RURAL DISTRICT HOSPITAL NYAMIRA — KISII

M. ARCH. THESIS
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UNIV. OF NAIROBI
OIGO S. N.

DECLARATION

This Thesis is my original work and has not been presented for a degree in any other University.

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This Thesis is submitted as part of the University Examination for the Degree of Master of Architecture.

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I wish to thank the Ministry of Works health group and M/S Cob Archer and Partners for their invaluable advice on medical buildings in various parts of the country and their limitations in terms of planning and layout.

Finally, I would like to thank the Secretary, who helped with the typing, and others who assisted me in any way during the production of this work.

S.N.O.
June, 1976.

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1.1 ABSTRACT

From my study of a rural District Hospital at Nyamira, an idea was established in my mind as a system which handles various categories of people ranging from patients, patients' escort, visitors, emergencies, hospital staff and hospital service staff.

For this reason, it functions as an educational centre, curative centre, and a service centre for health institutions in its catchment area. It handles 600 to 900 persons per day. Most of these people end up in the out-patient department which serves as a filter clinic. The remaining few are referred to diagnostic and treatment departments whereas those who need hospital nursing are admitted to the in-patient department.

The main objective was to keep the layout of units as compact as possible in order to reduce the time spent by both patients and staff walking from one section to another. In this case the out-patient was sited near the main entrance to the hospital for ease of access. The nursing units could not be compacted so much because this would involve air-conditioning which is expensive to instal and maintain. Instead courtyards between units for ventilation and light have been provided.

The degree of compaction has been achieved by placing those departments with heavy inter-traffic between them nearer to each other e.g. surgical units, maternity are close to operation theatre. Units with similar functions have also been grouped together e.g. surgical wards, medical wards.

The internal hospital circulation does not allow separate flows, but staff and central supplies are concentrated onto the main communication corrodor which includes engineering services as well.

The site slope of 5° has limited the spread of my buildings up and down the slope, but on the other hand it has enabled me to have all my service departments under the wards. The nursing units are on that same level as the x-ray and operation theatre for ease of movement.

This hospital is located in an agricultural area with quite a good amount of rain and solar radiation. The materials and finishes should be able to stand rough treatment. The floors should be washed at least once a day in order to maintain the standard of cleaniness.

Finally, the compaction of a rural district hospital does not necessarily mean pushing buildings close to each other but the location of departments in such a way that those with higher inter-traffic are close to each other. By so doing you have achieved the same thing you could have achieved and that is reduction of time for movement.

1.1 INTRODUCTION

This Thesis involves the study of the function of a rural district hospital at Kisii District in Nyanza Province. On the basis of these conclusions are drawn and focus is made on the functional requirements of a rural District Hospital. Most of the information was obtained from written manuals and by own observations in two district hospitals; one in the area where the proposed one is going to be located, i.e. Kisii Hospital and the other near Nairobi, i.e. Thika District Hospital. The two hospitals handle about 19,00 to 24,000 patients per month including both out-patients and in-patients. Generally, the bed capacity ranges from 200 to 300.

In this report, the type, number and size of individual facilities was based upon the functional requirements of each unit and its relationship to the total complex, but generally, a rural district hospital will be composed of the following departments:-

Out-patient Department

The department deals with curative care as well as preventive care. It serves the surrounding population as well as on health institutions in its catchment area. Those patients referred to it for further examination and treatment from the surrounding insitutions add up the work load to this department. It generally serves about 600 to 900 patients per day. It deals with all sorts of patients ranging from medical, surgical, gynaecological, dental and maternal/child-care clinics and emergency cases. The objectives of this depaerment is to undertake medical examination and consultations with the aim of advising and treating the out-patients.

In-patient Department

The objective of this department is to keep the patients in conditions which will enable diagnosis and treatment to be carried out with minimum distress or pain and with the maximam economy, comfort and speed. The grearest part of the patient's stay in the hospital, sometime all of his stay is spent in a bed or a bedroom. Most things (e.g. bathing, feeding etc.) which happen in this room or bed are things which happen to him in his own bedroom at home. Hence, the objectives of ward design in the In-patient department are to provide facilities for proper care and comfort of In-patients including proper supervision of pateints by nursing staff, control of incidence and/or spread of

infection; control of nuisance from noise, smell, light and heat; efficient use of the time, man-power, supplies, equipment and space available. This department should cater for medical and surgical cases, maternity cases, children's care gynaecological cases, isolation and other purposes such as orthopaedic and burns cases and amenity ward.

Diagnotic and Treatment Department

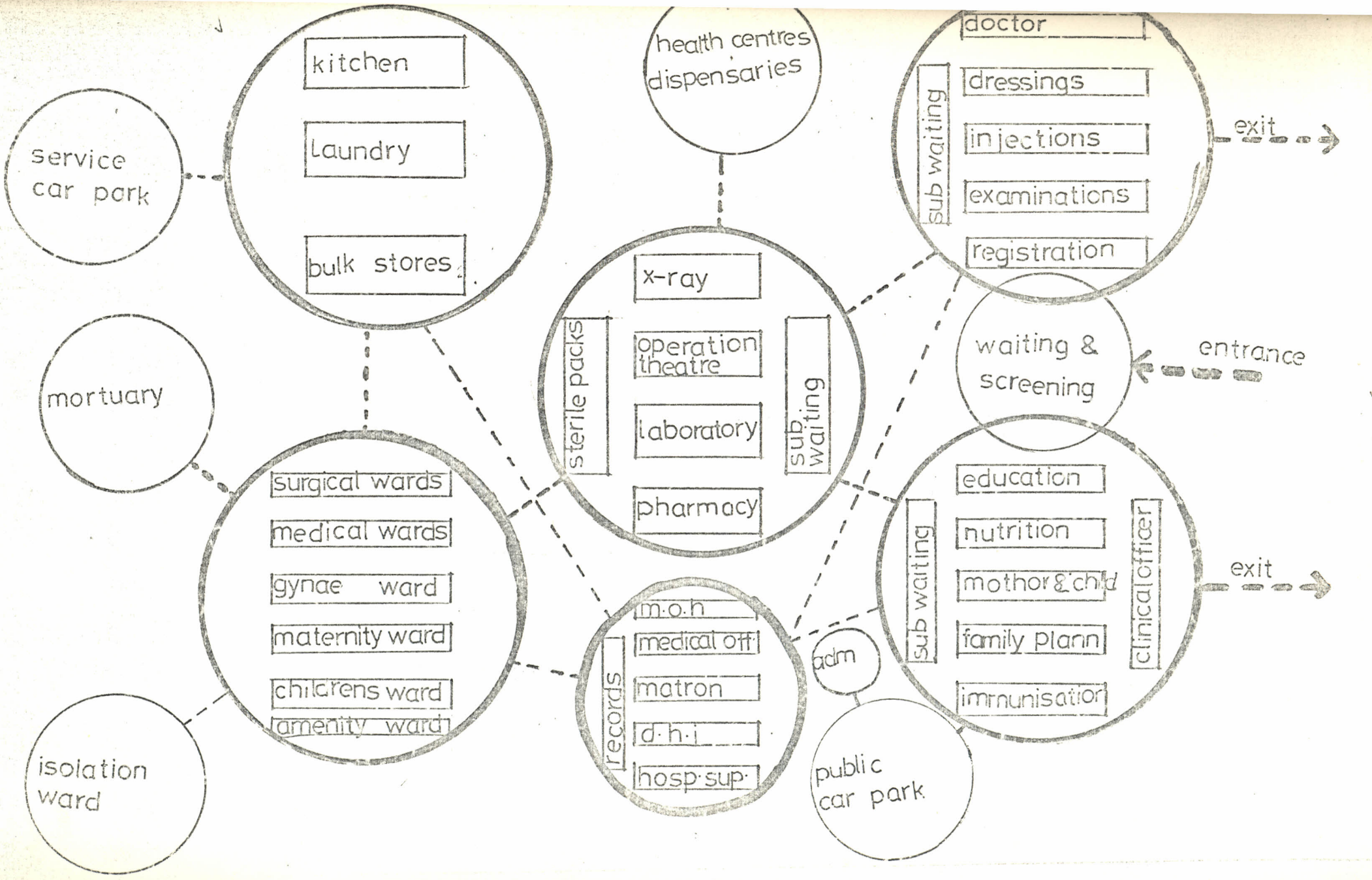
This department of the rural district hospital includes units for X-ray, Laboratory and operation theatres, sterilization, and delivery unit. These facilities are used by both the out-patient and in-patient departments. Therefore they should be readily accessible to the two departments. The above mentioned diagnostic and treatment facilities should be able to cope with all types of hospital cases and those from other health insitutions from its catchment area of 300,000 people. They form the core of the hospital as a whole. These facilities are not available at any other health insitutions in its catchment area.

CENTRAL SUPPLY DEPARTMENT

This department includes an administration, pharmacy unit, Kitchen, laundry, bulk stores, boiler room, and generator house, and mortuary. Most of these facilities will require vehicular access. It is also essential that the position of these facilities should permit delivery of foodstuffs, linen, medicines, hot water etc. to various departments with ease.

ADMINISTRATION

Although considered within the central supply department, the administration department is the co-ordinating organ for various hospital activities. Through its admitting function, it controls the influx of patients and their disposition through the entire system. It also controls hospital staff and service employees, visitors to the hospital and settlement of matters concerning hospital with the medical officer of health of a district.


service car park
kitchen
laundry
bulk stores
health centres dispensaries
doctor
sub waiting
dressings
injections
examinations
registration
exit
x-ray
sterile packs
operation theatre
laboratory
sub waiting
pharmacy
waiting & screening
entrance
mortuary
surgical wards
medical wards
gynae ward
maternity ward
childrens ward
amenity ward
records
m.o.h
medical off
matron
d.h.i
hosp.sup.
adm
education
sub waiting
nutrition
mothor & child
family plann
immunisation
clinical officer
exit
isolation ward
public car park

1.2 BACKGROUND The rural district hospital at Nyamira, Northern part of Kisii District.

Kisii is a compact physical unit consisting a plateau of 2000 to 2200 metres above sea level which is an erosion surface residual upon the encircling sub-miocene peneplain about one thousand feet lower.

Rainfall is higher than the surrounding plain and averages between 60 to 80 inches a year. On this island site are the Kisii people. Conditions are most favourable for agriculture but both physical features and surrounding tribal areas have limited the possibilities of expansion and population density is the second highest of any sub-region in Kenya, giving less than an acre of land per person.

The transportation system is low because of bad roads or lack of transport means so the simplest form of health for small communities is deemed necessary. In this basic permanenthealth facility, a person of the community with elementary knowledge of nursing is able to render effective first aid treatment and sometimes delivery assistance

There are two hospitals; one Government and one Mission hospital. The two hospitals have 400 beds which serve a population of 833,00 people. The location of both in the Southern part of the district has dictated the location

of a third hospital in the Northern part of the district. The hospital in the Northern part will have up to 300 beds eventually.

There are 5 health centres and 29 dispensaries serving an area of 572 sq. miles and a total population of 833,000 people. That gives us a rural density of 1100 persons per squire mile evenly distributed throughout the district with a greater concentration on the Northern part of the district where Nyamira Hospital is going to come up. The distribution of health centres and dispensaries in relation to the existing and proposed hospital are shown on the map in the appendix. In comparison to Kenya's population, Kisii's rural population is 6% and urban population is 0.9%. From the above percentages is justified by the location of medical facility in a rural setting rather than in urban centres.

DISEASE PATTERNS

The most common diseases are:
- Malaria
- Brochitis
- Skin Ulcer
- Common cold
- Diarrhoea
- Scabies
- Pneumonia
- Stomachache
- Conjunctivis
- Tuberclosis

It is not rare in a society based entirely on agricultural production to find emergencies of people who have cut their body while working with implements in their farms. So the hospital should be equiped with materials for stitching fresh cuts and wounds and simple fractures.

Climate

The site lies between 200 to 2200 metres in altitude. In climatic zones it is classified as the highland zone. The highland zone has a most pleasant climate, where extremes of temperatures rarely, it ever occur. The maximum mean temperature is 24°C and minimum mean temperature is 11.1°C and mean range is 12.9°C. The maximum humidity at 15.00 hours is 53%. The amount of rain is 145 mm per annum. High relative humidities are rare during the day but are the norm at night. Heavy dews are often experienced. The rainfall is mostly concentrated into two seasons, mid-March to May (long rains) and November to mid-December (short rains). The intensity of rainfall can be high, so giving rise to "flash" flooding, but heavy rain is seldon continuous over long periods. Dry intervals occur during the rainy seasons and sunny spells are often experinced on rain days.

1.2 Radiation

Radiation is the most significant climatic factor in this zone from the point of view of human comfort and it is the strong solar radiation during the day and the rapid out-going radiation at night that differentiate the equatorial highland climate of this zone from the climates of temperate regions. The sun, however, is too strong at mid-day to permit people to sit out comfortably in the open. In May to September, it can be chilly, this being due to the increased cloudiness and reduced radiation and 2°C to 5°C drop in air temperaturs. Nights are cool to cold throughout the year. Mosquitoes are rarely troublesome.

Highlands Zone

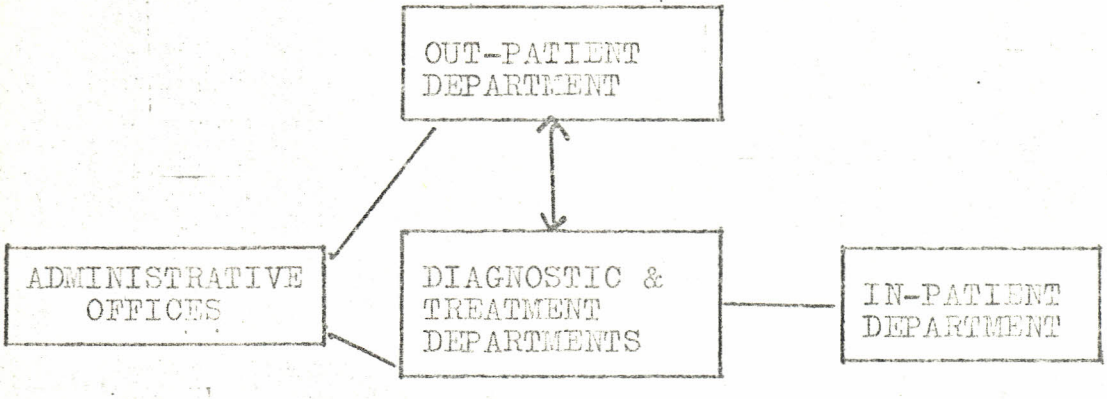
The following main factors should be considered regarding climate:-

Site Planning	Building orientation in this zone is more flexible, but adherence to an east-west axis is preferable.
	A compact layout is easier to keep warm.
	Landscaping with shady trees is beneficial in Highland Zone.
Ventilation	Cross-ventilation is not necessary, provided a heavy structure is used and solar protection provided.
	Permanent ventilation should be provided at a rate of ½% of floor area.
Structure and Materials	Heavy connection of both internal and external walls is desirable to moderate the diurnal temperature range.
	Heavy or well-insulated light-weight roof structure are appropriate.
Openings	Glazed openings approximately 25% of area of the principal elevations are appropriate.
	Solar protection to windows is required.

1.3 PLANNING CRITERIA

This section deals with a sequence of diagrams showing the functional relationships that exist within a hospital and later how these functions were translated into a building form for Nyamira Rural District Hospital.

In the case of the hospital, one can think of buildings in terms of those belonging to a necleus of medical departments whose relationship to one another is critical, and the periphery of supporting buildings which serve the medical functions, the precise location of which is less critical. Even so the design of the necleus should not be carried too far without clear idea of the distribution of the peripheral elements on the site.

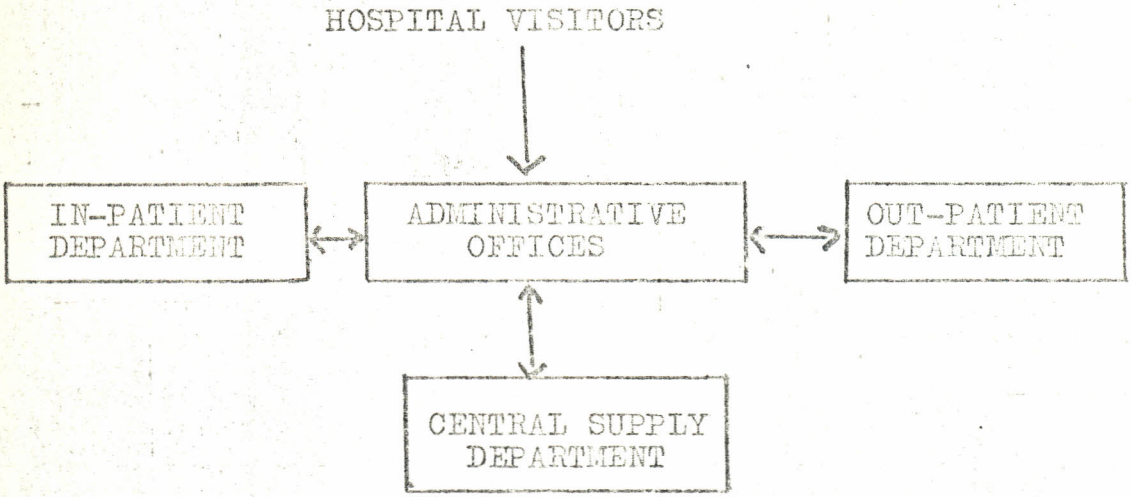


THE NUCLEUS DIAGRAM

The next step is to break each department down into its constitment parts in the nucleus.

ADMINISTRATION

This department contains offices for the administrative staff of the hospital, committee room etc. It also is the receiving point for visitors and should have simple access to all departments. The admission of patients takes place in this section.



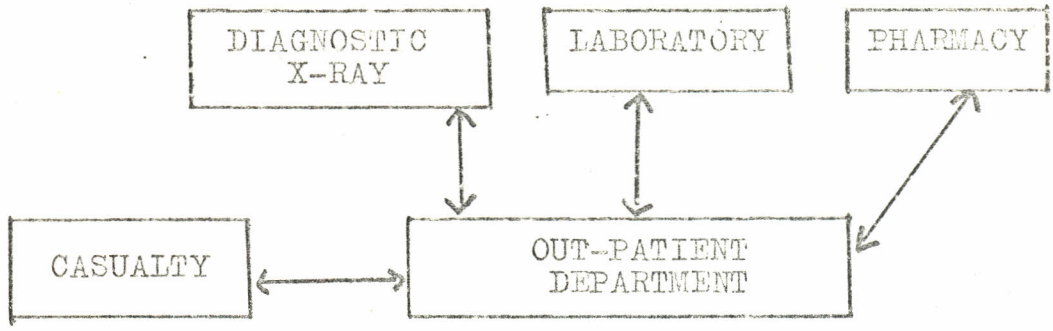
OUT-PATIENT DEPARTMENT

This department carries out curative and preventive care. The patients are referred to this department from various health institutions in its catchment area. The investigation and treatment of out-patients can be undertaken either within the department or in the related diagnostic and treatment departments such as X-ray, laboratory or operation theatre.

A current trend is the development of a day patient service to enable some of the more complex diagnostic and treatment procedures to be undertaken in the out-patient department.

There should be one entry point to the out-patient department. The out-patient department should be closely related to the specialist diagnostic and treatment such as x-ray, laboratory and operation theatre; and it is of advantage for orthopaedic and fracture clinics to be included in the casualty department.

The medical records and dispensary is also included in the out-patient department.



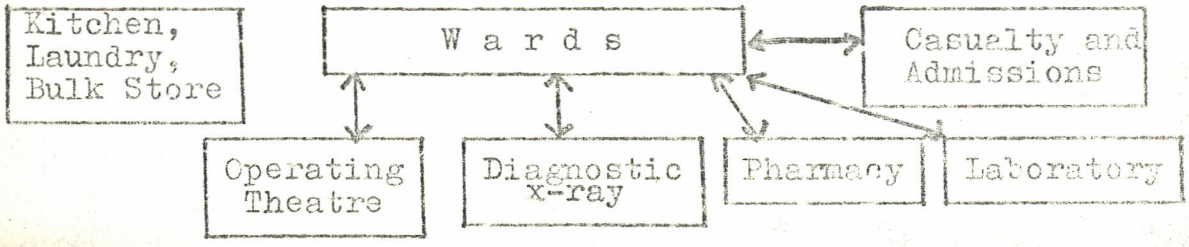
OUT-PATIENT RELATIONSHIP DIAGRAM

IN-PATIENT DEPARTMENT

The patients are admitted into the in-patient department in two ways; as emergencies, through the casualty and admission departments; or by pre-arranged admission from the waiting list.

The rural district hospital will contain wards for the medical, surgical specialities including gynaecology. For most part, wards will be of standard pattern, but wards for maternity, children, amenity and isolation require special planning.

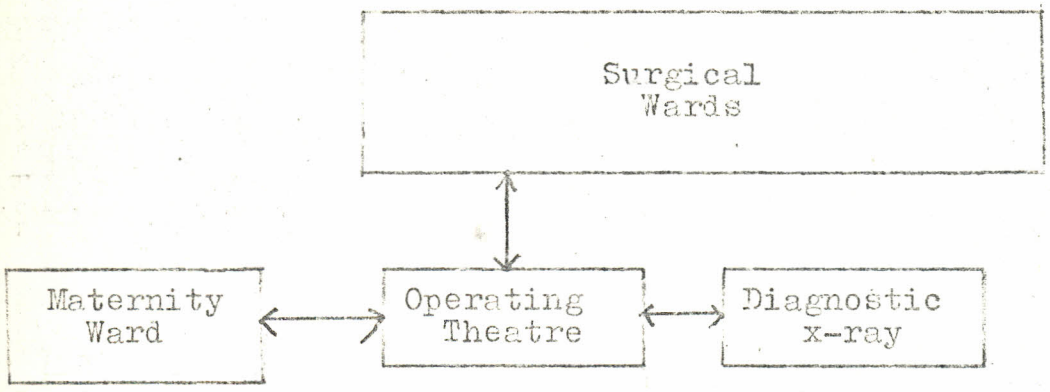
The departments to which patient access should be direct are operating theatres, and x-ray. The laboratory and pharmacy departments should also be readily accessible to the wards for convenience of staff. Deliverys of patients' meals and other supplies will be made to the wards from the kitchen, central sterilization, bulk store and clean linen from laundry.



IN-PATIENT DEPARTMENT DIAGRAM

DIAGNOSTIC AND TREATMENT DEPARTMENT AND OPERATION THEATRES

Operation theatres should be planned with easy access to surgical wards, sterile supply department, maternity ward, x-ray and casualty section for complicated operations.

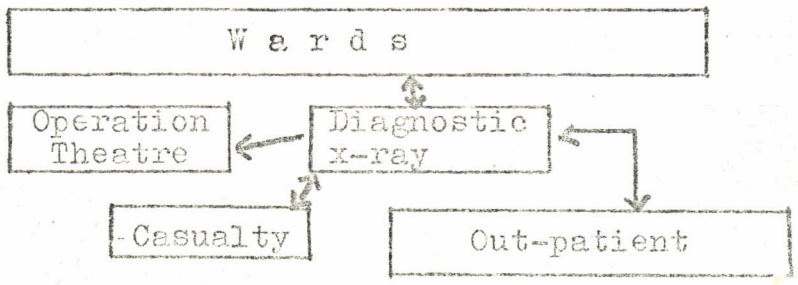


DIAGNOSTIC X-RAY DEPARTMENT

Nearly 50% of diagnostic x-ray work aries from the out-patient department, 30% from in-patient department, 11% from casualty and 9% from surrounding health institutions.

Since one of the main functions of the out-patient department is a diagnostic centre and as this makes heavy demands on the x-ray facilities, close association between the diagnostic x-ray department and out-patient department is most desirable.

Those patients moving to and from the department in large numbers require easily routed journey. Ward patients will generally be accompaned, x-rayed by appointment and reported on at leisure, so physical proximity is less essential - provided easy rapid means are available for transport of in-patients, who are often not ambulant to the x-ray department.

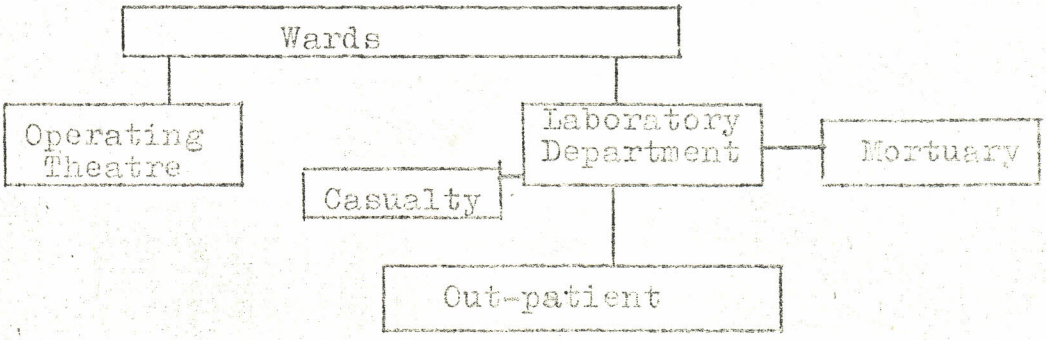


Diagnostic x-ray department relationship diagram.

LABORATORY DEPARTMENT

Laboratory department is a division of medical science which deals with the investigation of causes and manifestations of diseases by laboratory methods using chemical, microscopic, biological and bacteriology methods. Laboratory examinations involve the use of specimens taken from living and dead patients. It is by interpretation of his own clinical findings, in the light of the pathologist's report, after examination of these specimens, that the physician is able to make or confirm on diagnosis and control the treatment. The work is divided into five sub-sections; morbid anatomy, histology, haematology, chemical pathology, microbilogy, dealing respectively with macroscopic and microscopic examinations of diseased tissues, the examination of blood, the chemistry of blood and body fluids or excreta, and the culture and microscopy of micro-organisms (bacteria, protozoa, fungi, viruses). The department is in effect a suite of laboratories providing specialized conditions under which this work may be carried out.

This department will be used extensively in relation to both in-and-out-patient departments and by the patients from other health institutions in its catchment area, and while it is necessary to make arrangements for the attendance of out-patients on a limited scale (e.g. for collection of specimens of blood), there will be less patient traffic to this department than the x-ray department. Staff from the department will have to visit the wards frequently to take specimens. There is also direct relationship with the mortuary where post-mortem work is carried out.



CENTRAL SUPPLY DEPARTMENT

KITCHEN

The kitchen supplies all meals throughout the hospital. Patient's meals are usually distributed by means of heated trolleys. Direct and easy access is required from the main kitchen to all wards.

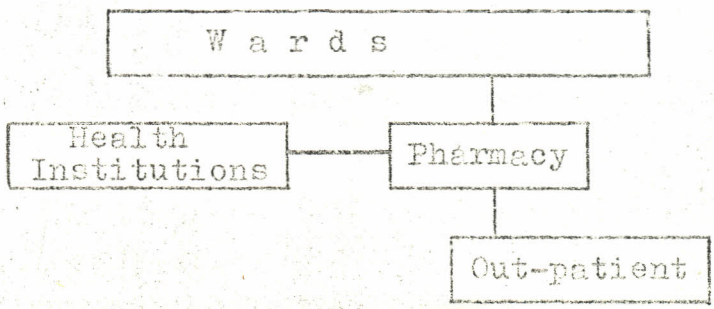
It is preferable that the kitchen, bulk store departments should be sited to ensure that noise and odours are not objectionable to other departments.

BULK STORE

This department receives, stores and issues bulk items which can with advantage be stored centrally, such as furniture, and house keeping supplies such as pharmaceuticals. Within the general storage area, it is usual to provide a central linen storage area - it is usual to include a new linen store.

PHARMACY

This is required for the casualty drugs and other medical supplies and for preparations of medicines for other health institutions served by the hospital. Items are supplied to the wards in large numbers. It should be accessible to the wards and to the out-patient dispensary. The reception of bulk supplies from vans and lorries must be considered.



LAUNDRY

It will deal with the reception of soiled, infected and foul hospital linen, which is disinfected, washed, dried, ironed, repaired and returned to the in-patient department and out-patient department. The laundry department is the major heat user, should be sited near the boiler plant. It should have easy access to the roads of the hospital.

Before going further to consider each of the above functions in detail, I would like to touch something concerning hospital traffic problems. The first question is "who travels in a hospital?" Because of fixed location of the in-patients, hospital personnel seems to be endlessly in transit. Because few workers are performing useful labour when travelling, another goal of good planning must be to eliminate the need for travel and to shorten travel distances.

Mobility becomes a major preoccupation of the planner as he decides on the shape of the buildings and the placements of its major components.

The lifts for vertical circulation are not used in rural hospitals because of these reasons; they are imported therefore expensive, roads to rural areas are bad for transportation of parts and spare parts, installation and maintenance problems because of lack of skilled man-power, spare parts are difficult to obtain and people in rural areas will not use them because they are not used to lifts.

2.0 THE OUT-PATIENT DEPARTMENT

The out-patient department provides primary health care for patients in the immediate neighbourhood of the hospital and for patients referred to it for special examination and treatment from health centres and dispensaries within its catchment area of 300,000 people.

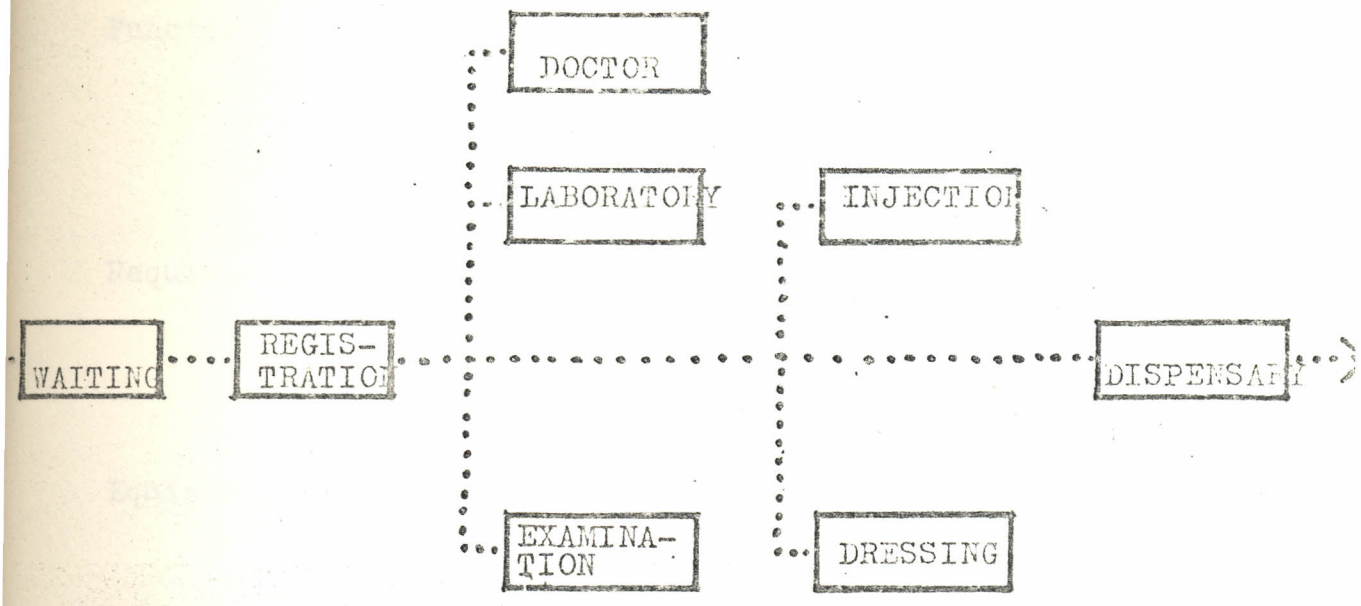
The preventive section deals with mother and child welfare which undertakes consultations and examination in multi-purpose rooms with the aim of advising mothers and their under-fives.

This section also undertakes to serve as an educationa centre for family planning, nutrition lessons in addition to providing preventive treatment e.g immunization of children and ante-natal services.

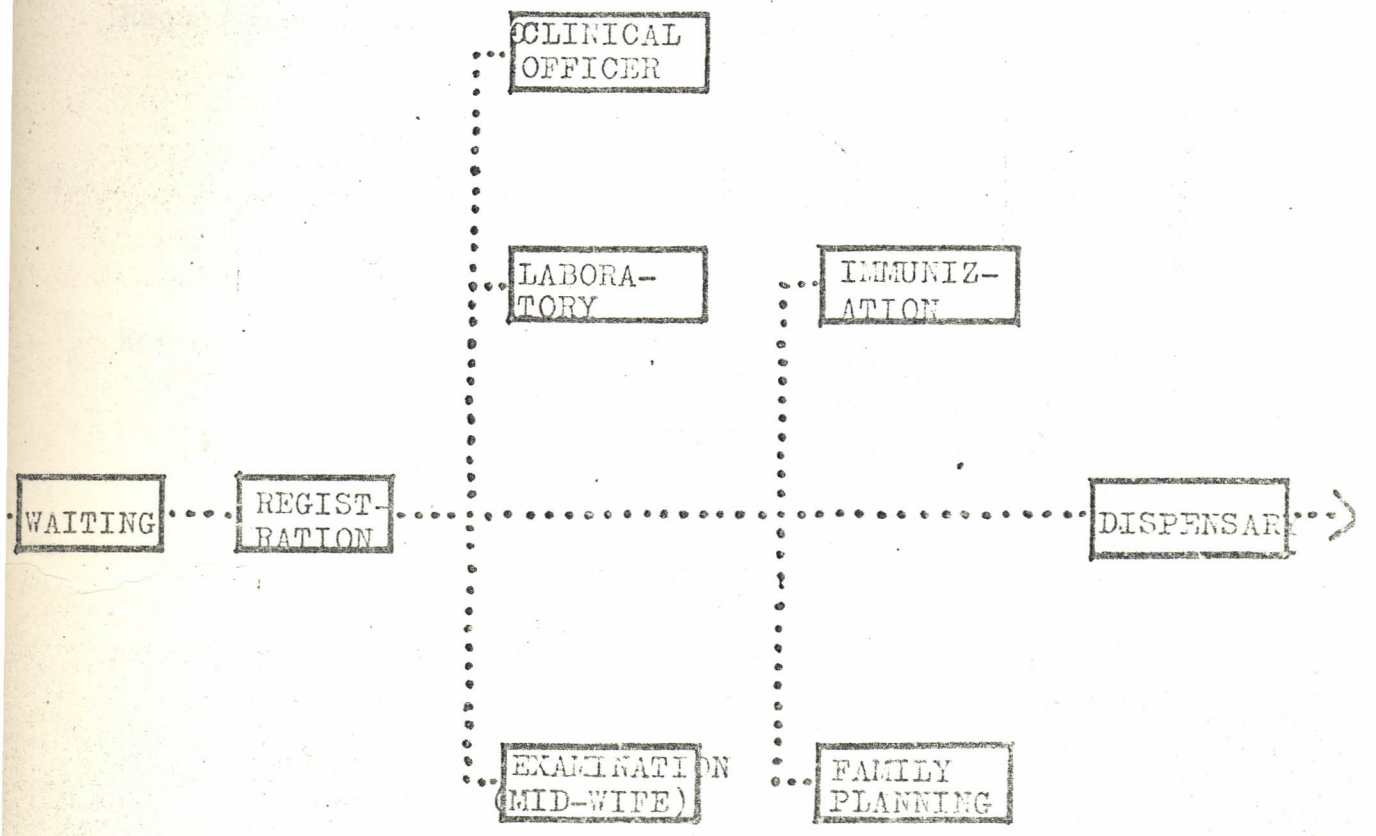
The rooms need natural daylight in addition to daylight artificial lighting is required. The rooms especially waiting spaces need to be ventilated properly. Waiting spaces are covered to avoid adverse weather conditions. For security purposes, all doors are lockable.

The curative section of the out -patient deals with medical surgical, gynaecological and dental cases.

CURATIVE SECTION



PREVENTIVE SECTION



REGISTRATION OFFICE

This section deals with various rooms and their functions in detail.

Function

To take data down from patients.
To direct patients to various sections according to their needs.
To keep patients' records.

Requirements

Counter
Shelves for keeping files
Visual contact with waiting area and arriving patients.

Equipment

Desk or counter
Stools and chairs
Benches for patients.
Files for registration.

WAITING AREAS

Fuction

Two waiting spaces; one for the curative side and the other for preventative side.

Requirements

Open arrangement.
A queing system according to the the arrival order of patients.
Toilets and washing facilities.
No visual contact with the examination and treatment rooms

Equipment

Comfortable fixed benches for 140 patients in curative side.
Comfortable fixed benches for 120 patients in the preventive side.

Educational aids in both waiting spaces.
Table or counter for demonstration models in the preventive side.

EXAMINATION ROOM

Functions

For new cases to diagnose and prescribe treatment.
For re-attendances to decide on continued treatment (mostly injections or dressings).
To record this information on the patient's card.
To select patients to be referred to the doctor for further examination.
Further diagnosis - e.g. laboratory or X-ray.

Requirements

Storage places.
Sink.
Examination couch.

Equipment

Table and two chairs.
Cubicle with examination couch
Clothes hanger.
Sink.

Comments

The room is designed for one patient
The room will have installation or a manual signal system (for calling patients).

DRESSING ROOM:

Fuctions

To apply dressings, ointments, eye and ear drops.

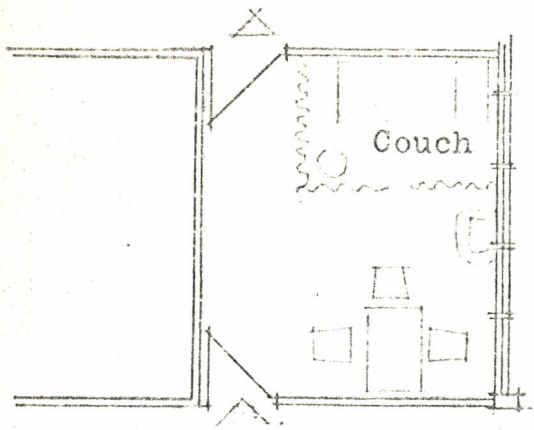
To keep record of treatment given which the clerk collects.
To clean wounds.
To take emergency cases.

Requirements

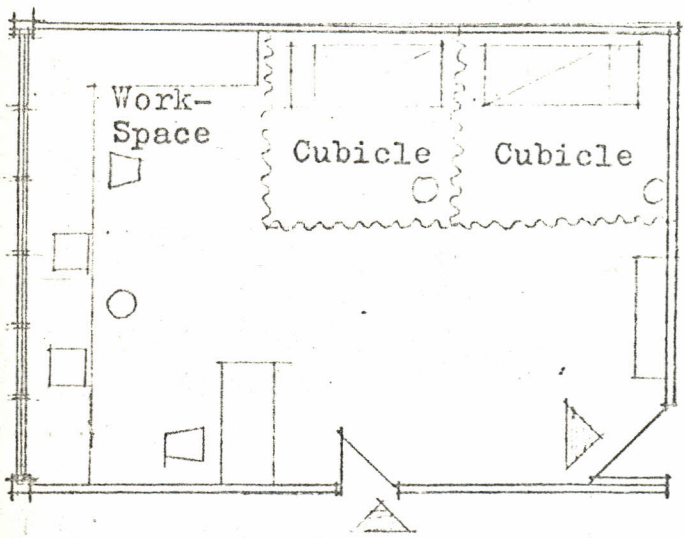
Drainboard and work room
linen trolley.
Dirty linen containers.

Equipment

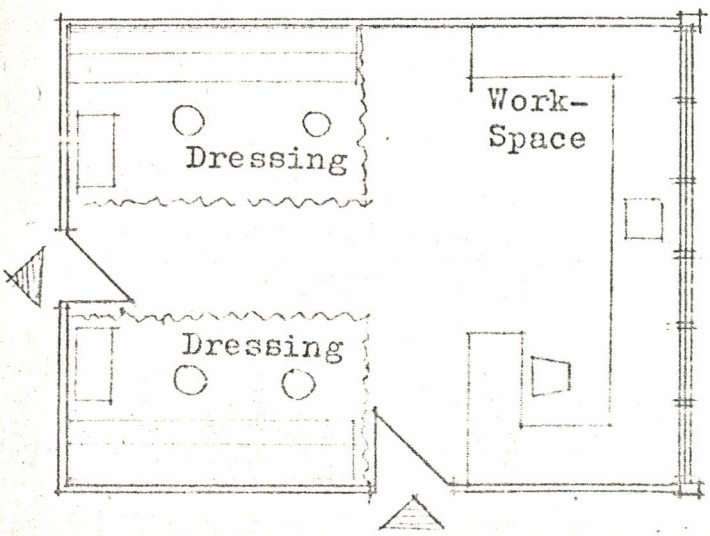
Ulcer benches, two in number.
Chair and two stools
Reception counter chair.
Trolley with dressings.
Garbage bin near ulcer benches.
Benches for dressing drums and mixtures.
File for records of dressings.



EXAMINATION ROOM



INJECTION ROOM



DRESSING ROOM

Comments — Provision for four patients in the room at the same time are provided, two waiting in stages of preparation while two are being treated.

INJECTION ROOM:

Functions
To prepare and give injections.
To keep record of injections given while the clerk collects.
To sterilize instruments.

Requirements
Drainboard and work space.
Waiting space for about 20 persons.

Equipment
Record book on desk.
Two screened cubicles for injections.
Shelves containing syringes, drugs and cotton.
Two chairs and a stool.
Sterilizer.
Table for sterilizer.
Bench for drugs and medicines.
Cupboards.

Comments — Provision for atmost two patients in the room at the same time.

DISPENSARY

Functions
To dispense pre-packed drugs
To dispense the drugs (mostly tablets and mixture).
Prescribed by the clinical officers.
To prepare mixtures: concentrated and dilute.
To record special drugs (anti-biotics and poisons).
To write instructions.
To clean bottles.
To fill bottles brought by the patient from bottle storage.

Requirements

Double doors
Faucet drainboard
Reception hatch or window
Medical storage
Roofed waiting area for 60 persons.

Equipment

Table for mixing drugs.
Table for writing and wrappings.
Chairs.
Shelves.
Cupboards.
File records.

LABORATORY:

This is one of the most important of the essenti services, carrying out, as it does, innumerable investigations for both in-patient and out-patie investigations which are necessary in the diagno and treatment of diseases. It must, therefore be easily accessible to both in-and-out patients It contains separate units for bacteriology , biochemistry,histology, haematology and a blood transfusion section. It will also serve the health institutions of the catchment area of the hospital. Mostly, specimens are brought to this department and only in rare cases do patients come to it.

Functions

General laboratory.
Bacteriology section.
Haematology and blood transfusion.
Stool and urine section.
Biochemistry section.
Reception and records section.
Despatch of various results after examination

Requirements

Lockable double door (1.20m wide)
Fume cupboards provided.
Storage of cupboards.
Waiting space for 20 persons.
Facilities for giving samples.

Equipment

Sinks and worktops.
Benches with underside cupboards.
Microscopes.
Calorimetric apparatus, centrifuges.
Stools
A refrigerator.
Sterilizer.
Water bath.
Trolley.
Fume cupboard.
Microscopy table.
Slop sink.
Incubator.
Apparatus for determining alkali reserve.
Gas outlets.
Chemical balance.
Stand for burettes.
Analytical arresting balance.
Stone weighing and titration table.

CASUALTY DEPARMENT

Fuction

Examination of emergency cases.
Treatment of emergency patients in minor theatre
application of plaster to simple fractures.
Stitching of wounds and cuts.
Bed spaces for patients awaiting admissions after accidents or recovering after minor surgery.
Serves as OPD after working hours.

Requirements	Double doors to all rooms.
	Trolleys space.
	Reception and waiting space for 20 persons.
	A ward for 3 beds.
	Toilet and wash places.
	Two examination rooms.
Equipment	Trolley and wheel chairs.
	Table and chairs.
	Registration counter.
	Work tops and sinks.
	Three beds.
	Shelves and cupboards.
	Plaster.
	Wash-hand basins.
	Benches for sitting.
	Stretchers.

3.0 THE IN-PATIENT DEPARTMENT

INTRODUCTION

The fundamental difference between the patient's home bedroom and the one in the hospital is that the latter commands a concentration of nursing skills, medical attention, and therapentic facilities. Because nursing maintains twenty four hour supervision of the patient, the over-riding problem of designing the patient housing facility is to provide for the greatest facilitation of nursing service.

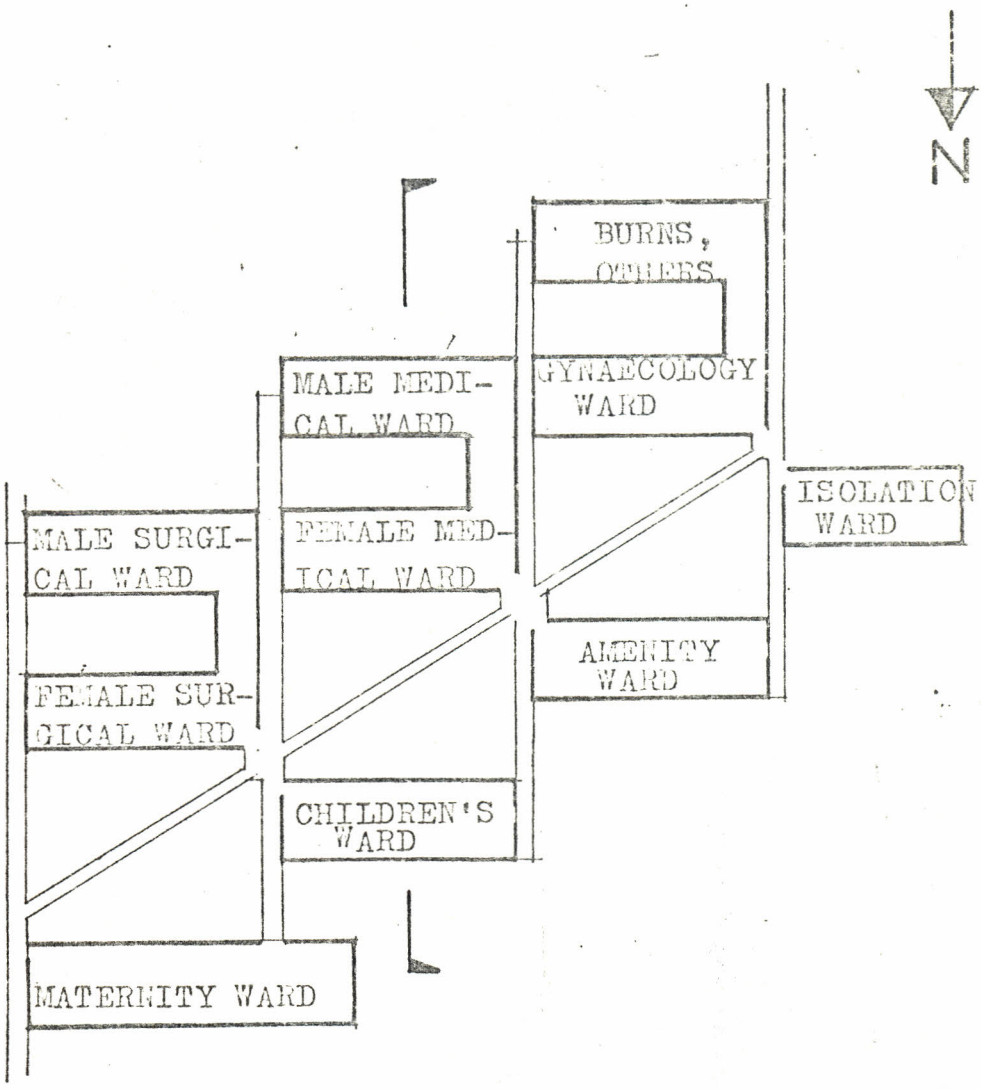
According to the Ministry of Health planning team, an in-patient department in the district includes the following:-

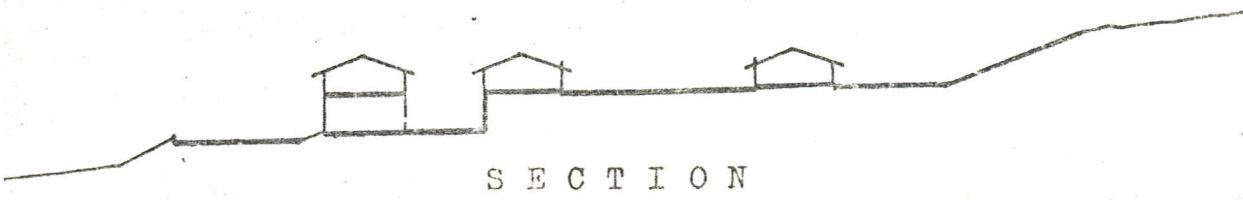
- 2 no. surgical wards.
- 2 no. medical wards
- 1 maternity ward
- 1 children's ward
- 1 amenity ward
- 1 gynaecology ward
- 1 isolation ward
- 1 orthopaedic, burns and other purposes ward.

3.1 THE NURSING UNIT

A nursing unit is a group of spaces so arranged that a number of nurses can tend a number of patients under the direction of usually a staff nurse. The work capacity of the nurse in charge of the nursing unit determines the size of the unit. However, observations have shown that although conditions vary from place to place, nursing unit containing 27 to 34 beds are optimal from a nursing point of view. In this present scheme a nursing unit of 30 beds is chosen.

LAYOUT OF NURSING UNITS





SECTION

BED WARDS

Two basically different ways of arranging with its own merits and shortcomings.

Nightingale Ward

This is the most commonly found ward in old hospitals in Kenya. This type of ward with beds arranged in rows at right angles to the length of the room with general circulation area down the centre. The chief advantage of this system is its economy in that a low floor area per bed is achieved and a relatively narrow building width will suffice which allows for an inexpensive form of roof construction.

Supervision

Supervision of the whole ward is possible from one position and that the path from the nurses' station to any bed is direct.

Patient Environment

The chief disadvantage and reason why this type of ward is being phased out in many countries is its barrack room appearance provides a poor patient environment. Also glare experienced by sitting in bed with a row of windows immediately opposite cause considerable discomfort.

RIGS WARD

The bed arrangement which is increasingly preferred is the so called "Rigs Plan" in which beds are placed paralled to the axis of the building, usually in groups of corridor. Alternatively a group of six with a side corridor.

Supervision

The disadvantages are firstly that direct visual supervision of all the beds in the ward is impossible. In a ward this may mean placing those patients likely to require most attention nearest to the nurses' duty room. Secondly,

the arrangement of beds is such that if patients are moved in their beds, the manoeuvering is more difficult than in Nightingale ward requiring that the beds be more spaced. This leads to the third disadvantage of Rigs plan namely that the floor area per bed ($5.6m^2$) is higher and the necessary span of the building greater ($8.0m^2$) both of which tend to make it more expensive than Nightingale Ward.

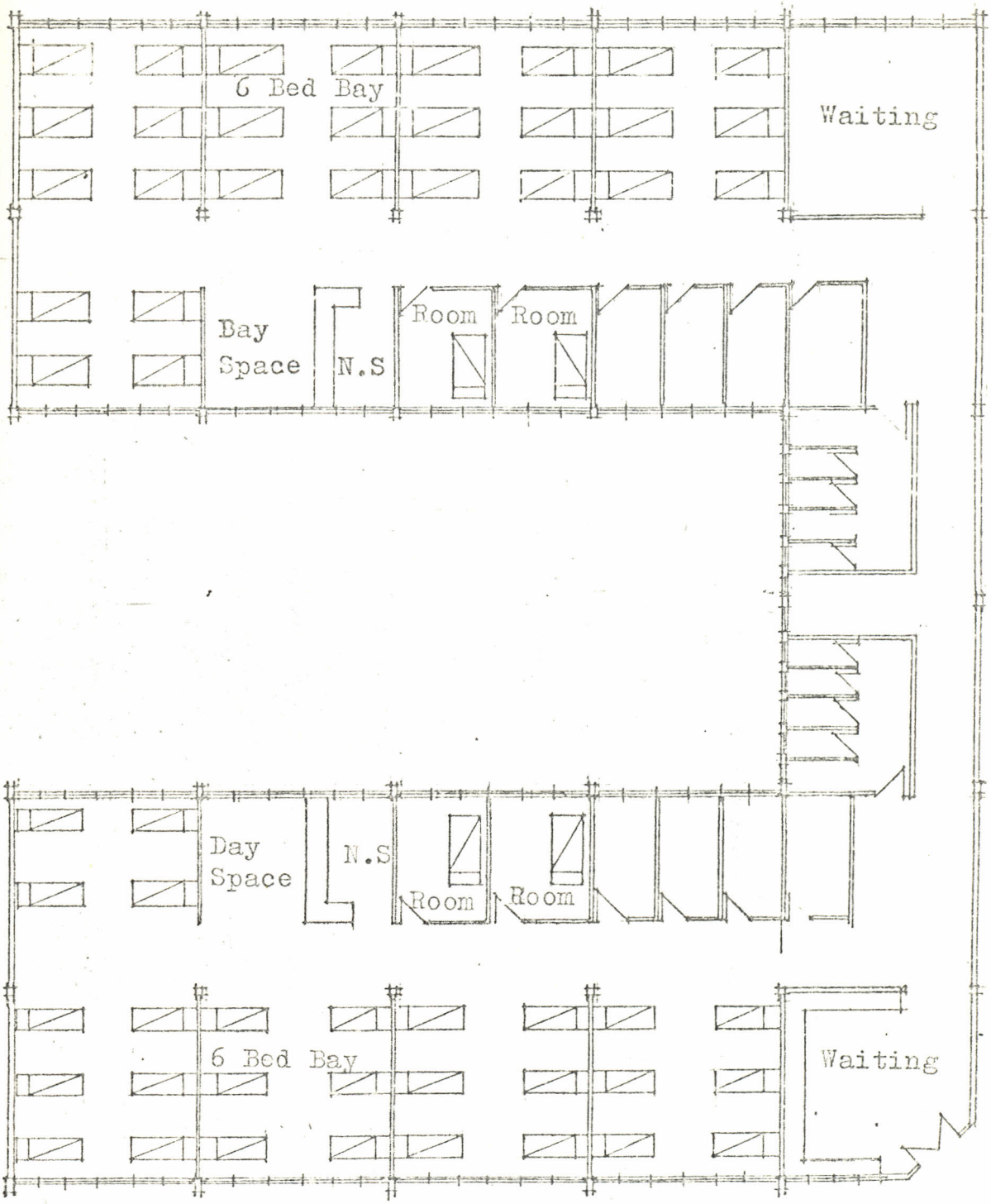
Patients Environment

The chief advantages of the Rigs plan is the improved quality of the patients' environment it produces due to the smaller groupings of beds and the fact that natural light falls from the side rather than from the front and back of the patient. After considering the above advantages and disadvantages of each system, I took Rigs plan as a system for my ward units because of the benefits of patients environment.

WARD DESIGN

Besides room for the beds, each ward needs additional space for general circulation and one or two tables for ambulatory patients to sit and take their meals. A wash basin should also be provided in each bay. A waiting space is also provided for patients' relatives and friends. As wards are large rooms, the ceiling should be fairly high (2.80 to 3.0m) and the place well lit and ventilated. This requires both natural as light as well as electrical lighting.

TWO NURSING UNITS JOINED



GENERAL WARD LAYOUT

The Six-Bed Bay

The bay is 6m deep and 6m wide. It is open to the corridor. The room contains six beds, six chairs, four bed-side cabinet and one wash basine.

The Single-Bed Room

The width of isolation room is determined by the length of the bed plus the space required behind the bed and the passage at the foot of the bed. The width is 3.0m and the depth 3.6m. The room contains one bed, one bed-side cabinet, a chair and a wash basin.

The following ancillary rooms are also included in the ward.

DUTY ROOM

Functions

Includes nurses' station
Supervision centre for the ward.
Instrument sterilization.
Storage space for drugs, medices and injections.

Requirements

Chairs and stools.
Counter.
Cupboard and shelves.
Medicine cupboard.
Drain board and sink.

LINEN ROOM

Space for shelves for storing unclean linen from laundry.
A table for sorting and laying out the articles to be issued.
Cupboards for clean instruments.
Trolley for dressings.

SLUICE ROOM

Functions

For washing trolleys.

Can be used as cenema room.
Emptying bedpans.

Storage of soiled linen.

Work space.

Sluice apparatus.

Disinfecting.

Requirements

Bay for soiled linen.

Sink for soaking badly soiled linen.

W.C. type sluice required.

Cement or terrazzo finish to floors.

Draining board with sink.

Facilities for disinfecting bedpans and washing them.

Equipment

Shelves and racks for drying bedpans and urinals.

Slop sink for bed pans.

Draining board or concrete work top.

Bay for soiled linen.

Container for disinfecting of linen.

Slop sink for urinals.

Cupboards.

CORRIDOR

A wide corridor makes the work of staff easier. A case in question is, for example, the manoeuvering of beds. Hence an effective width 2.40m is highly desirable.

BATH FACILITIES

Bath for washing those patients who cannot take showers themselves.
A wash basin is also included.
Hook hangers for towels and patients' clothing required.
Daylight and electrical light necessary.
Tiled walls.

DAY ROOM

Function

For ambulatory patients to sit and talk to relatives.
For dining for ambulatory patients.

Requirements

No door (open type)
Wash hand basin.
Tiled floor finish.

Equipment

A small table and chairs.
Wash basin.
Magazines.

IN-PATIENT DEPARTMENT

The in-patient department consits of 10 ward with a total of 272 beds. The type of ward and number of beds are as follows:-

Type of Ward	No. of Beds
Surgical ward, female, male	2 x 30
Medical ward, female, male	2 x 30
Gynaecology ward	30
Maternity ward	30
Children's ward	30
Isolation ward	16
Amenity ward	16
Others etc.	30
Total	272

The general wards, i.e. medical, surgical and gynaecology within the department remain approximately the same in terms of bays and requirements. Therefore a general design of one is shown below.

GENERAL WARD

MATERNITY WARD

The main task of this special ward is to nurse and treat ante-natal and post-natal patients, and handle premature babies. It is also combined with the delivery suite and placed next to the operation theatres in case of any complication. A patient can be rashed to the theatre from the delivery unit.

The layout of bay is the same as general ward, but more ancillary room included as shown in the drawings.

CHILDREN'S WARD

The children's ward takes children between the age of 0 - 4 years. In terms of layout is the same as general ward. No provision for mothers's beds. Seats are provided.

ISOLATION WARD

The main aim of isolation ward is to nurse and treat patients with infectious diseases or tuberclosis. It is therefore set slightly apart from the other wards in order to stop infection. The rooms are of various sizes according to the number of beds each contains. Some are single, two bed and four bed bays with ante-rooms before the corridor.

AMENITY WARD

The amenity ward is intended for private patients. Some rooms contain four beds, two beds and some have single beds.

Similar layout as isolation ward but they do not have ante-rooms.

PROPSED LAYOUT OF NURSING UNITS

Type of Ward	No. of Beds
Surgical ward, male, female	2 x 30
Medical ward, male, female	2 x 30
Gynaecolocical ward	30
Maternity ward	30
Children's ward	30
Isolation ward	16
Others, burns, wound	30
Amenity ward	16
Total	206

Comments All wards are on the same level.
They all open to the courtyards.
maximum view for bed wings.
One circulation spine from which other divert.
They all face North and South.

Area per ward roughly - 360m^2.

4.0 DIAGNOSTIC AND TREATMENT FACILITIES

The diagnostic and treatment facilities includes X-ray unit, operation theatres and laboratory (laboratory is included in the out-patient department).

4.1 X-RAY UNIT

To avoid out-patient through the in-patient wing, as mush as possible it was desirable that X-ray unit should be located between the in-patient wing and the out-patient department.

Functions

Diagnosis.
Film processing room.
Storage area for films.
Changing facilities.

Requirements

Lockable doors painted black.
Thick walls to stop radiation spread.
No opening in X-ray except doors.
Mechanical ventilation.
Darkroom for processing films.
Changing cubicles.
Control room.
Waiting bay.
Reception area.
Floor finish linoleum.
Universal unit and potter - bulky unit.
Control unit with observation windows.
Two changing cubicles doors with door painted black.
Mass X-ray room with a camera and screen.
Processing apparatus for films.
Films.
Racks for drying wet films.
Staff toilets

Cement floor finish for dark room.
Linoleum finish for others.
Cupboards for storage of dry films
Reception desk and counter.
Stool and chairs.

Total area 216m^2.

4.2 OPERATION THEATRES

This facility is located in such a way that there is an avoidance of out-patient traffic going through the in-patient department. It is therefore located between the in-patient department and the out-patient department.

Function
Surgical operations
Sterilization of instruments.
Storage of anaesthetics.
Application of anaesthetics.

Requirements
The minimum height should not be less than 3.5m.
The walls should be sprayed with a matt finish.
Seamless floor suitable e.g. terrazzo.
Doors for wheel bed should be 1.20m.
Translucent glass windows.
Suitable temperatures for operation is between 20°C to 25°C.

Equipment
Operating table and lamp.
Dressing and instrument trolleys.
Bag for soiled linen and dressing.
Table and chair for anaesthetist.
Anaesthesic apparatus.
Illuminator for X-ray photographs.
Stand for boxes with gauze and linen.
Central suction connection.

diatheracy apparatus.
Foot stool.
Trolley for anaesthetist.
Sinks.
A lock.
One or two drip stands.
Adjustable seat.
Double wall sockets.
Salt water connection.
Irrigator stand.

INSTRUMENT STERILIZATION

Function — To sterilize instruments and other materials used in operation theatres and wards.
Storage of sterile packs.
Issue of sterile packs.

Requirements — Hatch for issue of sterile packs.
Cement or terrazzo floor finish.
Ceramic tiled walls or a spray of matt paint.
Shelves for storage of sterile packs.
Cupboards for instruments.

Equipment — Instrument cupboards.
Slop sink.
Work top with cabinet below.
Shelves and racks.
Trolley for clean packs to be dispatched to theatres.
Stool and chair.

SCRUB ROOM

Function	Scrub up place for surgeon before and after an operation. Storage and changing place for staff before entry and after the theatre. Changing and storage of garments after theatre operations.
Requirements	Two changing rooms. Deep scrub up basins.
Equipment	Wash basins or troughs. Hooks for garments. Foot operated soap dispenser. Changing cubicles.

SLUICE ROOM

Function	Storage of soiled linen. Washing of soiled linen. Sterilizing of packs.
Equipment	Three washing troughs. Bags for soiled linen. Counter or hatch for receiving soiled items.

5.0 CENTRAL SUPPLY DEPARTMENT

This department should include kitchen, laundry, bulk stores, boiler room, generator house, pharmacy and mortuary.

5.1 KITCHEN

Function

To provide cooked and prepared foodstuffs to the in-patient wards.

To receive and store foodstuffs before use.

Requirements

Lockable double doors.
Daylight and electical light.
Electricity for cooking.
Standbye gas cookers.
Servery counter.
Space for food trolley.
Space for washing utensils.
Space for washing food trolleys.
Four cooking stores.
Work tops for meat and vegetable preparation.
Vegetable store and cold room for meat.
Off-loading and waiting bay.
Refuse bins.

Equipment

Four cooking stoves.
One roasting dish.
Two work tables.
Racks for pots and pans.
Draining boards and sinks.
Cupboards for cookery.
Refrigerator.
One potato peeling machine.
One bread cutting machine.
Weighing machines.
Desk and chairs for dietician office.

5.2 LAUNDRY

The work undertaken in the laundry includes the sorting of dirty linen, soating of badly fouled line, washing using machines, drying using machines, ironing and storing. The linen which is torn can be separated and taken to be mended. When linen is ready it is stored in a store before collection from various departments.

Equipment

Three washing machines.
Three drying machines.
Table for ironing.
Store for repair.

5.3 BULK STORES

This store is intended to unpack, retain and distribute general goods needed in the hospital. In addition to the district hospital needs, it should keep sufficient supplies for health institutions in the catchment area.

Generator
Boiler
Inclinerator

These supply units provide hot water and electrical power for the hospital. An inclinerator should be installed for disposal of certain waste.

Mortuary

Post-mortem examinations are not normally performed on hospital cases; this procedure being reserved for accidents and judicial cases.

5.4 PHARMACY

The pharmacy should be capable of preparing, storing and distributing medicinces to the hospital, and about 6-10 local health centres.

Requirements

Loading and off-loading place.
Double doors for trolleys.
Daylight and electrical light.
Storage Spaces for drugs and tablets.
Preparation machines

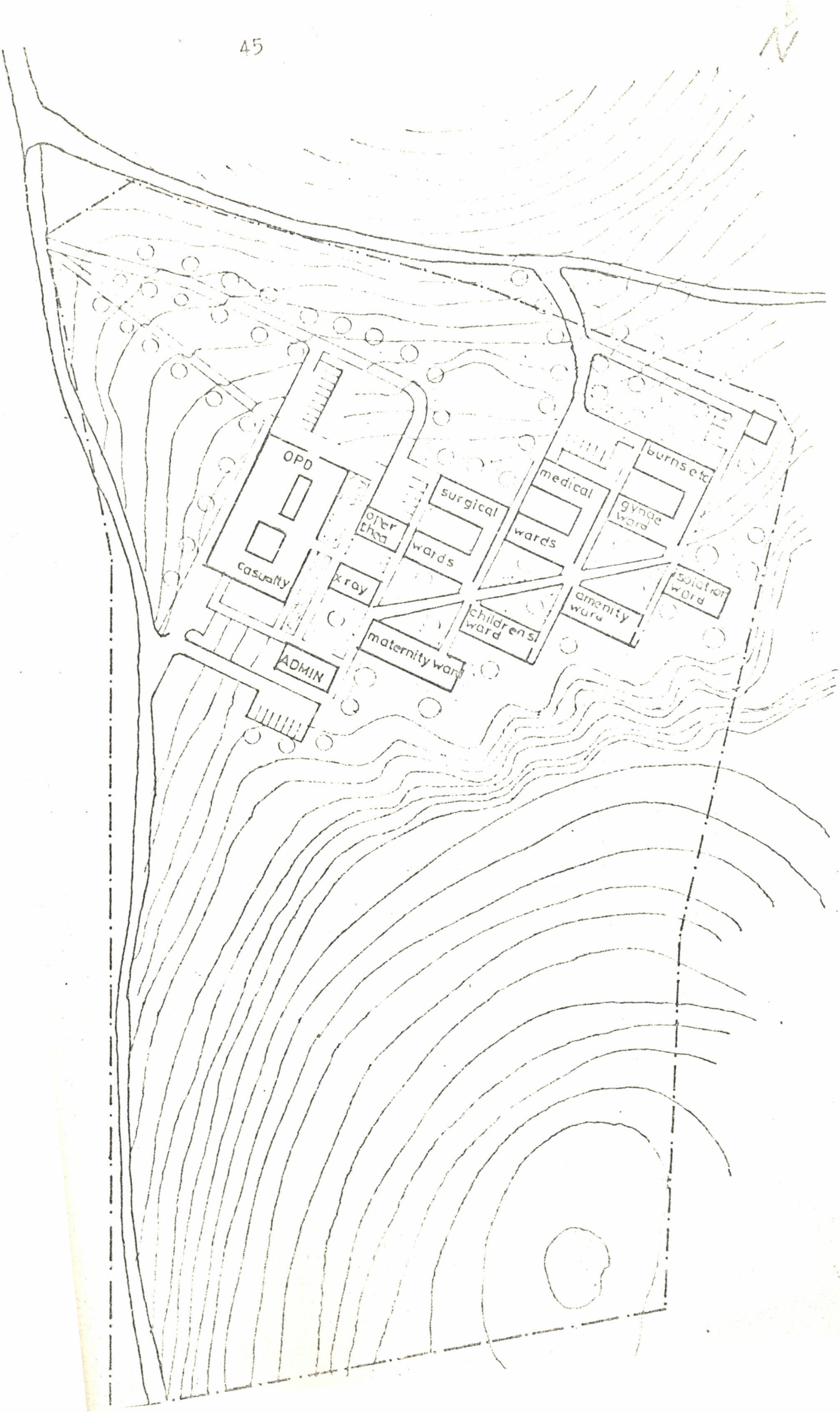
6.0 SITE LAYOUT CRITERIA

The following main factors were considered in the layout of the hospital.

The access points to the site played an important role in the placement of the out-patient and in-patient departments. The first facility you come to from the road is the out-patient.

The slope of the land of 5^{o} was also an important feature in the determination of site layout. So my buildings follow along the contours as shown in the site plan.

Orientation was a major environmental aspect. In this region, solar radiation is a problem. Since bed patients are always in bed, the internal comfort could not be sacrificed. So the buildings face North and South where windows are with high thermal capacity because walls heat up during the day and give out heat at night when needed. Cold nights are experienced in this region even temperatures go below the comfort zone - hence a compact layout is easier to keep warm.


N
OPD
casualty
oper thea
x ray
surgical
wards
medical
wards
burns etc
gynae ward
isolation ward
amenity ward
childrens ward
maternity ward
ADMIN

7.0 CONSTRUCTION MATERIALS

Heavy construction, both internal and external walls is desirable to moderate the diurnal temperature range. Hence, concrete walls are used for walls and internal partitions.

The structure is r. concrete columns and beams system supporting a well-insulated light-weight roof structure. The roof is made up of timber trusses at 2 metres centres.

The covering for the roof is clay tiles and ceiling is made of expanded polystyrene.

The infill between concrete columns either concrete blocks and bricks and for windows glass with metal casings.

Columns are 200mm x 200mm or 200mm x 300mm.

The roof slope is 1:3.

Floor finishes vary from department to department-generally for dry sections cement screed finish and wet areas of rooms terrazzo.

Service duct runs along the main circulation spine with points of access for servicing.

8.0 RURAL DISTRICT HOSPITAL AT NYAMIRA, KISII

DESIGN THESIS STATEMENT

The layout plan of my district hospital has evolved from the limitations and understanding of building functions dictated by the sloping site.

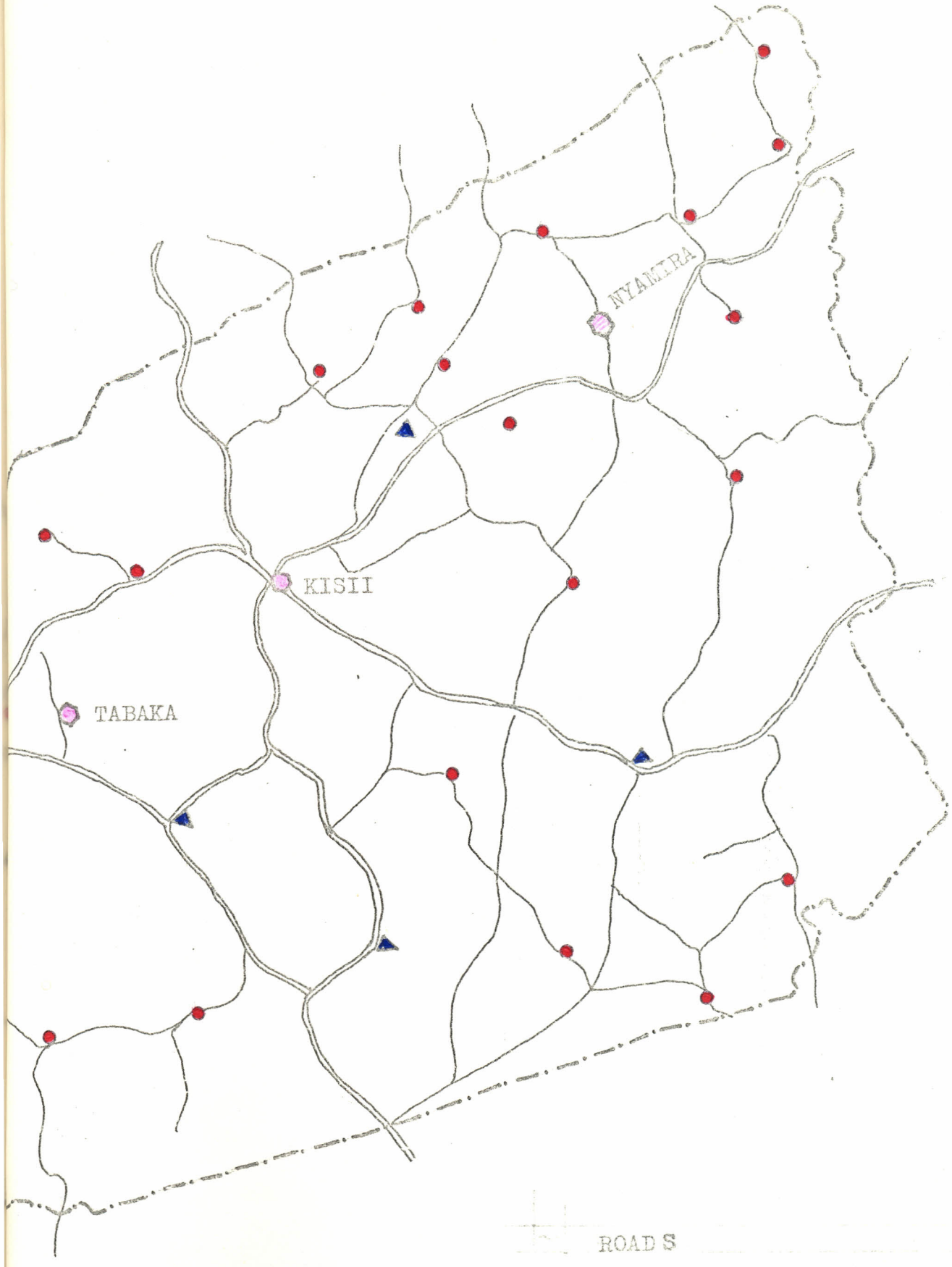
The site slope of 5^{o} has limited the spread of my buildings up and down the slope. In fact, all my units are placed along the contours.

The next determinant of site layout was the environmental quality in my ward units. The buildings had to face North and South where windows were to avoid excessive solar radiation entry. This was an important factor because the unwell patients spend twenty-four hours in bed. The enclosed courtyards in my layout also contribute positively towards heat conservation during the cold nights.

The third point and one of the most important in determination of my site layout was the inter-traffic and the departmental links. The compaction of my layout went along way in reducing time spent by patients and staff walking from one section to the other. Each department was conviniently sited and those with most inter-traffic connections were sited close to each other. The internal hospital circulation was arranged without separation of different flows, but priority was given to a system whereby staff and central supplies are concentrated onto a main communication corridor. Service installations are co-ordinated to allow for maintenance and additions without interferance to activies of buildings.

In respect of the main inter-departmental links, in-patients are taken easily from wards to operating theatres and X-ray unit for examinatien and treatment. A reasonably good connection has been maintained between the out-patient and the treatment facilities. Hence, my site layout follows this sequences. Access from roads, out-patient department, treatment facilites and finally in-patient department.

TRIBUTION OF HEALTH FACILITIES IN KISII DISTRICT.



OUT-PATIENT DEPARTMENT

GENERAL	Registration
	Records office
	Store
	Kiosk
CURATIVE SECTION	Waiting
	Toilets male and female
	4 Consultation rooms
	Dressing room (sub-waiting)
	Injection room (sub-waiting)
PREVENTIVE SECTION	Waiting
	Female toilets
	Registration counter
	Consultation rooms
	Family Planning Room (sub-waiting)
	Immunization room (sub-waiting)
	Clinical officer room
GENERAL FACILITIES	Dispensary (sub-waiting)
	Laboratory (sub-waiting)
	Medical officer (sub-waiting)
	Casualty (sub-waiting)
	Total area 1190m^2
LABORATORY	Biochemitry
	Bacteriology
	Haematology
	Laboratory office
	Blood bank (One room + cold room)
	Waiting Space
	Patients' lavy
	Staff lavy
	Reception counter and records
	Total area 216m^2

IN-PATIENT DEPARTMENT

GENERAL WARDS	Medical
	Surgical
	Gynaecological
	Burns etc.
SPECIAL WARDS	Maternity and delivery
	Children
	Amenity
	Isolation
TYPICAL WARD	Thirty beds
	Six bed bays (3 bays)
	One bay (10 beds)
	Two single bed rooms
	Nurse station
	Pantry
	Sluice room
	Bathroom
	Two showers and two W.C's
	Staff toilet
	Total area 360m^2
MATERNITY WARD	Waiting room
	Examination room
	Lavatories
	Bathroom
	Sterile room
	Sluice room
	Labour ward
	Delivery rooms
	Ante-natal ward (6 beds)
	Six bed bay (3 in number)
	Three single rooms (isolation of infected mothers)
	Two showers and two W.C's
	Milk kitchen
	Cool room
	Gowning room
	Premature babies' room
	Nurse station
	Staff lavatory
	Baby bathroom
	Total number of beds 30
	Total area 520m^2

CENTRAL SUPPLY DEPARTMENT

KITCHEN

Trolley park
Servery
Potato wash and store
Special diets
Store
Staff lavy
Refuse bin
Off-loading and waiting
Dietician and records
Cooking
Gas
Cold storage
Vegetable Store
Vegetable preparation
Meat preparation

Total area 360m^2

LAUNDRY

Store
Issue
Mending
Stoves
Boiler
Delivery
Soiled
Washing bag
Ironing bag
Toilets

Total area 360m^2

BULK STORE

This store is intended to unpack, retain and distribute general goods needed in the hospital. In addition to the District Hospital needs, the Central Store should keep sufficient supplies for about 6-10 local health centres.

Total area 360m^2

CENTRAL SUPPLY DEPARTMENT CONT'

PHARMACY

The pharmacy should be capable or preparing, storing and distributing medicines to the hospital and about 6-10 local health centres.

Total area 216m^2

MORTUARY

Post mortem rrom
Waiting and viewing
Two cold rooms (4 bodies each)
Motor room
Attendance and records room
Inflammable store
Shower room
Chemistry room
Toilet

Total area 64m^2

ADMINISTRATION DEPARTMENT

Records office
General office
Enquiry office
Waiting room
Hospital Superintendent office
Medical officer of health
Sisters' office
Medical officers' office
Steno's office
Duplicating machine room
Tea room
Female lavatory
Broom store
Male lavatory
Cashier's office

Total area 264m^2

CASUALTY DEPARTMENT	Waiting room
	Patients' toilets
	Plaster room
	Minor operation
	Sluice room
	Resuscitation room
	Staff toilets
	Male and female observation wards (3 beds)
	2 examination rooms
	Duty room
	Total area 144m^2
X-RAY DEPARTMENT	Mass x-ray room (camera room)
	Control unit
	2 changing cubicles
	X-ray room
	Control unit
	2 changing cubicles
	Dark room
	Office and reception desk
	Cupboards for files
	Staff toilet
	Total area 216m^2
OPERATING THEATRES	Waiting room
	Issue room
	Sterilizing room
	Sluice room
	Minor operation theatre
	Major operation theatre
	Ante room
	Changing cubicle
	Scrub room
	Total area 216m^2

LIST OF FACILITIES FOR A DISTRICT HOSPITAL

The District Hospital may be divided into the following seven main departments or types of facilities:-

1. Inpatient Department (IPD)
2. Outpatient Department (OPD)
3. Administration Department
4. Diagnositc Facilities
5. Treatment Facilities
6. Domestic Facilities
7. Miscellaneous Facilities.

1.0 INPATIENT DEPARTMENT

The District Hospital consists of 8 - 12 hospital wards and 220 - 299 hospital beds. The type of wards and the number of beds in each ward are given in table 1. A ward has 15 - 32 beds including facilities such as showers/bath, WCs, stores, pantry, treatment room, sluice, office, nurse station, etc.

TABLE 1 - DISTRICT HOSPITAL WARDS AND BEDS

TYPE OF WARD	NO. OF BEDS
Female Surgical	25 - 32
Female Medical	25 - 32
Gynaecology	25 - 32
Obstetrics	25 - 32
Male Surgical	25 - 32
Male Medical	25 - 32
Children	25 - 32
Isolation	30 - 30
Amenity	15 - 15
Other*	30
Total	220 - 299

Note: *other wards or beds could be used for other purposes which may be necessary (psychiatric, orthopaedics, burns, etc.)

..../2

2.0 OUTPATIENT DEPARTMENT

The outpatient facilities are made up as follows:-

2.1 Reception/Registration/Record office with a waiting place large enough to seat 200 patients at a time. The records office should be adequate to serve the whole hospital.

2.2 Consultation Rooms used for consultation, medical examination and medical councelling. The main clinics are surgical, medical, gynaecology/obstetrics, dental, maternal/child health, and general public health. Each clinic should have a sub-waiting area adjacent to it.

2.3 Treatment Facilities include injection room, a room for dressing of ulcers and septic wounds, a minor surgery and a plaster room. Dental clinic is mentioned under paragraph 2.2. Each room should have a sub-waiting area adjacent to it.

2.4 Pharmacy including drugs store. This should be large enough to serve the whole hospital and to provide supplies to the health centres, health sub-centres and dispensaries in the district. It should have a waiting area large enough for 100 siting patients at a time.

2.5 Outpatient Laboratory should consist of a small room which can handle simple tests such as urine testing for albumin or sugar wich might be needed quickly during special clinics, for example, obstetrics clinics, etc.

2.6 Observation Beds for patients waiting for admission into the wards or waiting to go home after minor surgical interventions. Their number should be 8 - 10 (males, females, children).

2.7 Casulty/Accident Centre for emergency cases, etc.

2.8 Admission/Discharge Centre with reception, stores, etc.

2.9 Other Outpatient Facilities, for example, offices for supervisory staff, canteen for public use, etc.

3.0 ADMINISTRATION DEPARTMENT

This consists of offices for district heads of various health departments, namely, the District Medical Officer of Health, the Assistant District Medical Officer of Health, the District Health Inspector, the District Public Health Nurse, the Hospital Administrator, the Rural Health Administrator, the District Matron, and the District Family Planning Field Officer. In addition to these, there should be general offices for clerical staff and other miscellaneous activities.

...../3

sterilization facilities for the whole hospital and the rural health facilities in the district.

7.5 Stores should be adequate for hospital and rural health requirements.

7.6 Staff Houses for workers who, because of the nature of their duty, should be housed as near as possible.

7.7 Other Miscellaneous Facilities, for example, library, recreation, etc.

DISTRICT HOSPITAL DEVELOPMENT STAGES

It may not always be possible to provide all the 220 beds in one project deal. This could be due to financial and manpower constraints at the time. However, such as hospital could be constructed in two or more phases. The first phase should be fully functional and should therefore include the following facilities:-

i. Five wards with 115 - 130 beds.
ii. The essential diagnostic, treatment, domestic and miscellaneous facilities.
iii. At least 50% of staff houses.

With regard to what should actually be included in the first phase, each case should be considered on its own merit. The rest of the facilities could be provided in the subsequent phase or phases.

TABLE 2 - DISTRICT HOSPITAL PHASE ONE

TYPE OR WARD	NO. OF BEDS
Female General	25 - 32
Obstetrics	25 - 32
Male General	25 - 32
Children	25 - 32
Isolation	15 - 30
Total	115 - 158

...../5

4.0 DIAGNOSTIC FACILITIES

The Diagnostic Facilities should serve the whole hospital and other health institutions in the district. They are as follows:-

4.1 Laboratory Department including Blood Donation Centre. The laboratory should be sufficient to serve the whole hospital and other health institutions in the district.

4.2 Radiology Department should cope with hospital cases and cases from other health institutions in the district.

4.3 Other Diagnostic Facilities, for example, ECG room, EEG room, etc.

5.0 TREATMENT FACILITIES

The main Treatment Facilities are as follows:-

5.1 Operating Theatre (two) with facilities such as holding area/reception, changing rooms, anaesthetic room, office, etc.

5.2 Intensive Care Unit with at least 4 beds.

5.3 Other Treatment Facilities for physiotherapy, occupational therapy, radiotherapy, etc.

6.0 DOMESTIC FACILITIES

6.1 Kitchen - apart from serving the hospital the kitchen may also serve a training school attached to the hospital.

6.2 Laundry - the position may be similar to that of kitchen.

6.3 Boiler room with boiler plant to provide hot water and steam.

6.4 Generator House for power supply where necessary and also for emergency purposes.

6.5 Other Domestic Facilities, for example, water supply, staff dining facilities, etc.

7.0 MISCELLANEOUS FACILITIES

7.1 Maintenance Unit including workshop, vehicle maintenance, offices, stores, etc.

7.2 Mortuary with post-mortem examination facilities.

7.3 Incinerator of a temperature of at least 800°C.

7.4 Central Sterilization Unit should provide

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INSTITUTIONAL STAFF HOUSES FOR DISTRICT HOSPITAL PHASE ONE

STAFF CATEGORY	TYPE C	TYPE D	TYPE E	TYPE F
Medical Officers	2			
Nursing Sisters		3	3	
Medical Assistants		3	3	
Pharmacists		1	1	
Radiologists		1	1	
Laboratory Technicians		1	1	
Enrolled Nurses/Midwives				25
Others	1	1	1	5
Total	3	10	10	30

SITE PLAN FOR A DISTRICT HOSPITAL

The lay-out should be compact in order to reduce the time spent by patients and staff walking from one section to another. Each department or section should therefore be conveniently sited and be as easily accessible to one another as possible. The ease of movement and flow of patients should be one of the main aims. Similarly future extensions and expansions which may be necessary in future should also be borne in mind.

SUB-DISTRICT HOSPITAL

A Sub-District Hospital should consist of 115 - 158 beds broken down as in the case of phase one of the District Hospital. (See table 2). Other facilities should be provided to conform with the number of beds. Sub-District Hospitals will always expand and this should be taken into account in the site planning.

LIST OF EQUIPMENT AND SUPPLIES FOR A DISTRICT HOSPITAL

This is given in Appendix one herewith attached.

INSTITUTIONAL STAFF HOUSES FOR A DISTRICT HOSPITAL

STAFF CATEGORY	TYPE C	TYPE D	TYPE E	TYPE F
Medical Officers	3			
Nursing Sisters		5	6	
Medical Assistants		3	4	
Pharmacists		1	1	
Radiologists		1	1	
Laboratory Technologists		1	1	
Enrolled Nurses/Midwives				40
Others	1	3	5	10
Total	4	14	18	50

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APPENDIX THREE

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APPENDIX FOUR