines.

- Clean work area where the washed materials are extracted and dried. Those requiring mending are passed to the tailors to be mended. The rest are ironed, folded, and stored for distribution.

Figure 5.1 shows the processing of hospital linen.

5.2.2. House keeping section does the cleaning, gives maid service generally, and handles all the linen. It also distributes paper towels and soap, toilet paper, and such supplies. Generally, the maid service, done by women and limited to day time work and relatively light tasks, is distringuished from janitor service, which includes washing and waxing floors, replacing and cleaning shades and blinds, washing windows and the like.

Another important part of house keeping is refuse and garbage disposal.

Elements of this section are

- Floor cleaners' store for keeping all cleaning equipment of each block floor.
- Central workroom
- Storage for supplies
- Office for house keeper
- Rest room for cleaners.

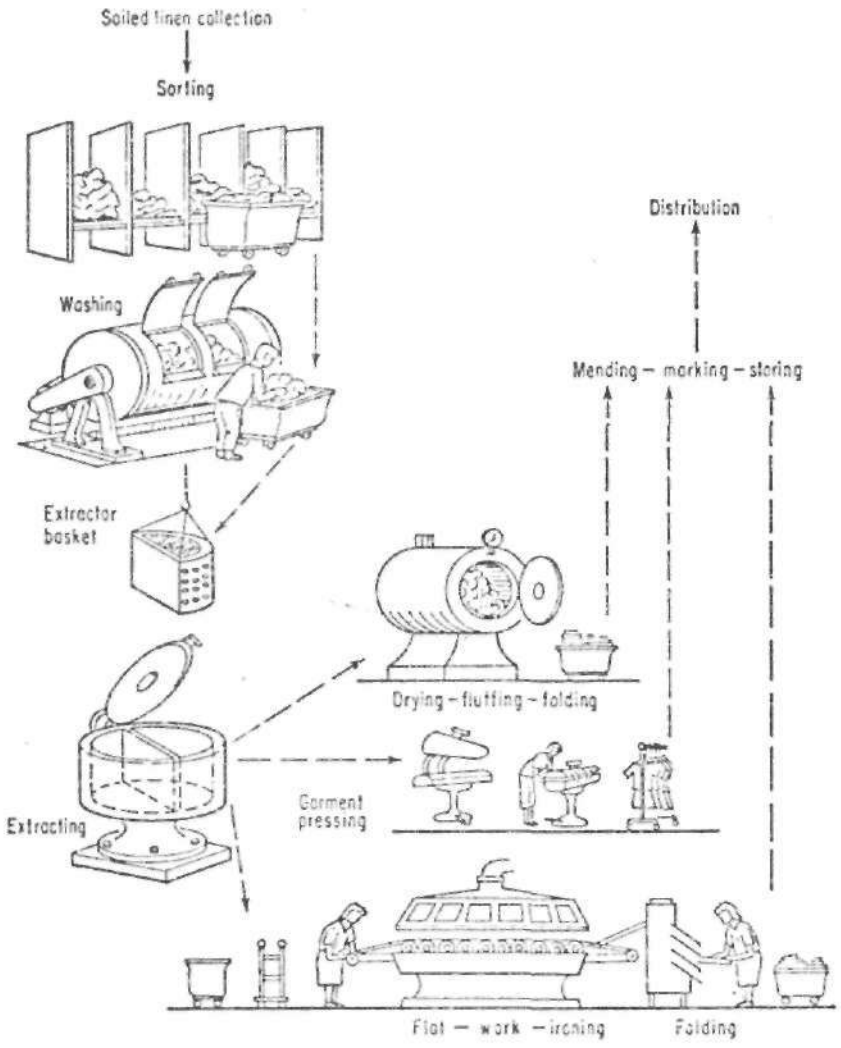


Fig. 5.1 Processing hospital linen.

5.3. Central General Stores

The Central General stores (C.G.S.) is the centre for collection, storage and distribution for goods purchased in bulk only to be used in small quantities. These goods include sterile goods, special equipment, linens and even drugs. Others are bulk foods, printed forms etc.

The stores space is subdivided into several categories of new goods.

5.3.1. All perishables for dietary which are received and checked for both quantity and quanlity and transported directly to refrigerated storage or to kitchen for use.

5.3.2. All bulk food, non- perishables, and other packaged supplies which are received and stored in the main store room of the C. G. S.

5.3.3. Certain special items, such as pipes or wire for use in maintainance which go to the appropriate shop for storage and use after receipt. Other items like bottled gases, volatile liquids and special hospital equipment go to the storage places provided for them.

5.3.4. Separate storage for equipment awaiting resuse or repair.

Apart from the main store area, there is the need for

- Offices for clerks and supervisors
- Receiving room with counters
- Work space for finishing outgoing goods.

The stores should be grouped in such a way that they are easily accessible to vehicles bringing in fresh supplies.

The U.S.P.H. recommends as a minimum, $2M^2$ of space per bed for an average hospital situated near the central market of the area.

Figure 5.2. shows the functional relationships of general stores.

5.4. Central Sterile Supplies (C.S.S.)

In this unit, all items which have been returned from the departments, are cleaned, assembled, put up in packs, sterilized and stored for distribution when needed.

Linen is rinsed out in surgery and sent directly to the laundry. Linens come to the C.S.S. already clean. Rubber surgical gloves are cleaned seperately, tested for holes, dusted for ease of getting them on and off and packed for sterilization.
Disposal Surgical gloves when used, eliminate this process.

- C.S.S. therefore will serve the following:
- Surgery
- Delivery suite
- Patient care units
- Emergency
- Ambulant patients department.

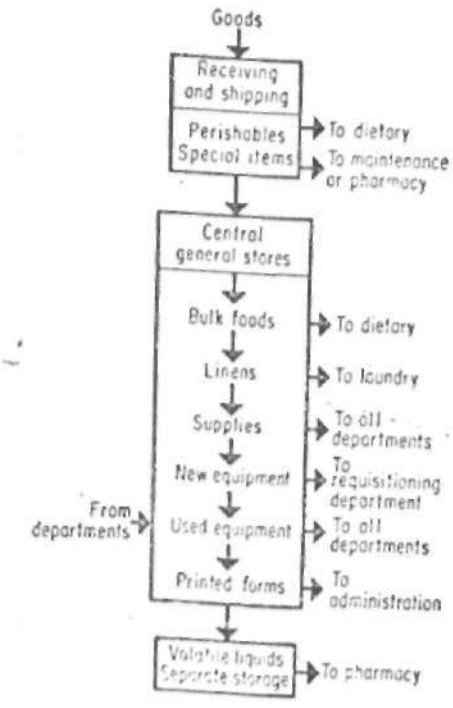


Fig. 5-2 Functional relationships, central general stores.

The process involved in this department are:

- Receiving and sorting
- Washing and drying
- Packing;
- Storing;
- Distributing.

The recommend floor area for the C.S.S.D. is $0.65M^2$ to $1.0M^2$ per hospital bed.[1]

The American Sterile company recommends the following percentages for determining the areas assigned for different functions within the total area.[2]

- Workroom - 20%
- Sterile Store - 17%
- Bulk Store - 2%
- Wash room - 11%
- Syringes - 10%
- Offices, restoom, receiving and sorting and circulation - 30%

See figure 5.3 showing sterilizing equipment

5.5. Maintenance Unit

This section deals with the day to day repairs that arise during the use of buildings and equipment.

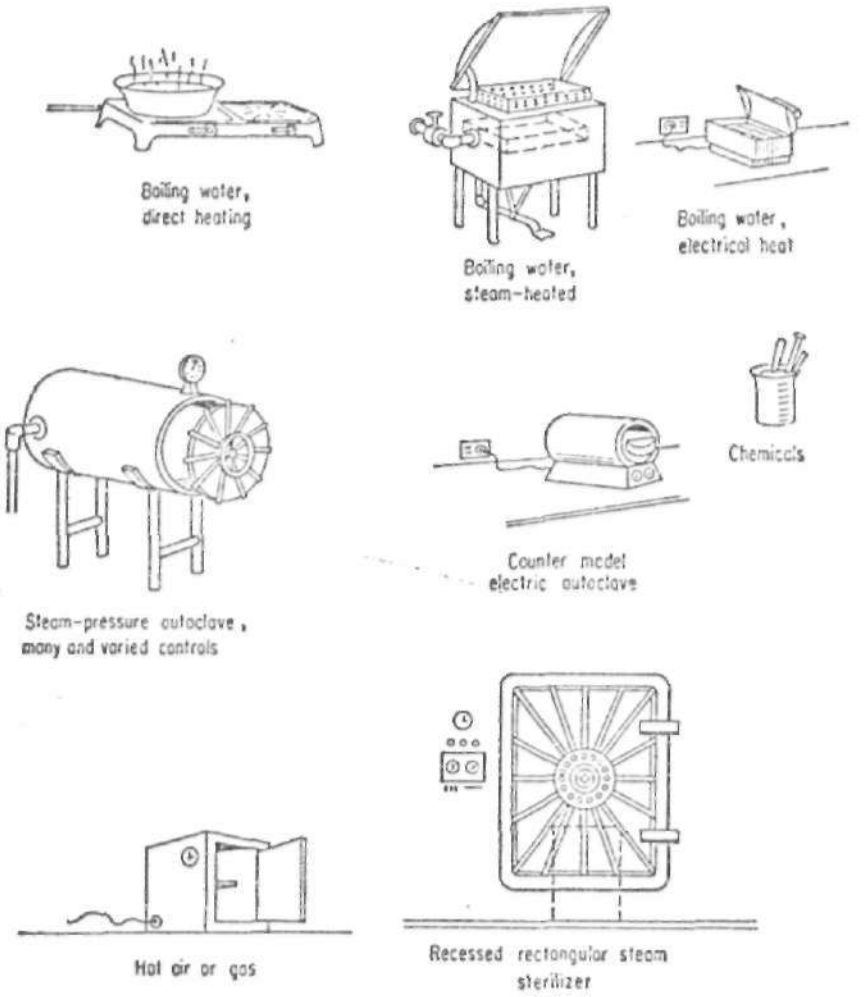


Fig. 5.3. Sterilizing equipment.

It comprises of the following:

5.5.1. Carpentry, masonry, plastering, floor coverings, roofing, building structure

5.5.2. Painting and furnishing

5.5.3. Plumbing, heating, ventilation, air conditioning and refrigerating

5.5.4. Electrical Systems, lighting, communications, motors and control.

5.5.5. Elevators where used.

5.6. Staff Facilities

Changing facilities should be provided to enable hospital workers to change from street clothes into hospital garments. There should be some rest or coffee room for each department if no central one is provided.

5.7. Administration

The administration section deals with public relations matters, employment and purchasing of hospital materials and equipment, medical and nursing staff organisation, public health programmes etc.

Offices required for these functions include:

- Administrator and Assistants
- Business or purchasing offices such as:
  Accountant's Office

- Public relations office
- Medical and Nursing Staff Offices
- Conference Room
- Toilets for both males and Females.

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CHAPTER SIX

CLIMATIC AND DEMOGRAPHIC DATA OF BAUCHI

Bauchi is the state capital of Bauchi State which came into being (as a capital) in 1976.

6.1. Location:

Bauchi lies in the Western spur of the old North-Eastern State approximately 09° 49' East and 10° 17' North.

6.2. Relief

Bauchi lies in the crystalline uplands of Northern Nigeria. The high planes as the uplands have come to be known, represent the major exposure of crystalline rocks in the North. Most of the town lies over 2,000ft. above sea level, some 2,00ft. lower than Jos to the west but higher than the KeriKeri Plateau to the east. Above the Bauchi plains rise a number of residuals consisting of isolated rocks, hills and low ranges. In the area around Bauchi town, some of these hills are easily visible. Most significant are the Wambai and Wurinji to the N-East, the Kodi, Idi and Dumi in the S-East, the Jahun and Gudun in the south and Kobi which dominates the centre of the town. All of these hills stand a little over 2,000ft.

6.3. Geology

The Bauchi region consists of an ancient crystalline basement. This crystalline basement comprises the remnants of igneous and highly metamorphosed sedimentary rocks of cretaceous tertiary age. The Biu Plateau further east is a product of basaltic flows of the late tertiary and quaternary volcanic activity.

6.4. Climate

The long dry season lasts from October to April and the wet only occurs between may and September reaching its peak in the mouth of August as indicated in table 6.1 in which the mean annual rainfall is about 43 inches (1075mm)

During April, the hottest mouth, maximum shade temperature reaching 104 °F has recorded. The maximum daily humidity decreases slightly about the middle of the rainy season but drops more dramatically from about 94% in August to less than 10% during the Harmattan.

See table 6.2 for mean monthly temperature.

CLIMATIC DATA OF BAUCHI

1. Mean Monthly And Mean Annual Rainfall

Rainfall	Inches	MM
January	0.00	0.0
February	0.02	0.5
March	0.21	5.3
April	1.41	35.8
May	3.73	94.7
June	5.77	146.5
July	9.95	252.7
August	13.42	340.9
September	7.16	181.9
October	1.37	34.8
November	0.03	0.8
December	0.01	0.2
Total	43.08	1094.2

Table 6.1

2. Mean Monthly Temperatures: Maximum and Minimum

Temperature	°C	°F
January	22.4	72.4
February	24.2	75.6
March	28.0	82.4
April	29.6	85.3
May	28.5	83.3
June	25.3	79.5

July	24.6	76.3
August	24.1	75.5
September	24.6	76.3
October	25.0	77.3
November	24.0	75.3
December	21.8	71.4

Table 6.2.

Age and Sex Distribution

Age groups in years	% males	% females	% of age group to total
Under 15	51.	49	47.1
15 - 54	48.1	51. 8	49.3
over 55	50.5	49.5	3.6
Average Total	49.6	50.4	Total 100

Table 6.4

DEMOGRAPHIC DATA

Bauchi Population Projection (To Year 200)

YEAR	POPULATION	ANNUAL GROWTH RATE(%)
1947	10,179	4.74
1953	13,440	19.91
1963	38,014	5.75
1975	75,250	
1980	108,030	Assume constan
1985	155,090	annual average growth
		rate for
1990	222,650	1974-2000 of 7.5%
1995	319,650	
200	458,900	

Sources:

1947-53: District officer's report

1963: National census

Max Lock Group Nigeria Limited

1974: (Household interview survey)

Table 6.3.

CHAPTER SEVEN

7. CASE STUDIES

7.1. General Hospital Kumo

The General Hospital Kumo was conceived during the defunct Civilian Government. It is located at the outskirts of the town due to lack of a more appropriate site .

7.1.1. Approach:

The hospital site is approached through a sub-arterial road which leads to it and divides into two. The first leads to the hospital complex and the other leads to the Staff quaters. On reaching the hospital complex, one immediately comes to the parking which is divided into two. One for public, and the other for the hospital Staff.

7.1.2. Diagnostic and treatment facilities

On approaching the hospital complex, the patient first meets the out-patient department (o.p.d.) - designated D. in figure 7.1. Here, all new patients assemble to await consultation by the attending physician. Those patients with minor ailments are diagnosed and given prescriptions to collect medicines at the pharmacy. Those whose diseases are serious however, and need supervision for some length of time by the doctors, are sent to the patient care units.

Opposite the o.p.d. is the pharmacy department where medications are collected by the ambulant patients and by staff for use of the patient care units (wards). The location of the pharmacy near the o.p.d. ensures short travel distance by the patients and restricts the patients travel to the periphery of the hospital.

Those who require additional diagnosing before their diseases are established, are sent to the laboratories (designated J) where they give out required specimens for example blood, urine, stool, sputum etc for investigation. Others are sent to the X -ray department for filming of some of their body organs.

Some patients are sent directly to the operating room (f) for operation before admission.

These above facilities constitute what is known as the adjunct diagnostic and treatment facilities.

7.1.3. The patient care units

These are more popularly known as wards. Here, patients needing prolonged medication and supervision are accommodated.

The wards are in the form of modules which are easily repeated when the need arises. The maternity ward is located to one side of the wards but no road leads to it. There is the need for a means of vehicular access to the maternity since some women arrive during the time of labour when they cannot

walk on their feet.

There is also an isolation ward where patients with diseases liable to infect others, are kept.

The Surgical suite however, since it gives direct service to the wards has been located far awa" from them instead of being central.

7.1.4. The service departments

The service department consist of the Kitchen, the laundry and the central stores. These are grouped to one side also opposite the wards. There location near the wards is very important since they give direct services to them. Distance of travel os shorten so that food from the Kitchen does not have to be carried along distance to where the patients reside. This consequently saves in labour.

One problem with the location of the central stores is that it is too far away from the pharmacy since bulk medications are stored in the central stores and carried in smaller quantities to the pharmacy for compounding and dispensing. However, its placement near the kitchen and laundry is more important.

Vehicular access is provided for delivery of bulky materials to the department.

7.1. 5. Administration

The administration is located near the adjunct facilities and is easily accessible. It is also kept to the periphery since it does not provide direct service to the patients. Hence its location here is alright though it would have been better placed where the opd has been placed.

7.1.6. Circulation

The two types of circulations that is vehicular and pedestrian have been seperated so that no conflict in traffic is encountered.

The pedestrian or internal circulation is by covered walkways which lead to each of the departments.

The hospital complex is planned as a parvilion type which elongates as it growth. The circulation pattern follows the nature of the this planning.

7.1.7 Expansion

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The site is quite big and allows for future expansion more especially the patient care wards. However, the expansion can orly be uni-directional since (as far as the wards are concerned) since the site is bounded to one side by the wall of the hospital and the wards are bounded on the other side by the service departments.

Summarily, the hospital planning as a whole is quite workable and well articulated. The departments are grouped, each group consisting of related facilities or its.

7. 2. Hull Hospital, Yorkshire, U.K.

This hospital was commissioned in 1966 at Hull, Yorshire in U.K. The hospital was planned to accommodate 542 beds, with ancillary, diagnostic and treatment facilities.

7.2.1. The site:

The site covers an area of 2.34 hectares in the centre of hull and bounded on the north by the railway and on the south and west by main roads. The site is thus restrictive. To overcome the site restrictions, accommodation was concentrated in one block composed of standardised wards.

Parking is provided in front of the block immediately on arrival.

7.2.2. Planning principles and layout:

Being a multi-storey complex, the ground floor consists of the kitchen, the general stores, the pharmacy and the accident and emergency units. All of these need access by vehicles since bukly materials are brought to the kitchen, the general stores and the pharmacy. There was thus a compromise of placing the outpatient department on the first floor level and

providing it with good access by lifts and staircases.

The first floor accommodates the pathology, the public Health Laboratory Services, the medical records and the outpatient department.

The second floor consists of the X - ray suites, the physical medicine and the adminstration.

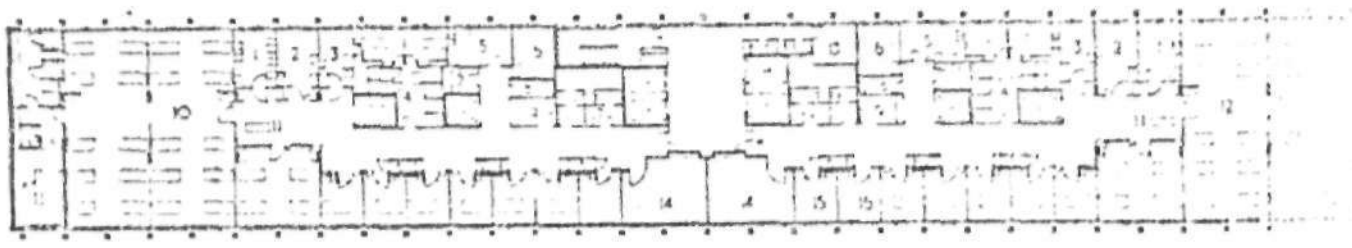
The third floor consists of the central sterile supplies, the operating theatres some part of the physical medicine, and the hospital plant room.

The rest of the floors accommodate the patients. Each wing accommodates 58 patients and divided into two sections each with its supervisory nursing staff.

Typical floor plan of the wards is shown in figure 7.2. Figure 7.3. shows the floor that houses the outpatient department.

7.2.3. Advantages

- Being a multi-storey complex, a high degree of articulation of the various related departments is achieved and consequently efficient service.
- The problem of internal circulation has been reduced to the barest minimum since travel distances are vertical, and these are done by lifts and staircases.
- Most services are done by automation thus saving in time and labour.



Typical ward floor at fourth floor level in slab block

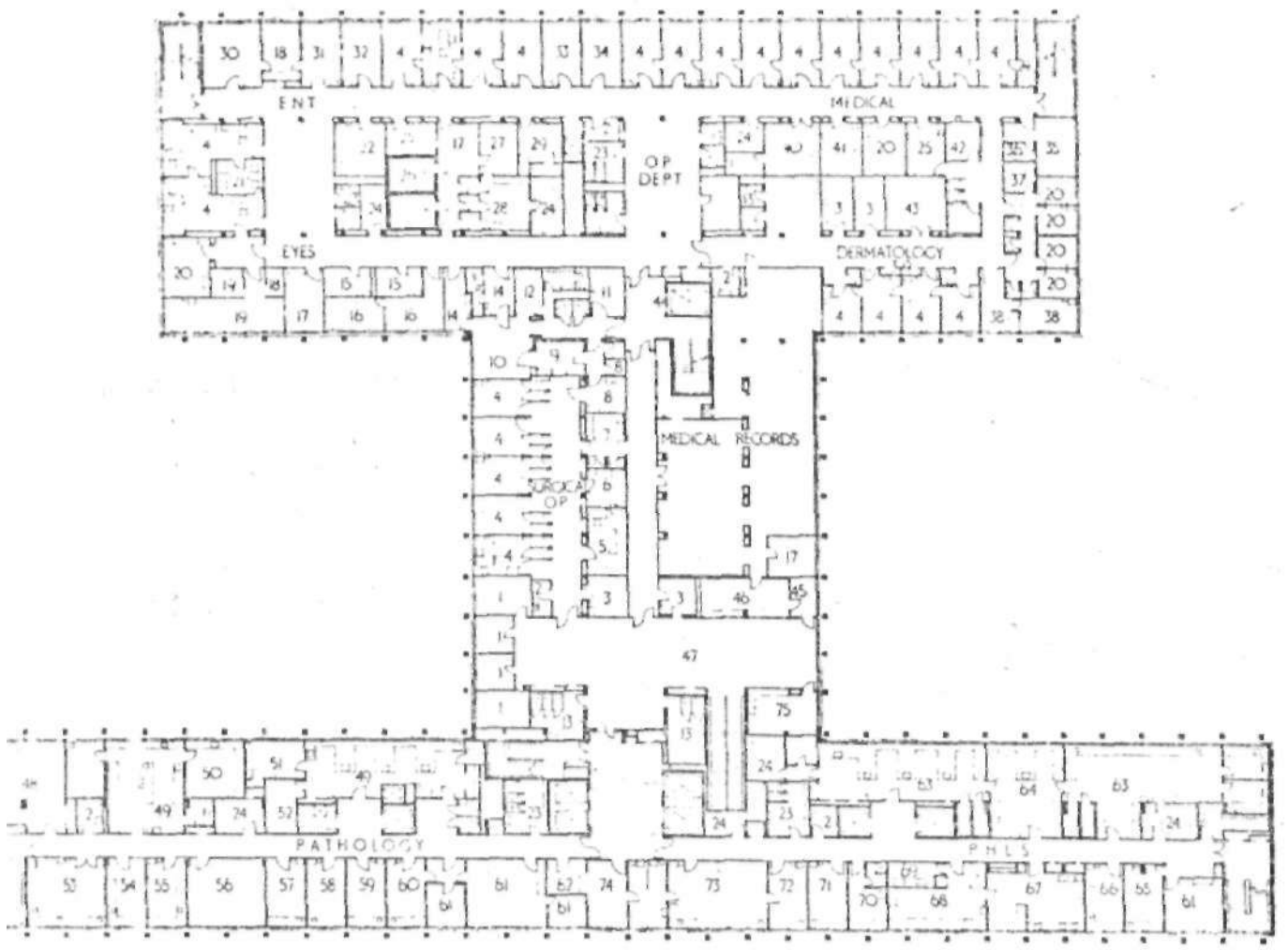
1 Utility
2 Treatment
3 Sluice
4 Bath and lavatories
5 Kitchen
6 Store
7 Cleaner
8 Flowers
9 Linen
10 Women's ward
11 Nurses' station
12 Men's ward
13 Visitors
14 Dayroom
15 Doctor
16 Office
17 Staff cloaks



Theatre floor plan (scale = 1/16")

1 Sisters
2 Theatre superintendent
3 Sluice
4 Recovery ward
5 Utility
6 Anaesthetic
7 Sterile
8 Aseptic theatre
9 Preparation
10 Clean theatre
11 Theatre
12 Scrub-up
13 Aseptic theatre
14 Plaster
15 Trolley
16 Trolley and bed park
17 Sink
20 Transfer area
21 Central sterile supply department
22 Theatre X-ray store
23 Plaster store
24 General theatre
25 Orthopaedic theatre
26 Laminar flow
27 Theatre post
28 Theatre nurses changing
29 Theatre surgeons changing
30 Sterile
31 Theatre clothes changing
32 Theatre rest room
33 Theatre kitchen
34 Theatre
38 Plant room
39 Chapel
40 Vestry
41 Chaplain
42 Theatre
43 General theatre store
44 Sterile
45 Anaesthetic
46 Anaesthetic
47 Theatre
48 Theatre
49 Theatre
50 Theatre
51 Theatre
52 Theatre
53 Theatre
54 Theatre
55 Theatre

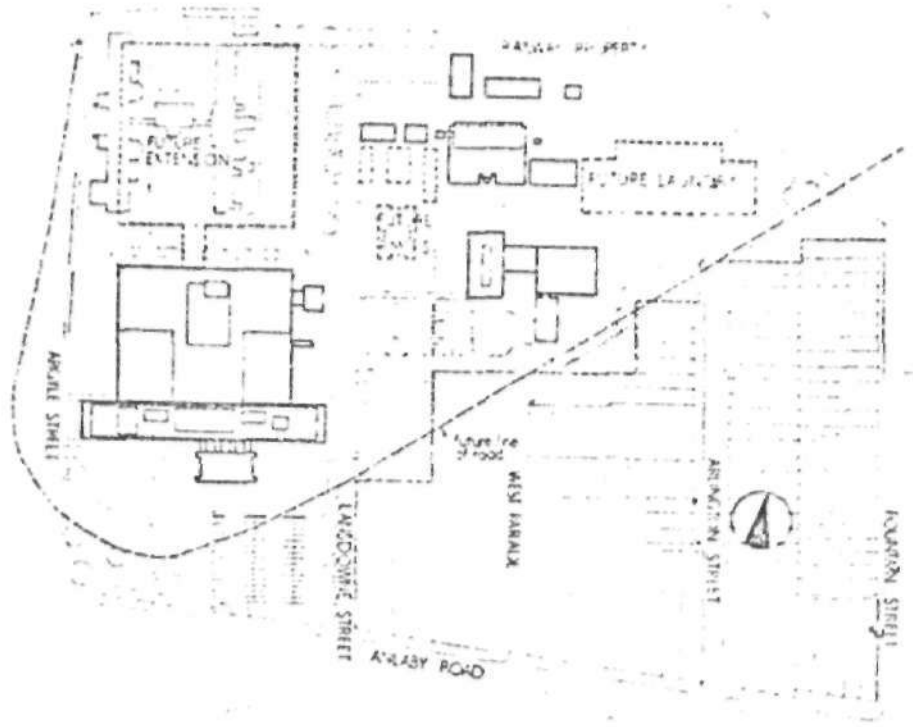
FIGURE 7.2



First floor plan ($\frac{1}{16}$in = 1ft)

1 Medical social worker
2 Cleaner
3 Records office
4 Consulting, examination
5 Clinical
6 Sluice
7 Nurses' changing and lavatories
8 Preparation
9 Anaesthetic
10 Endoscopy
11 Recovery
12 Doctors' change and scrub-up
13 Men's and women's lavatories
14 Sink room and sterilising
15 Opthalmic optician
16 Dispensing opticians and fitting
17 Office
18 Darkroom
19 Orthoptist and orthoptics
20 Treatment
21 Special examination
22 Treatment room
23 Staff men's and women's lavatories
24 Store
25 Utility
26 Audiometry
27 Fitting
28 Repairs room
29 Children's waiting-room
30 Senior consultants
31 Registrar's office
32 Teacher of the deaf
33 Dieticians
34 Clerks
35 Staff common-room
36 Kitchenette
37 Bathroom
38 Superficial therapy
39 Dressing-gown store
40 Electrocardiogram
41 Laboratory
42 Ultra-violet light
43 Minor surgical procedures
44 Lift
45 Typist
46 Registration
47 Outpatients' waiting-room
48 Study and conference
49 Biochemistry
50 Chromatography
51 Biochemists
52 Balance
53 Metabolic biochemistry
54 Optical room
55 Research laboratory
56 Technicians
57 Frozen sections
58 Consultant pathologist
59 Chief technologist
60 Special bacteriology
61 General office/records/typist
62 Orderly
63 Bacteriology
64 TB mycology laboratory
65 Pathologist
66 Food and water laboratory
67 Sterilising and equipment cleaning
68 Preparation and media room
69 Plate pouring
70 TB sputum inoculation
71 Consultant bacteriologist
72 Haematologist
73 Haematology and serology
74 Waiting and cubicles
75 Tea bar

FIGURE 7.3



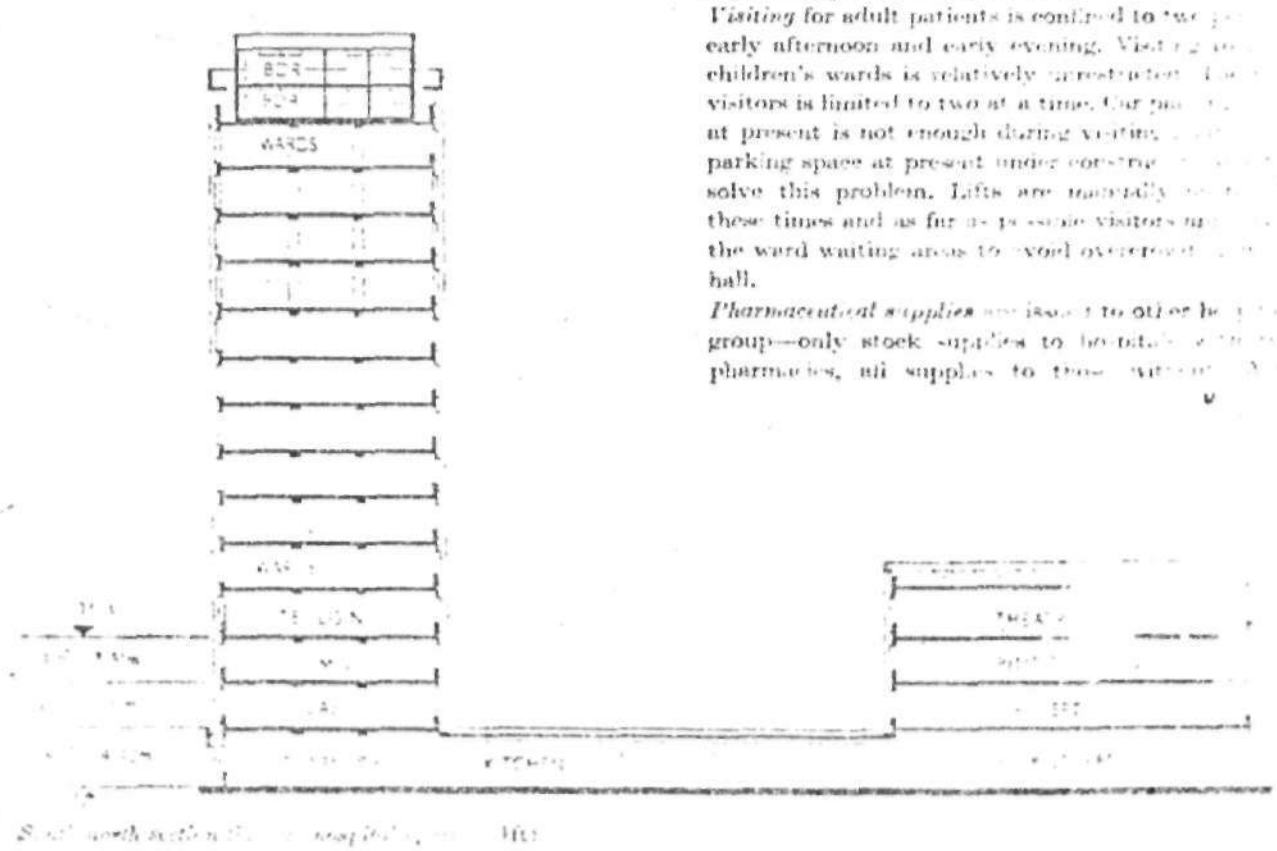
Site plan of new Hull Royal Infirmary (1/24in. = 1ft). *Old buildings shown in thin line*

plated by ward catering assistants and [illegible] nursing staff.

Sterile supplies to wards are provided [illegible] delivered each day by the paternoster lift [illegible]. The central sterile supply department [illegible] sterile packs, excluding instruments, for the department. Supplies to other hospitals [illegible] sent by van and the service will probably [illegible] psychiatric hospitals and others in the [illegible] additional load on the east will be absorbed [illegible] shift work. Instruments for repair are [illegible] supplies department via the east.

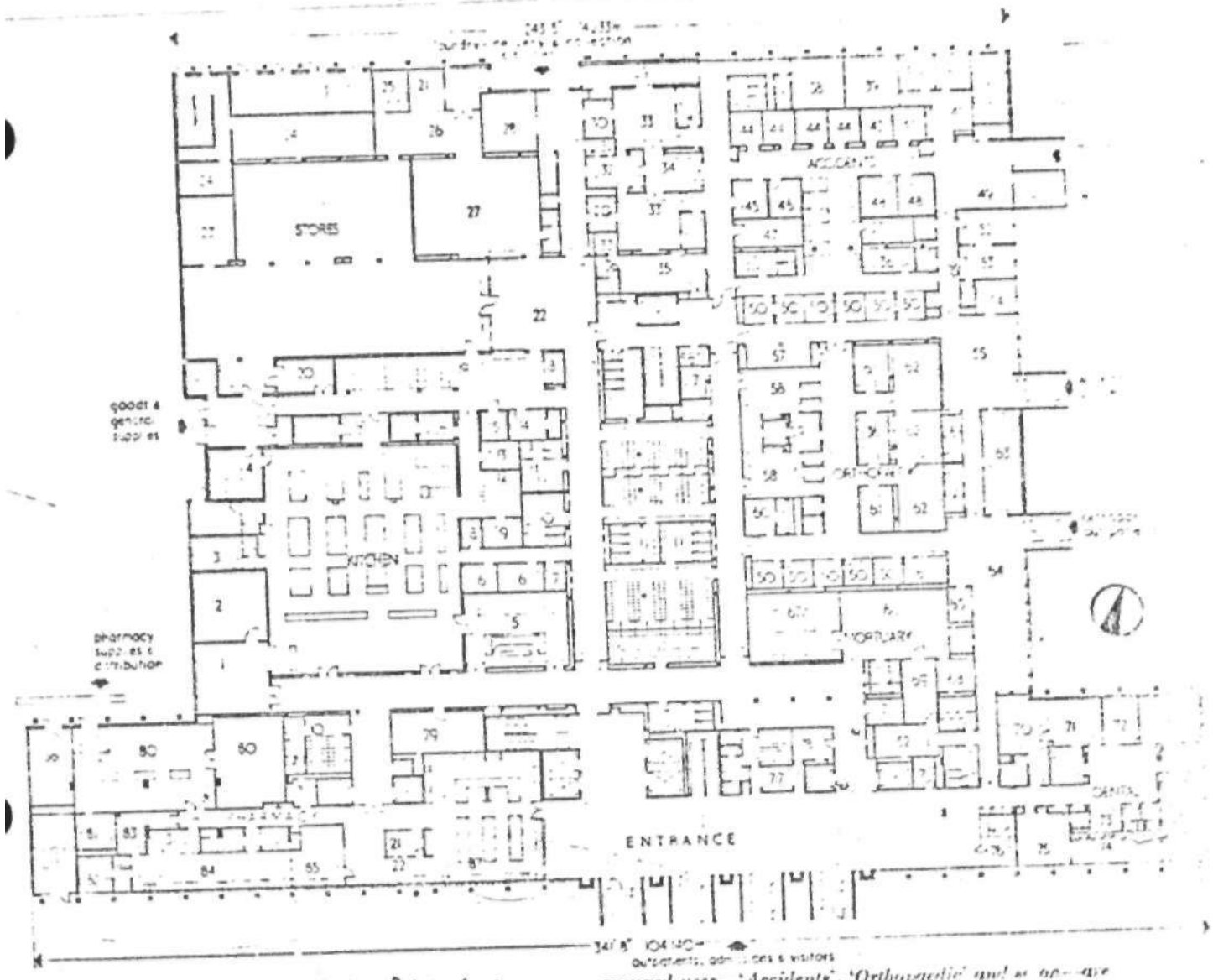
Visiting for adult patients is confined to two [illegible] early afternoon and early evening. Visiting to children's wards is relatively unrestricted. [illegible] visitors is limited to two at a time. Car parking [illegible] at present is not enough during visiting [illegible] parking space at present under construction [illegible] solve this problem. Lifts are manually [illegible] these times and as far as possible visitors are [illegible] the ward waiting areas to avoid overcrowding [illegible] hall.

Pharmaceutical supplies are issued to all [illegible] group—only stock supplies to hospital [illegible] pharmacies, all supplies to those without [illegible]



[illegible] north section [illegible] hospital [illegible]

FIGURE 7.4.



Ground floor plan ($\frac{1}{16}$in = 1ft). *Various points of entry are marked. Owing to the complexity and scale of the plan the uses of individual rooms have had to be keyed, but grouped uses—'Accidents', 'Orthopaedic' and so on—are shown*

1 Dining-room
2 Domestic staff rest-room
3 Kitchen staff rest-room
4 Vegetable store
5 Central wash-up
6 Catering office
7 Cleaner
8 [illegible] store
9 [illegible]
10 Male staff changing
11 [illegible] staff changing
12 [illegible]
13 Dry store
14 Dairy
15 Fats store
16 Larder
17 Butcher
18 Bread store
19 Dry food store
20 Crates and churns
21 Office
22 Issues area
23 Public health laboratory store
24 Switchroom and plant
25 Sewing room
26 Clean linen sorting
27 Central linen store
28 Dirty linen sorting
29 Disposal area
30 Sink room
31 Autoclave
32 Sterilising room
33 Minor theatre
34 Anaesthetic room
35 Recovery
36 Utility
37 Service
38 Staffroom
39 Chief of department
40 Transport officer
41 Police interview
42 Wheelchair
43 Receiving and examination
44 Stretcher and first aid
45 Casualty preparation
46 Bathroom
47 Special examination
48 Casualty officer
49 Trolleys
50 Examination cubicles
51 Porters
52 Relatives' waiting-room
53 Children's waiting room
54 Sister
55 Casualty waiting-room
56 Medical gas store
57 X-ray waiting-room
58 X-ray room
59 Darkroom and processing
60 Appliances and store
61 Consultant examination room
62 Plaster preparation and store
63 Records
64 Orthopaedic waiting room
65 Tea bar
66 Bed lockers
67 Autopsy
68 Attendants
69 Viewing chapel
70 Workroom
71 Surgery and recovery
72 Hydrotherapy
73 Reception
74 Records
75 Clerks
76 Shop
77 Toilets
78 Toilet room
79 Clerks
80 Plaster store
81 Examination
82 Sterilising facility
83 Assistant's office
84 Preparation room
85 Plaster room
86 Medical [illegible] and staff

FIGURE 7.5

- An appealing achitectural form is achieved which is pleasant to the eye.

7.2.4. Disadvantages

- The main disadvantage of this vertical concept of design is the problem of exapnsion. If expansion is carried out, it becomes detached from most of the facilities needed by it and which is hard to duplicate.
- Ventilation and lighting are mostly by artificial means which is hard to employ in the Nigerian situation due to reasons of economy.
- Automation is very expensive and creates joblesness.
- For the majority of the Nigerian masses, who are illiterates, the complex nature of this hospital concept will be confusing and difficult to get by
- High degree of maintenance is required for this type of hospital complex since all facilities are grouped together.
- The hospital environment will be too strange since it is lacking in natural environmental features brought about by courtyards and pavements when the parvilion type of design is adopted.

The author, having enumerated both the advantages and disadvantages of going vertical in hospital design, considers the vertical type of design not the most appropriate for the Nigerian condition. Rather, the parvilion type of design, consisting of not more than two storeys and expanding horizontally will be more suited to the Nigerian circumstances.

CHAPTER EIGHT

8. DESIGN REPORT (CONCEPT)

The author approached the design as a whole by first going to the hospital complex and assessing the existing facilities available and the conditions of different building therewith. He then carried out an appraisal which enabled him to come up with this design.

8.1. Site Access:

The site as it exists, has two access roads both of which terminate at the entrance for all purposes.

The redevelopment programme has come up with a new entrance though still maintaining the existing entrance but reserves it as service entrance that is, for the kitchen and General Stores. It is reserved for services because it is not convenient to patients and visitors due to the manoeuvres involved before reaching it. An alternative entrance has been provided from the eastern side of the hospital complex. This new entrance is easily accessible because a new road called the Murtala Muhammed road has already been completed which passes by that side of the hospital as shown on the site plan.

From the Murtala Muhammed road, and through, the main entrance, a road branches and leads to the administration which is the first a person meets on

entering the complex, and then to the nursing units visitors parking. The other branch, on the other side leads to the emergency, the delivery suite and then to visitors parking. Thus visitors parking problem has come to be solved since the parking was formally outside. Thus one parks outside and treks all the way through.

8.2. New Facilities

8.2.1. Adjunct diagnostic and treatment facilities

Through the new entrance, on entering the hospital complex, the patient first meets the out-patient department which receives all new patients and those requiring continuation treatment.

The out patient department (opd)

This is subdivided into two sections. One caters for male patients, and the other females and children. Main components of the opd are the consulting and examination rooms. Waiting areas are provided so that the patients can sit and await their turn for consultation. A dispensary is provided for collecting medications. The patient may then go to the injection and treatment rooms situated further in if there is the need.

Toilets are provided for both patients and staff.

X - ray unit

This is for further diagnosing of a patients disease. It is divided into three non-distunct zones. The first is the patients reception and waiting. The second is the offices and the dressing cubicles, and the third is the one that consists of the X -ray diagnostic rooms. Patients collect their X - ray films from the distribution room which is adjacent to waiting area.

Laboratories

This consists of the various laboratories for helping establish a disease or confirming it. It also consists of two sections. The public area and the technicians work area. A specimen toilet is provided so that patients can conveniently procure their urine or stool specimens for the laboratory investigation. Also incorporated, are the E.C.G., E.E.G., and B.M.R. facilities which were absent beofre the redevelopemtn.

Pharmacy

A pharmacy unit has been incorporated since there was nonw Here, compounding and distribution of medications take place. Storage is also provide for such that need be stored. An office for the pharmacist is also provided.

Emergency unit:

This is also designed as part of the opd for accident and emergency cases. Access is provided to this unit and also provided, is ambulance parking.

The surgical suite:

This is a suite consisting of six operating rooms. It is placed centrally between the two wings of the nursing units so that it distributes its service equally. It receives its supplies from the central sterile supplies which is just ahead of it.

The physical medicine department

This does not originally exist. No provision for it was made and plans were not underway to bring about it.

The department is housed in the former maternity ward and is divided into two: Physiotherapy and occupational therapy both of which form the physical medicine department. In the physical medicine section, two main parts exist- the hydro, thermo and electro-therapy part, and the exercise area.

In the occupational therapy, there is a main therapy room, a wood workshop with its storage facility, an out-door therapy which is just surrounded by the wall.

8.2.2. Service departments

These are also of direct service to the patient, in the design, all the service departments have been grouped together since their functions are related to one another. The components are the kitchen, which is provided with ample cooking, preparation, and storage areas, the laundry, which, as opposed to the former, uses machines to process the laundry operations. Washing, drying and ironing are all done by machines, This promotes efficiency of service and saves a lot of labour.

The general stores and the sterile stores are on the opposite side of the kitchen-laundry complex and the complex is bounded on two sides by the shops which consists of electrical, mechanical, plumbing, carpentry, masons, painting and telephone exchange.

A service parking is provided and unloading bay also provided for the bulky materials brought to the general stores for onward distribution to other departments.

8.3 Existing or old facilities retained

Of the former facilities, only the nursing units, retained their original structural form though with major alterations or modifications in the old ward type and minor ones in the relatively new wards.

8.3.1. Old wards (type one)

These were originally six in number and still remain six. However, the ward has been expanded towards one side and partitions introduced. These partitions divide the ward into single rooms and 4-bed rooms. Thus the Nightingale nature of the wards has been transformed into the Rigs ward layout.

The number of single rooms was three (3) and has now come to be five (5) each with its own private toilet which was lacking originally. With the provision of self contained toilets, maximum privacy or degree of isolation will be achieved.

The toilets of rest of the patients have been transfered from where they were to a more central position to reduce patients' walking distance.

A treatment room is also provided for treatments that cannot be carried out in the patient's bedroom.

To reduce boredom and provide relaxation for the convalescent patients, a day room has been incorporated within the nursing units. Visitors can also be received there by the patients.

A janitor's closet has also been curved out so that proper maintenance of the wards is achieved and hence a higher degree of asepsis.

8.3.2. The ward type two

This ward type is comparatively new and contains better facilities than the former. However, due to high patient load, the ward came to be denatured by removing the partitions that were supposed to be separating the ward into four-bed rooms.

This design has added to the present number of two to five so that patients will be properly accommodate.

There was the problem of distant toilets as is the case with the former. This has been solved by bringing the toilets to a more central position thus reducing the patients' walking distance.

The nurses' station was too far away from the single rooms which equally need supervision so the design has brough the station nearer to the middle of the ward for supervision of both sides. Placing the nurses' station near the ward entrance has also made it a control centre for incoming traffic.

8. 3.3. Delivery suite

This was absent in the existing situation so the design has integrated a Labour-Delivery suite to the new maternity ward. The suite consists of Labour rooms which number up to 5 and 3 delivery rooms.

A post-partum recovery room has also been incorporated for the mothers.

Since the delivery suite operates on a 24-hour basis, sleeping facilities have been provided for the doctors or nurses. Two sleeping rooms adjacent to the staff lounge serve this purpose. This saves the time for calling a doctor to attend to the patient since it may involve emergency or some complications may arise in which case the doctor is needed.

There is also the provision of a fathers' room for fathers who may wish to see their wives during the period of labour. If the hospital policy allows that, the room will serve that purpose. However, if it does not, then another function will be assigned to it.

CHAPTER NINE

9. HOSPITAL BED NEED & SCHEDULE OF ACCOMMODATION

9.1 Bed Need

The population of Bauchi town as projected by the Max Lock Group Nigeria Limited, for the year 1985 and 1990 are 155,090 and 222,650 respectively.

In accordance with the Nigerian Medical Council recommendation of 3 hospital beds per 1000 population in an urban area, of which Bauchi is one, there will be 465 beds for the present population of 155,090 and 675 beds by the year 1990.

The hospital will be redeveloped to accommodate 500 beds capable of expanding to 700 - bed by the year 1990.

Distribution of beds by services

1.	Medical	24%	120 beds	168 beds
2.	Surgical	33%	165 "	231 "
3.	Obstetrics	19%	95 "	133 "
4.	Paediatrics	15%	75 "	105 "
5.	Psychiatric	9%	45 "	63 "
	Total	100%	500	700 beds

Ward type 1

Accommodation requirements

Space	Number of rooms	Size of each ($_M^2$)	Total area ($_M^2$)
1. 1-Bed rooms	5	15	75
2. 4-Bed rooms	10	27.5	275
3. Nurses' Station	1	17.5	17.5
4. Medication room	1	10	10
5. Sister's room	1	14	14
6. Treatment room	1	15	15
7. Clean Utility	1	12.5	12.5
8. Dirty utility	1	12.5	12.5
9. Doctors' room	1	15	15
10. Day space	1	27.5	27.5
11. Linen and supplies	1	24.5	24.5
12. Patients' toilets	8	1.5	12.0
13. Staff toilets	2	1.5	3.0
14. Stretcher Store	1	7	7
15. Pantry	1	24.5	24.5
16. Janitor's Closet	1	7	7
Total			491.5m^2

Ward type 2

Accommodation requirements

Space	Number of rooms	Size of each (m^2)	Total area (m^2)
1. 1-Bed rooms	6	20	120
2. 2-Bed room	1	1	17.5
3. 4-Bed rooms	9	30	270
4. Nurses' Station	1	17.5	17.5
5. Medication room	1	12.5	12.5
6. Treatment room	1	20	20
7. Clean utility	1	16	16
8. Dirty utility	1	6	6
9. Doctor's room	1	24	24
10. Sisters' room	1	20	20
11. Linen Store	1	17.5	17.5
12. General store	1	15	15
13. Stretcher bay	1	8	8
14. Day room	1	32.5	32.5
15. Pantry	1	12.5	12.5
16. Staff toilets	2	1.5	1.5
17. Patients' toilets	8	1.5	1.2
18. Waiting area	1	10	10
19. Janitor's closet	1	10	10
Total:			626.0 m^2

Out - patient department

This provides consultation, investigation, diagnosis and treatment for patients who require little or no recovery services afterwards, and are not admitted to acute wards.

Number of Consulting and examination rooms required:

In determining these, average weekly attendance and Consultation time are employed. The calculations are as follows:

$$Y = \frac{M \times t}{S}$$

Where
Y = Critical number of sessions held
M = Average weekly attendance
t = Average consulting time in minutes
S = Total length of each session.

For an annual attendance of 513,000 patients, Weekly attendance will be 9865.4 - 10,000, an average consultation time of 5 minutes, and a session of 7 hours (8.00 a.m. to 3.00 p.m) = 420 minutes,

$$Y = \frac{10,000 \times 5}{420} = 119 \text{ Critical number of sessions}$$

Number of consulting rooms (c) therefore,

$$C = \frac{Y}{n} = \frac{119}{6} = 20 \text{ Consulting rooms}$$

Where n = number of sessions per week

Number of examination rooms are a maximum of 2 per Consulting room.

In this case, 1 examination room/consulting room is considered. Therefore examination rooms also = 20

MALE O.P.D (37 %)

Space	Number of rooms	Area of each (M^2)	Total area (M^2)
1. Waiting area	2	111	222
2. Appointments & information	1	30	30
3. Records	1	23.5	23.5
4. Drugs dispensary	1	40	40
5. Consulting rooms	8	13.5	108
6. Examination rooms	8	13.5	108
7. Staff toilets	2	1.5	3.0
8. Public toilets	6	1.5	9.0
9. Treatment rooms	2	35	70
10. Injection rooms	2	25	50
Total			664.5m^2

FEMALE & CHILDRENS' O.P.D. (63 %)

	Space	Number of rooms	Area of each (M^2)	Total area (M^2)
1.	Waiting area	3	111	333
2.	Appointments & information	1	30	30
3.	Records	1	23.5	23.5
4.	Drugs dispensary	1	40	40
5.	Consulting rooms	12	13.5	162
6.	Examination rooms	12	13.5	162
7.	Staff toilets	3	1.5	4.5
8.	Public toilets	10	1.5	15.0
9.	Treatment rooms	2		35
10.	Injection rooms	3		25
	Total			$915.5m^2$

Surgical suite

This is technically a therapeutic aid in which a team of Surgical Staff operates on a patient.

For a hospital of 500 beds of which 165 are surgical, assuming an 8 day average stay and 100 percent maximum occupancy, estimated number of annual operations

$$= \frac{165 \text{ beds} \times 100\% \text{ occupancy} \times 365 \text{ days}}{8 \text{ day average stay}} = 7528$$

These are then subdivided as follows:

1.	General Surgical	- 64%	=	4818
2.	Orthopaedics	- 14"	=	1054
3.	Eye & E.N.T.	- 10"	=	753
4.	Gynaecologic	- 6"	=	452
5.	Cystoscopic	- 6"	=	452
		100%		7528

Number of operating rooms:

1. For a hospital of 500 beds with 165 as Surgical, 4818 genral surgical cases per year, a full day schedule (8.00 a.m. to 3.00 p.m), 5½ days per week, number of general operating rooms required is:

$$N = \frac{4818 \text{ operations per year}}{286 \text{ Days} \times 3.5 \text{ operations per room per day}}$$

$$= 4.8 _ 5 \text{ operating rooms}$$

2. For 1054 Orthopaedic Surgical Cases, number of operating rooms required = 1
3. Eye & E.N.T. = 1 operating room
4. Gynaecologic operations = 1 operating room
5. Cystoscopic operations = 1 operating room

Total number of operating rooms = 5 +1+1+1 = 8

Recovery beds:

The requirement is 1½ to 2 beds per operating room. For 8 operating rooms, taking the lower value of 1½, number of beds = 1.5 x 8 = 12 recovery beds

	Space	Number of rooms	Area of each (m^2)	Total area (m^2)
1.	Entrance lobby	1	30	30
2.	Janitor's Closet & Stretcher bay	2	10	20
3.	Doctors' lockers	2	25	50
4.	Nurses' lockers	2	25	50
5.	Scrub - up	2	18	36
6.	Operating rooms	8	36	288
7.	Anaesthesia rooms	2	10.5	21
8.	Frozen sections labs	2	25	50
9.	Staff room	2	25	50
10.	Supervisors	2	15	30
11.	Instruments Storage	2	20	40
12.	Toilets (staff)	4	1.5	6.0
13.	Unsterile equipment store	2	20	40
14.	Recovery rooms (12 beds)	2	20	40
15.	Bulk items Storage	1	15	15
16.	Disposal room	1	9	9
	Total			775.0m^2

Obstetrical Delivery Suite

This is where pregnant women come at the on-set of labour to the time of delivery. There is also provision for post-portum recovery.

Number of delivery rooms:

For an average annual live births of 3643, number of delivery rooms required are

$$N = \frac{DLY}{365 \times DLRD}$$

Where N = Number of delivery rooms.

DLY= Deliveries per year (including Caesarian sections)

365= Days per year

DLRD= Deliveries per room per day

Taking an average DLRD of 5,

$$N = \frac{3643}{365 \times 5} = 1.98 = 2$$

Add 1 to off-set need for extra room therefore

$$N = 2+1 = 3$$

For each delivery room, provide 2 labour rooms

Labour rooms = 2 x 3 = 6

Delivery Suite

Accommodation requirements

Space		Number of rooms	Area of each(m^2)	Total Area (M?)
1.	Delivery rooms	3	*k9*	11*.?
2.	Labour rooms		20	100
3.	Toilets	'J	1.5	13.5
*k**	Doctors[l] lockers		25	25
5.	Nurses[1] lockers		25	25
6.	Staff lounge		^2	*kz*
7.	soiled holding		18	18
8.	Janitors[T] closet		6	6
9.	Scrub-up		15	15
10.	Sub-sterilizing		15	15
11.	AnaestViesia store		6	6
12.	Recovery room		27	27
13.	Sterile store		12	12
1lu	Sleeping rooms		21+	21+
15.	Fathers' room		8	8
	Total			l4.91.5m*

Nursery

This is where the new born are kept until they are fit for home care or until **their** mother is fit to go back home after parturition.

Number of bassinets

For an annual average of 3643 live births, 6% are considered premature (low birth weight of less than or equal to 2.5 Kg)

6% of 3643 = 0.06 x 3643 = 220 premature births

Full-term births, therefore, are 3643-220 = 3423

Dividing Full term births by 73 (the number of periods in one year resulting from an average 5 - day stay)

3423 - 73 = 47 full-term bassinets

Number of premature births divided by 18 (the number of periods in one year resulting from an average 20 - day stay)

220 - 18 = 12 premature bassinets

Total bassinets = 47 + 12 = 59 = 60

Nursery

Accommodation requirements

	Space	Number of rooms	Area of each(M^2)	Total Area (M^2)
1.	Nursery	3	56	168.0
2.	Nurses' Station	2	25	50.0
3.	Work space	2	20	4.0
	Total			$258.0M^2$

Pathology department

This department consists of the clinical laboratories where specimens from patients are investigated to establish disease or confirm it.

	Space	Number of rooms	Area of each (m^2)	Total Area (m^2)
1.	Waiting area	1	20	20
2.	Patholozist's office	1	13,5	13.5
3.	Venipuncture cubicle	1	10	10
4.	Specimen toilet	2	1.5	3.0
5.	Glass washing and Sterilization	1	12	12
6.	Storage room	1	10	10
7.	B.M.R & E.C.G Room	1	30	30
8.	E.E.G. room	1	25	25
9.	Haematology laboratory	1	30	30
10.	Chemical pathology lab.	1	30	30
11.	Histology laboratory	1	30	30
12.	Serology and Bacteriology	1	30	30
13.	Parasitology laboratory	1	30	30
14.	Technicians lockers	1	25	25
15.	Technicians toilets	4	1.5	6.0
16.	Janitor's Closet	1	6	6
	Total			312.0m^2

Emergency unit

This provides 24 - hour, 365 days per year service for accident and emergency cases which may occur in any place

Number of Emergency beds.

In determining this, the general rule is that there should be a minimum of 4 beds in two rooms (for seperation of Males and Females) plus an additional two for each 100 beds of the hospital over 100.

Therefore in this hospital of 500 beds, number of beds

= 4 + (2 x 4) = 4 + 8 = 12 observation beds

These are distributed equally for both sexes (6 each)

	Space	Number of rooms	Area of each (m^2)	Total area (m^2)
1.	Reception/Waiting	1	40	40
2.	Ambulance parking	2	11.5	23
3.	Doctor's office	1	13.5	13.5
4.	Nurse's office	1	13.5	13.5
5.	Treatment room	1	16	16
6.	Observation rooms	2	25	50
7.	Utility rooms	2	15	30
8.	Operating room	1	36	36
9	Janitor's Closet	1	6	6
10.	Scrub-up	1	15	15
11.	Clean-up	1	15	15
12.	Staff toilet	2	1.5	3.0
13.	Patients toilets	4	1.5	6.0
	Total			282.0m^2

Radiology Department

This department is mainly a diagnostic department which utilizes the penetrating power of X - rays to provide information of body organs.

Number of diagnostic rooms

To determine the number of radio-diagnostic rooms, Todd Wheeler provides a formula for that in his book - Hospital design and function.

$$N = \frac{DTY}{DW \times WKS \times HD \times DTRH}$$

where

N = Number of radiographic rooms

DTY = X - ray determinations per year

DW = Working days per week

WKS = Weeks per year

HD = Hours in a days

DTRH = Determinations per room per hour

Maximum determinations per day = 50

Therefore determinations per year = 14,300

Length of determinations - 15 to 20 minutes

Working days = 5½

Hours per day = 7 (i.e. 8. a.m to 3.00 p.m)

Weeks per Year = 52

$$N = \frac{14300}{5.5 \times 52 \times 7} = 2.4 = \underline{\underline{3}}$$

Assigning 3 Cubicles per room,

number of Cubicles = 3 x 3 = 9 = 10

Accommodation requirements:

	Space	Number of rooms	Area of each (m^2)	Total area (m^2)
1.	Reception	1	16	16
2.	Patients' Waiting	1	50	50
3.	Patients' toilets	2	1.5	3.0
4.	Stretcher waiting	1	9	9
5.	Dressing Cubicles	11	1.5	16.5
6.	W.C. for barium patients	3	1.5	4.5
7.	Barium Kitchen	1	5	5
8.	Radio - diagnostic rooms	3	25	75
9.	Dark room	1	15	15
10.	Doctor's Viewing	1	15	15
11.	Sorting and distribution	1	15	15
12.	Radiologist's office	1	20	20
13.	General Store	1	20	20
14.	Staff toilets	2	1.5	3.0
15.	Film store	1	7.5	7.5
16.	Janitor's Closet	1	10	10

Physical Medicine department

This department consists of two sections:

1 Physiotherapy

This is a form of physical exercises which utilizes heat, water electricity, massage etc, to help a patient regain motor control of a disabled member of his body.

Accommodation requirements

Space	Number of rooms	Area of each (m^2)	Total area (m^2)
1. Reception	1	25	25
2. Waiting area	1	40	40
3. Stretcher Storage	1	9	9
4. Examination room	1	15	15
5. Offices	2	15	15
6. Locker rooms (Changing)	2	21	42
7. Treatment Cubicles	4	9	36
8. Hydro - therapy room	1	150	150
9. Exercise room	1	150	150
10. Store	1	12	12
11. Patients' toilets	4	1.5	6.0
Total:			

2. Occupational therapy

This is the second part of the physical medicine department. It seeks to assist the patient in putting his regained physical ability to some economic or social use.

Accommodation requirements

	Space	Number of room	Area of each (m^2)	Total area (m^2)
1.	Reception/Waiting	1	50	50
2.	Records room	1	9	9
3.	Offices	2	12	24
4.	Store	1	12	12
5.	Staff toilets	4	1.5	9.0
6.	Patient's toilets	4	1.5	9.0
7.	Patients shower	4	1.5	9.0
8.	Main therapy room	1	540	540
9.	Wood Workshop	1	100	100
10.	Workshop store	1	45	45
11.	General store	1	45	45
12.	Staff lockers	1	25	25
13.	Out-door therapy	1	750	750
	Total:			1627.0m^2

Pharmacy department

This department is concerned with drugs and medications and consists of two parts, that is compounding section and dispensing section.

	Space	Number of rooms	Area of each (m^2)	Total area (m^2)
1.	Waiting and distribution	2	30	60
2.	General Storage	1	25	25
3.	Pharmacist's office	1	15	15
4.	Bulk Chemicals Store	1	30	30
5.	Storage for Flammables	1	10	10
6.	Storage for narcotics	1	10	10
7.	Compounding area	1	50	50
	Total			195.0m^2

Supporting Services department

1. Kitchen and Catering Facilities:

This Unit is the Meals supply centre where meals for the patients are prepared.

Since the hospital will accommodate 500 patients at 100 percent occupancy, the kitchen serving three times in a day, it should then be capable of serving 1500 meals every day.

Accommodation requirements:

	Space	Number of rooms	Area of each (m^2)	Total area (m^2)
A.	Kitchen Stores	-	-	-
	1. Cold store (Meat)	1	20	20
	2. Vegetable Cold store	1	20	20
	3. Diary products	1	20	20
	4. General Store	1	25	25
	5. Janitor's Closet	1	6	6
B.	Preparation area	-	-	-
	1. Meat and fish	1	20	20
	2. Pastry and sweet	1	20	20
	3. Vegetable	1	20	20
	4. Diet	1	20	20
C.	Cooking area	-	-	-
	1. Cooking space	1	80	80
	2. Trolleys parking	1	20	20
	3. Trolleys washing	1	20	20
D.	Staff Facilities	-	-	-
	1. Offices	2	15	30
	2. Locker room(Changing)	2	25	50
	3. Toilets	6	1.5	9
	Total:			380.0m^2

2. Laundry and housekeeping unit

This Unit receives for cleaning all garments and hospital clothes from the nursing units and other hospital departments. The housekeeping section concerns itself with the general cleaning of hospital buildings

Accommodation requirements:

	Space	Number of rooms	Area of each (M^2)	Total area (M^2)
1.	Collection and sorting	1	25	25
2.	Main workroom and washing area	1	200	200
3.	Storage for supplies	1	25	25
4.	Mending room	1	20	20
5.	Clean Storage	1	20	20
6.	Staff lockers	1	25	25
7.	Staff toilets	3	1.5	4.5
8.	Staff rest room	1	25	25
9.	Housekeeper's office	1	15	15
10.	Clerks' office	1	20	20
11.	Head of Unit's office	1	15	15
12.	Distribution space	1	25	25
	Total			$299.5m^2$

3. Central General Stores

This store all bulk items purchased for the hospital's use. These include food items, stationaries, equipment etc. Items are checked and recorded before being stored or passed to appropriate departments for use.

Accommodation requirements:

	Space	Number of rooms	Area of each (M^2)	Total area (M^2)
1.	Receiving & distribu-tion	1	75	75
2.	Clerks' office	1	25	25
3.	Bulk food store	1	50	50
4.	Linen store		50	50
5.	Volatile liquids		25	25
6.	Used equipment	1	175	175
7.	General stores	2	150	300
	Total:			700.0m^2

4. Central Sterile Supplies

This Unit receives for Sterilization, all hospital gowns and equipments used in the Surgical and delivery Suites as well as the emergency unit; and all hospital departments requiring its service.

Accommodation requirements:

	Space	Number of rooms	Area of each (m^2)	Total area (m^2)
1.	Receiving & distribution	1	75	75
2.	Wash-up space	1	25	25
3.	Gloves & instruments washing	1	25	25
4.	Clean work area	1	100	100
5.	Sterile Store	1	50	50
6.	Non-sterile Store	1	40	40
7.	Supervisor's office	1	16	16
	Total			331.0m^2

5. Maintenance Unit

This Unit is responsible for maintaining the hospital buildings and other equipment e.g. plumbing, electrical and mechanical works, etc.

Accommodation requirements

	Space	Number of rooms	Area of each (m^2)	Total area (m^2)
1.	Head's office	1	15	15
2.	Clerks	1	15	15
3.	Carpenters	1	20	20
4.	Plumbers	1	30	30
5.	Masons	1	30	30
6.	Painters	1	30	30
7.	Electricians	1	30	30
8.	Telephone exchange	1	20	20
9.	Staff rest room	1	16	16
10.	Staff toilets	4	1.5	6.0
	Total:			112.0m^2

SUMMARY

The General Hospital Bauchi being grossly underequiped and retaining some structures that are more or less obsolete, needs some life to be injected into it so that it performs the function of a General Hospital for which it was designed.

This design has achieved more or less that by taking up a redevelopment programme of the hospital.

The author (or designer in this case) started by discussing ways of salvaging and modernising existing hospital structures. Of these structures, some are physically obsolete while others are functionally obsolete. Those that are physically obsolete had had to be efaced and in their stead, new structures erected. Those that are not completely obsolete, that is to say they are functionally obsolate, had had to be altered in some ways so that they effectively render their services.

The author then moved to discuss as a whole, the existing situation of the hospital structures which fall into groups mentioned above.

Documentation of hospital design literature was delved into elaborately to guide the author in tackling the challenges he/~~is~~ was faced with.

The hospital complex should normally consist of various departments each being complimentary to the rest. The most important are the nursing units where the patients requiring constanst supervison are accommodated. This becomes the patient's home during his stay in the hospital so as much as possible it should be made to resemble the home.

Next follows the diagnostic and treatment facilities which include the surgical suite for operating on the patients, the X - ray and laboratories both of which are diagnostic while the surgical suite is atreatment facility. Others are the pharmacy, the physical medicine, the out-patient department which includes the emergency unit.

The service departments give suplies to the rest of the departments. These include the kitchen, laundry, general stores and sterile supplies. Though these departments do not ~~the~~ require the use of a professional, yet they are so vital that without them, the professional himself cannot carry out his work. Thse services are sometimes reffered to as supporting services.

Bed need for the patients had to be determined and that served as a basis for determination of facilities required by each department..

Case studies of existing hospitals were undertaken to serve also as a guide in coming up with this work.

Future expansion was also taken into consideration since the site is big enough to provide that. This will take place northward within the site.

CONCLUSION

Having undertaken this work, the author has come to know a lot about hospital as an institution and has understood the complexes which work hand in hand to give a hospital service to patients.

This work is not a new design as the topic indicates so despite the authors efforts to improve on the situation, some aspects had had to be left as they/~~were~~ lest a new hospital be designed which defeats the aim of the thesis.

The hospital has been replanned as the parvilion type of design where all buildings are of single story and assume a horizontal organic growth.

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