COMPARITIVE COST ANALYSIS OF HOSPITAL SERVICES

By

NANDENE.R

0702MBA0655

68107202065

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Certified that the Project report titled **COMPARATIVE COST ANALYSIS OF HOSPITAL SERVICES** is the bonafide work of **Ms.Nandene.R** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Signature of student

Name: NANDENE.R

(in capital letters)

Roll No. : 0702MBA0655

Reg. No.: 68107202065

Signature of Guide

Name: Prof.K.R.AYYASWAMY

(in capital letters)

Designation: Project Guide

Address: KCT Business School

DIRECTOR
KCT BUSINESS SCHOOL
KUMARAGURU COLLEGE OF TECHNOLOGY
COIMBATORE - 641 006

Signature of Project-in-charge

Name: Prof.Dr.S.V.DEVANATHAN

(in capital letters)

Designation: Project In-charge

CERTIFICATE OF VIVA-VOCE-EXAMINATION

This is to certify that Thiru/Ms./Tmt. Nandene.R (Roll No. 0702MBA0655 Register No. 68107202065) has been subjected to Viva-voce-Examination on 12/9/2009 at ....9.a.m.... at the Study centre 105, Kumaraguru Colllege of Technology, Saravanampatti Post, Coimbatore.

Internal Examiner

Name: PROF. K.R.AYYASWAMY

(in capital letters)

Designation: PROFESSOR

Address: KCT Business School

KUMARAGURU COLLEGE OF TECHNOLOGY ★ KCT STUDY CENTRE ★ COIMBATORE-6 ★

External Examiner 12/9/09

Name: Dr. N. SENTHILKUMAR

(in capital letters)

Designation: ZONAL OFFICER, ZONE VII

Address: Jamal Mohammed College Campus, Trichy.

Coordinator

Study centre

Name: Dr.S.SADASIVAM

(in capital letters)

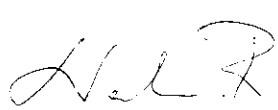
Designation: Coordinator

Address: KCT Business School

CO-ORDINATOR.
KCT STUDY CENTRE.
CDE ANNA UNIVERSITY CHENNAI
KUMARAGURU COLLEGE OF TECHNOLOGY
COIMBATORE 641 006.

ABSTRACT

The research involves a comparative analysis of the various diagnostic services and treatments rendered by hospitals in Coimbatore city and the cost involved in offering such services. The purpose of the research is to identify the hospital that offers the best of healthcare related services at an affordable and reasonable cost. In order to obtain the objective, the following aspects are to be determined. The various forms of treatments and diagnosis available for the patients in the hospital premises, the health support services offered and charges against such services provided, are identified and obtained through collection of secondary data collected from the hospital authorities. The cost of such services with reference to a particular hospital, and the most reasonable cost in comparison with that of other hospitals are evaluated and acquired using analysis tools such as arithmetic mean, weighted average and rank correlation. The obtained results are represented using charts for a better and clear understanding of tabulated values under analysis. The comparative analysis of GKNM Hospital, Sri Ramakrishna Hospital and K.G.Hospital reveals that costs are least expensive and public preference both department-wise and income-wise is greatest for GKNM hospital. They also reflect the consistency of GKNM Hospital against its major players in the city.



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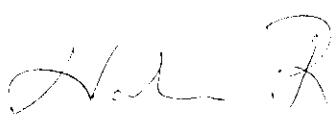

NANDENE.R

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CHAPTER 1- INTRODUCTION

1.1 RESEARCH BACKGROUND

The Indian healthcare industry has grown manifold during the last few years. Overall the Indian healthcare infrastructure is fast improving with initiatives by the government and the private sector. The entry of private players has further spurred the development of the healthcare sector. The Indian middle class, is more willing than ever before to pay more for quality healthcare. On the other, the supply of healthcare services has grown steadily, as the private sector becomes more involved in owning and running hospitals.

The Health Care Industry in Coimbatore has witnessed a tremendous growth in the last decade. With the increasing demand for best treatment and best facilities, the Coimbatore hospitals have established themselves. Surprisingly, Coimbatore has the sophisticated large hospitals offering the world class quality treatments equivalent to the best hospitals around the world. Coimbatore is also well-known for its exclusive super-specialty hospitals.

The Lakshmi group started the **Kuppusamy Naidu Hospital**. From a 50 bedded Hospital in 1952, the GKNM Hospital today is a 530 bedded multi-disciplinary referral institution. They offer a wide range of world class healthcare services at affordable cost to the community. It is the vision of the Hospital to be the foremost health care service provider of the highest standards, focusing on accessible, safe and humane medical services to the Community. It is one of the five centres in the country for the detection of cancer and education on cancer. G. Kuppuswamy Naidu Memorial Hospital, Coimbatore has been awarded the National Accreditation Board for Hospitals and Health care providers (NABH), the highest national recognition for Quality patient care and Safety on May 7th 2009. This is a public recognition of the achievement of accreditation standards by the hospital organizations demonstrated through an independent extended peer assessment of the Organization's level of performance in relation to the standards. The Hospital is the first Health care provider

in the State of Tamil Nadu to be awarded this coveted recognition and it is the 26th Hospital in India to be accredited by the NABH. NABL accreditation is a formal recognition of the technical competence of a testing or calibration laboratory for a specific task following ISO/IEC 17025 2005 Standard and this is based on third party assessment. Standards of ISO/IEC 17025 2005 and ISO 15189 2007 are unique documents that takes into consideration the specific requirements of the medical environment and the importance of the medical laboratory to patient care. ISO 15189:2007 is for use by medical laboratories in developing their quality management systems and assessing their own competence, and for use by accreditation bodies in confirming or recognizing the competence of medical laboratories.

K.G. Hospital, Coimbatore was founded by K. Govindasamy Naidu, a leading philanthropist and industrialist on the city. Started as a 25-bed hospital in 1974, the hospital is today a 300-bed multi-specialty high-tech hospital offering a variety of healthcare services. The K.Govindasamy Naidu Medical Trust, a non-profit charity organization of the $150 million K.G. Group of Companies, runs the K.G. Hospital. The Hospital has grown to 550 super specialty beds, with all major Departments as are required for a Modern Super Specialty Hospital, the supporting departments being Blood Bank, Biochemistry, Microbiology, Clinical Pathology, Cytology, Histopathology and Virology Research Laboratory. The Radiology Department is equipped with an MRI, 3-D/4-D C.T. Scan, Colour Doppler, Digital Cathlab, Echocardiography and Ultrasound Scanner. There are seven Operation Theatres - 5 major and 2 minor. The Intensive Care Units cater to the needs of Medical, Surgical and Coronary care patients. The Hospital also has a Physical Medicine and Rehabilitation Unit. The Hospital has 5 Ambulances, out of which one ambulance is equipped as a mobile Intensive Care Unit. The Hospital's staff strength is around 1,200, of which 150 are Doctors specialized in various fields of medicine, rendering round-the-clock service. The hospital is the third center in India to have successfully conducted a Cadaver Kidney transplant. The Hospital has also a College of Health Sciences to provide training in Nursing and allied health science to the students. The Hospital has been recognized by the Government of India, Dr MGR Medical University and National Board for conducting Medical research, and as a center for

nursing education and post graduate courses in 9 medical super-specializations including General Medicine, General Surgery, Neuro Surgery, Orthopedics, Neurology and Radio Diagnosis. K.G. Hospital is a recognized Designated Blood Bank for nearly 200 hospitals located in Coimbatore and adjoining areas. The hospital is also a beneficiary of the Prime Minister's and Tamil Nadu Chief Minister's Relief Fund for providing medical relief to the poorer segments of the society. K.G. Hospital is the fourth Hospital in the country to have obtained ISO 9002 for rendering quality medicare. It is one of the ten hospitals recognized in India for treatment.

Sri Ramakrishna Hospital was established by S.N.R. Sons Charitable Trust. The trust was founded in 1970 by the sons of Sri S.N.Rangasamy Naidu. With total commitment to social cause he founders of S.N.R. Sons Charitable Trust embarked on a selfless mission to give relief to the needy and the poor. Sri Ramakrishna Hospital founded in 1975 is perhaps the most benevolent of the Trusts projects with a great scope of achieving the mission's prime objective namely "Service to Humanity". The hospital has now grown into an all under one roof hi-tech medical complex with 500 beds and covering all specialties. Free medical treatment is provided to the needy poor and with charges for those who cannot afford the full cost of treatment. Free medical camps are conducted in the surrounding villages in association with Non Governmental Agencies. This is a multi-specialty hospital having hi-tech ultra modern medical gadgets for diagnosis and treatment with well qualified and experienced doctors. The hospital has its own Pharmacy that serves round the clock and well stocked. An ambulance with Mobile Ventilator, Defibrillator, Oxygen supply, emergency drugs along with trained personnel is available on call for 24 hours service. Also attached to the hospital is a canteen for the use of patients and other visitors. Senior doctors resided in the campus and one instantly available for emergencies. This hospital is recognized by the medical council of India for training of C.R.R.I's in the department of General Medicine, General Surgery and Obstetrics & Gynaecology. It conducts medical courses like B.Pharm, Nursing, B.P.T., (Including Post Graduate Courses) & B.D.S. It has been recognized by National Board of Examination for DNB course in General Medicine, Obstetrics & Gynaecology, Anesthesia, Radiotherapy, Radio diagnosis and Family Medicine. This

hospital has also been recognized to treat patients who obtain Chief Minister's Public Relief Fund and Prime Ministers National Relief Fund for Kidney Transplantation & Heart Surgery etc. It has the Govt. of Tamilnadu recognition to perform Family Planning Operations. The Government of Tamilnadu and The Government of India have also accredited this hospital for treating State Government employees for specialties namely, Cardiology, Nephrology, Neurology, Orthopedics, Simple Ophthalmology and Oncology.

1.2 IDENTIFIED PROBLEM

The research involves a comparative analysis of the various diagnostic services and treatments rendered by hospitals in Coimbatore city and the cost involved in offering such services. The purpose of the research is to identify the hospital that offers the best of healthcare related services at an affordable and reasonable cost. In order to obtain the objective, the following aspects are to be determined. The various forms of treatments and diagnosis available for the patients in the hospital premises, the health support services offered and charges against such services provided, are identified and obtained through collection of secondary data. The cost of such services with reference to a particular hospital, and the most reasonable cost in comparison with that of other hospitals are evaluated and acquired using analysis tools and charts.

1.3 NEED FOR STUDY

- Most of the costs in our economy are on a hike and cost of healthcare is no exception.
- Health is a vital commitment to everyone and health-related expenditure though large is expended without hesitation.
- Spending for health maintenance is not a deal to majority of our population.
- Medical technology has grown by leaps and bounds and has become all inclusive with advanced trends when compared to the traditional background of Indian Medicine.
- It is essential to be aware of the spectrum of services that hospitals provide, the costs charged against them and the degree of affordability towards such costs.

1.4 OBJECTIVES

1.4.1 Primary:

- To compare the cost of diagnostic services and treatment types of three selective departments as provided by GKNM Hospital with relation to its major players.
- To develop an index to rank patient preferences treatment-wise.

1.4.2 Secondary:

- To enlighten the various healthcare services that the departments of Dermatology, Pulmonology and Orthopaedics provide.
- To compare the charges collected against such diagnostic services and treatments rendered.
- To analyze the income-based preference of treatments and hospitals.
- To evaluate and suggest the hospital, which seems to provide affordable services.

1.5 SCOPE

The study Sri Ramakrishna, K.G and G. Kuppuswamy Naidu hospitals enables us to understand in depth the wide range of diagnostic services and treatments that these hospitals render in the departments of Dermatology, Pulmonology and Orthopaedics as a part of the healthcare sector. The cost analysis gives a clear picture of what charge each service costs. The comparison between hospitals with cost as the basis helps us to relate the costs charged for a particular service in one hospital against the cost charged for the same service in another hospital. Thereby the level of reasonability involved in rendering healthcare services to the public can be evaluated and the hospitals can be ranked based on their cost.

1.6 DELIVERABLES

- The hospital affording best and reasonable costs for healthcare services is arrived at.
- The treatment-wise preference of hospitals is obtained.
- The income-based preference of hospitals is derived.

CHAPTER 2- LITERATURE SURVEY

2.1 REVIEW OF LITERATURE

2.1.1 Analysis of Hospital Costs:

A Manual for Managers

by

Donald S. Shepard, Ph.D.

Dominic Hodgkin, Ph.D.

Yvonne Anthony, Ph.D.

September 29, 1998

Prepared for the

Health Systems Development Program

World Health Organization

Geneva, Switzerland

2.1.1.1 Cost Finding and Analysis as Management Tools

In both developing and industrialized countries, hospitals are viewed as vital and necessary

community resources that should be managed for the benefit of the community. As such, hospital management has a responsibility to the community--to provide health care services that the community needs, at an acceptable level of quality, and at the least possible cost. Cost finding and analysis can help departmental managers, hospital administrators, and policymakers to determine how well their institutions meet these public needs. They are also the process of manipulating or rearranging the data or information in existing accounts in order to obtain the costs of services rendered by the hospital. If structured accurately, cost data can provide information on operational performance by cost center. This information can be compared to budgeted performance expectations in order to identify problem areas that require immediate attention. These data give management the material to evaluate and modify

operations if necessary. Moreover, knowledge of costs can assists in planning for future budgets and to establish a schedule of charges for patient services. A hospital cannot set rates and charges which are realistically related to costs unless the cost finding system accurately allocates both direct and indirect costs to the appropriate cost centers. Finally, cost finding and analysis are also of value to management in ensuring that costs do not exceed available revenues and subsidies. It is the best available technique for accomplishing this.

2.1.2 Costing Studies to Define Costs and In Ministry Of Health and Population Hospitals

Undertaken by

The governorates of

Alexandria, Suez, Bani Suef, Dakahlia, Port Said, North Sinai, South Sinai and Aswan.

2.1.2.1 Introduction

This study presents the results of the costing of Gamhuria General Hospital at Alexandria Governorate. The data collection and analysis were conducted by a team from the Alexandria Health Directorate in collaboration with the Data for Decision-making project (DDM). The DDM project is a collaborative effort between the Department of Planning (DOP), Ministry Of Health and Population (MOHP), United States Agency for International Development (USAID), the Harvard School of Public Health, and the University of California, Berkeley, School of Public Health.
Operating costs of the Gamhuria General Hospital from July 1993 to June 1994 were allocated to the individual cost centers. These cost centers are classified as overhead, intermediate service and final service departments. The overhead departments such as, personnel, finance and maintenance provide support to intermediate and final service departments. The intermediate service departments, such as laboratory and operating theaters, provide procedures and services to patients in final service departments in the inpatient wards and outpatient clinics. Fifty functional departments were identified

as cost centers at the hospital. Overhead, intermediate service and final service departments account for 11, 26, and 63 percent, respectively, of total hospital-wide costs.

Five major categories of costs were selected to estimate the total costs: building and permanent structures, equipment and furniture, drugs and medical supplies, food and clothing, utilities, and personnel. The study uses the step-down technique for allocating overhead and intermediate service departments costs to final service departments. The step-down technique was also used to allocate overhead and intermediate service department staff to final service departments, and to estimate the full-time equivalents for each department and clinic. The largest expenditure in hospitals is on personnel, which includes take-home pay and all related benefits. Annual personnel costs account for 51 percent of the total expenditures at the Bani Suef General Hospital. Costs for personnel at intermediate service and final service departments constitute 89 percent of personnel costs, while salaries for personnel at overhead departments represent 11 percent of the total cost of personnel. Physicians' and nurses' salaries account for 69 percent, while other staff categories constitute 31 percent of the total costs of personnel. Sixteen percent of the total annual costs for 1993-94 were spent on drugs and medical supplies. The total annual cost of drugs and medical supplies include not only the drugs actually used but also donated and wasted drugs. This total annual cost of drugs and medical supplies is estimated at L.E. 552,877. This does not include prescription drugs purchased by patients out-of-pocket.

The average cost of drugs per inpatient day is 2.75 L.E. This low expenditure suggests the magnitude of the dependency of the system on patient drug purchases outside the hospital or it suggests low quality of care. A small portion of the drugs and medical supplies (7 percent of the annual total) is consumed by the Renal Dialysis Unit. The cost of drugs and medical supplies varies significantly across final service departments. Drugs and medical supplies account for only 0.7 percent of the inpatient treatment for the incubator department, while they constitute 56 percent of

expenditures on the renal dialysis unit. The study assessed the actual cost of renal dialysis as an example of one of the interventions financially supported by the MOHP in spite of its high cost. The average cost per visit is 102 L.E., which totals 10,608 L.E. per patient annually taking into account that the renal failure xx patient needs 2 weekly visits (104 visits yearly on average, 4-6 hours for each visit). The cost of drugs and medical supplies constitute 56 percent of the total cost. See table 27 for the distribution of costs per outpatient visit. The average cost per admission is 223 L.E. Costs range from 127 L.E. for gynecology and obstetrics department to 853 L.E. for the incubator department. The cost per admission is highest in departments with low occupancy rates and long average lengths of stay (see Table 29). Some departments were very well staffed with an average of 2.49 staff for every occupied bed; however, the average occupancy rate is 43 percent resulting in high admission costs (see Graph 24 for annual admissions per full time physician output versus cost per admission). The average cost per day, 45 L.E., varies depending on the occupancy rate. This daily cost ranges from 15 L.E. (general medicine department) to 139 L.E. (incubator) resulting from lower occupancy rates and higher input costs in these departments. The average annual cost per bed is 7,876 L.E. This ranges from 6,655 L.E. in the pediatric department to 21,484 L.E. in the incubator department. General medicine has the lowest cost of 3,084 L.E. per bed. See Graph 22 for the total annual cost per bed. The total maintenance cost in this hospital is about 83,100 L.E., which represents 0.28 percent of the annual recurrent cost. The international average percentage of maintenance costs ranges between 10 -15 percent of the annual recurrent costs to uphold effective hospital operation (Mills 1991). Outpatient visits in this hospital cost an average of 5.21 L.E. Drugs account for 11 percent (0.58 L.E.), while personnel costs consume more than 61 percent of the total. The cost of an outpatient visit depends on the number of visits to each clinic. It ranges from 3 L.E. in the general medicine clinic to 40 L.E. for physiotherapy clinic; with respectively treat 145 and 3 patients daily. (see Table 27 for the distribution of costs per outpatient visit). Cost per visit for the emergency unit is 5.82 L.E. Drugs and medical supplies make up 18 percent (which is more than the cost of drugs and medical supplies for outpatient clinics). Outpatient care at GGH absorbs 34 percent (1,208,201 L.E.) of total hospital

recurrent expenditures. The average occupancy rate in 1993-94 was 48 percent. This rate ranges from 29 percent in the ENT department to 94 percent in the orthopedics department. Both the gynecology and obstetrics and ICU departments have the highest turnover rates (71 and 48 patients per bed, per year, respectively). Turnover rate decreases in the urology department with 18 patients per bed per year and is at its lowest in the general medicine department at 15 patients per bed per year. The turnover rate in the Alexandria General Hospital is 35 patients per bed per year. This study assessed the average length of stay for 74 diagnoses to help determine the diseases with the longest length of stay. Deliveries present the highest number of admissions (17.45 percent of total hospital annual admissions, ALOS 1.9 days), and appendectomies present the second highest number of admissions (10.13 percent of total hospital annual admissions, ALOS 2.4 days). In general, average lengths of stay appear appropriate for the most common diagnoses. Patients in the ophthalmology department stay an average of 11 days, while they stay only 3 days in the ENT departments. These figures are based on an analysis of the admission and discharge sheets of the hospital. This was one way to ensure the accuracy of the results. See Tables 12, 13, 14 and 15 for a list of average lengths of stay at Gamhuria General Hospital. The average number of inpatient days per full-time equivalent physician was 463 patient days. Based on the fact that each physician works 270 days a year, each physician attends to 1.7 patients during his/her 6 hour day. This number decreases to 61 patient days for a physician in xxi the incubator department, meaning he/she is responsible for less than one patient per working day, which is a very low ratio. Recommendations: Improving the efficiency of this hospital will require an increase in occupancy rates. This can be achieved through a number of changes in management.

2.1.2.2 Recommended changes include:

- Increase hospital autonomy and decision-making by the hospital director in budget allocations, staffing, drugs purchases, etc. A performance-based

incentive system is one feasible and practical method for rewarding good management practices and performance.

- Staffing ratios per bed or bed day are not an infallible proxy for quality of service. Training and skill level, supporting technology, team work, and organization of services are all essential complementary co-determinants of quality. In addition, differences in the case mix inside and between departments has an important role. For example, ICU patients need more staff than orthopedics patients.
- Increases in the budget for drugs and medical supplies; This will increase the total annual cost of the hospital; on the other hand, the availability of drugs will likely increase the quality of care and the utilization rate (number of admissions) and this, in turn, will decrease the total cost per admission.
- Treatment protocols for the same cause of admission vary among physicians of the same department. The average length of stay can be reduced by more than 50 percent by changing the standard practice for specific cases of admissions.
- Maintenance has important implications for the overall technical efficiency of the hospital.
- Unfortunately, maintenance costs are directed mainly towards repairing hospital equipment and not towards regular and preventive maintenance, for which there are no plans.
- Reducing the average lengths of stay by increasing the occupancy rate would enable the turnover rate to increase and would extend hospital benefits to a greater number of people to benefit from hospital services. The study investigated the main causes of long average lengths of stay for different diagnoses. The following factors contribute to extended lengths of stay; Most of the cases admitted to inpatient care for diagnostic tests are confined until results are received before being given medical or surgical treatments. Physician's lateness or absence due to conflicting appointments arising from dividing their time between their hospital service and private practice; It is critical for the hospital to work out arrangements with the physicians to ensure

that such conflicts are minimized. Absence of standard practices; Treatment protocols for the same cause of admission vary among different physicians of the same department. Hospital infections as a result of poor sterilization (although very little data is available on the magnitude of hospital infections and their effect on ALOS).

- It is evident that the existing information systems rarely produce the required information. Research is required into how routine systems can best be altered and augmented. Reliable data will help in identifying resource allocation problems and in planning changes to health sector resource allocation patterns.
- The results of this study will provide a definitive basis for negotiating a price for the daily reimbursement rate for these private patients based upon the average cost per day of 45 L.E. It can also be used for negotiating a reimbursement rate from health insurance companies and for health insurance companies to set insurance prices based on estimated annual costs for hospitalization and utilization in the population covered.
- For Gamhuria General Hospital, increasing the capacity of the general hospital to perform ambulatory surgery and other treatments would potentially assist in increasing hospital occupancy and efficiency while fulfilling patient demand for improved hospital care. This would require upgrading the skills of the surgeons and anesthesiologists, and possibly require some specialized equipment.

The current system of hospital admissions and management, which is divided between the governorate, the Ministry of Health and Population, and the hospital administration, provides no incentive to improve management, quality, and efficiency. Changing the decision-making system so that efficient, high quality care is rewarded will likely have the greatest impact. This change will require increased decision-making autonomy in the hospital regarding staffing patterns, maintenance budgets, and drug purchases, among other considerations. These changes might also lead to the hospital's increased accountability to provide efficient and client-oriented services.

The role of the central and governorate level health administration would expand to developing hospital policy and monitoring as well as assuring quality services.

2.1.3 Estimating the Cost of District Hospital Services

Co-coordinators: Joseph Wamukuo & Pamela Ntutela

Research team: Devina Dawkinun, Siyabonga Jikwana, Sello Setagane, Bridget Maclou and Dolly Mabusela

October 2002

2.1.3.1 Introduction & Background:

The health care system all over the world is facing significant pressure to improve the quality of the service with reducing the rate of cost increase. Increasing need for equity of service and health for all necessitates the adoption of approaches and technologies designed to monitor, compare and improve the performance of health care provider. In some European countries, increased concern about cost and quality of care led to relentless focusing on improving quality of information which in turn resulted in better services, effectiveness and efficiency in use of scarce resources and generally an improvement in the overall health and welfare of the people (Hurst, 1991). Cost analysis is an essential tool relating the inputs of resources in monetary terms to the outputs of services provided by the hospital. Cost information (timely, reliable and good quality information) on a number of aspects, such as the levels and structures of current and future costs, as well as relative efficiencies within and across health facilities, is part of the basic information needed by managers and policy makers for making decisions about how to improve the performance of hospitals and where to allocate the resources within or among hospitals. Also, it allows for performance comparison between different hospitals. Currently, quality hospital cost data to inform policy is generally lacking in this country, as this involves stringent costs information requirements from the hospitals, which in turn entails extra effort in collection and accurate analysis. Secondly, effective cost data requires both good quality primary data as well as appropriate and transparent costing methods. In addition to these, for costs to be relevant for decision-making, the costs should be

provided in disaggregated form, and a variety of analyses are necessary to understand the determinants of cost (Mills 1990, Newbrander et al 1992, Jacobs 1997), Cost data are not always available from routine data systems, due to poor information systems and lack of resources devoted to hospital management, and in the absence of the above, there has been an over-reliance on expenditure review data. Unfortunately this kind of data is only good for accounting purposes but not adequate to assess efficiency levels or accurate estimation of costs per patient for the services provided. Without quality cost data it is not possible to make accurate projections, improve technical efficiency, control expenditure and enhance accountability of managers. The primary rationale for this study was to address the limitations of existing approaches to cost estimation, to compensate for lack of data in district hospitals, provide findings that inform policy regarding hospital performance, and ultimately to use the results on resource use and costs as a first step in estimating the cost of district hospital package developed in 2000. The Health Financing and Economics (HFE) Directorate commissioned the costing study, after being approached by the QA Directorate for assistance. The HFE in turn approached the DCH to cost the two selected hospitals in KwaZulu-Natal while personnel at HFE took care of the remaining three. Financial support for the study came from the European Union (EU).

2.1.3.2 District Hospital Services

In all countries, hospitals are regarded as vital and necessary community resources that should be managed for the benefit of the community (World Health Organization 1987, 1992). The health planners and managers therefore have an obligation in ensuring that essential health care services are not only provided, but most importantly are of high quality and at lowest cost possible. The district hospital packages are those services that could be feasibly delivered at facilities currently defined as district hospitals, subject to financial and human resource availability. The district hospital package as defined in the quality assurance (QA) Directorate's document (Department of Health, 2001) are those interventions dealing with various priority services that require the competencies to be found at first level. There is a set of clinical services that district hospitals should provide (World Health Organization's

functional definition). These disciplines offered at a generalist level include: Medicine, Obstetrics, Psychiatry, Surgery, and Pediatrics and Geriatrics. In South Africa, district hospitals form a crucial part of the district health system (DHS), by both supporting primary health care and being a gateway to more specialist care, and in some circumstances provide primary health care services where there is no alternative source of this care within a reasonable distance. In the long-run, with the continued strengthening of primary health care (PHC) services at the community and health centre levels, it is hoped that the need for hospital services will be reduced to some extent. Not all district hospitals offer the full range of services above, and even for those that do, the district management teams need to be informed of the extent (and efficiency) to which they are meeting these basics and most importantly the cost implications in terms of extra resources requirements in attempting to bridge the gap towards these minimum requirements. As a management technique, cost finding and analysis can furnish the necessary data to help departmental managers, hospital administrators, and policymakers to determine how respective institutions are performing (in meeting these public needs), and for making more informed decisions concerning future operations and infrastructure investments. In the absence of quality hospital cost data, as is the case currently, proper estimations of both current and future health care cost implications are difficult if not impossible. As a result, health care managers are likely to continue with inappropriate generalizations and true health care costs will remain unknown and efficiency and quality poorly assessed and ultimately resulting in less than optimal health care resources allocation and service delivery. This study is therefore important as it goes beyond expenditure review to measuring the costs of providing specific hospital services as well as assessing relative efficiency in service delivery, and will thus help managers make the best use of these resources.

2.1.3.3 Background: McCord Hospital

McCord was established in 1909 and is a 180-bed district cum-regional hospital located in Durban. The hospital has 8 wards, 26 outpatient consultation rooms, and 3

theatres in main theatre block. There are 11 specialist services (surgery, orthopaedics, gynaecology, ophthalmology, ENT, dermatology, medicine, paediatrics, plastic surgery, urology and anaesthetics) provided, most of these on a limited basis. McCord was selected as ideal because of its reputation as a functional hospital, plus it is an urban hospital and is close to the Natal Medical School. McCord had 26 physicians (excluding 12 interns), 300 nurses (100 in training), 30 support staff, 72 administrative staff, and others making up the staff of about 500 people. Based on the results of this survey, McCord services about 10164 inpatients and 157896 outpatients a year. There were about 5700 operations performed in the year. The occupancy rate is estimated to fluctuate around 60% but varies depending on the speciality. The overall length of stay was estimated at 3 days, though this varies again depending with speciality with 4 days estimated at Male surgical and about 11 days in Maternity postnatal. The study used a step-down allocation method to allocate indirect costs (see details above). McCord was divided into 23 departments or cost centres, 10 of which were indirect and 13 direct cost centres.

2.1.3.4 Background: Osindisweni Hospital

Osindisweni is a district hospital located just outside of Durban. The hospital was established in 1963 and currently has 318 beds in use. The hospital has 8 wards (two paediatric wards combined for the study), 5 outpatient consultation rooms, and 2 main theatres. There are no specialist services provided in the hospital. Osindisweni was selected as ideal for being a fairly well runs rural district hospital plus its easy access from the Natal Medical School. Osindisweni had 8 physicians, 231 nurses, 3 lab technicians, 31 administrative staff, and about 200 others. Based on the results of this survey, Osindisweni services about 9000 inpatients and 40000 outpatients a year. There were about 1668 operations performed annually. Bed occupancy rate is about 75% overall. The average length of stay was estimated at 8.8 days (mainly due to lengthy stays in TB wards), ranging from 4.1 days in Maternity to 119 days in Male TB ward. The study used a step-down allocation method to allocate indirect costs (see details above). Osindisweni was divided into 17 departments or cost centres, 5 of

which were indirect (administration and support) and 12 direct cost centres including the theatre.

2.1.3.5 Background: Pretoria west hospital

Pretoria West Hospital (PWH), a district hospital situated in Region C was built in 1964 and started operating in 1974 as a tertiary hospital. It was downgraded to a district hospital about 4 years ago. The hospital has five wards, six consultation rooms in the OPD, and three theatres of which only one is functioning. Wards include a medical, surgical, maternity, paediatric (mostly infection cases), and psychiatric. There are 30 beds in the medical ward, 80 in the paediatric ward, 16 beds and 14 cots and bassinets in the maternity ward, and 26 beds in the surgical ward. There are 666 staff members in the establishment and only 412 of these posts are filled. The hospital's administration has five area managers and one assistant director. The hospital is manned by four principal medical officers, a senior medical officer and a community doctor for house-manship. There are numerous arrangements with private doctors. The acting Superintendent works three days a week, the rest being spent at Garankuwa hospital. He also assists in the diabetic, hypertension and arthritis clinics. The hospital receives transfers and referrals from Karen Park, Hercules, Pretoria West, Danville, Daspoort, Proclamation Hill, and Laudium CHC. It also receives day obstetrics cases from Correctional services. The OPD sees about 7000 patients per month. Specialists for gastroscopy, ophthalmology and ENT visit the hospital once a week. Private Doctors from outside also do sessions at the hospital. A dental clinic is attached to the hospital. The antenatal clinic, is one of the few clinics that open after 5.00 p.m. (1.00 – 7.00pm) Support includes a physiotherapy section run by two physiotherapists, and has a gymnasium, hydro room, sluice room, and a linen room. The pharmacy is run by three pharmacists, two principal pharmacists, one senior pharmacist; one administrative clerk, one pharmacist intern, and three general assistants. The pharmacy gets its supplies via Auckland Park and others directly from pharmaceuticals. It can use 5% of the budget on non – EDL medicines. OPD pharmaceuticals only started in September 2001and there is no record for them.

Dispensary expenditure has been increasing at the cost of other units. The laundry is contracted out, so only a small washing machine is available at the hospital. The hospital also runs a crèche for employees' children aged between 8 weeks and 3 years. The three year olds attend an adjacent pre-primary school until 7.00 pm. The main kitchen caters for patients and children at the crèche, but no meals are provided for staff. The nurses' residence is also used for casual accommodation, bringing in revenue for the hospital. Doctors' quarters are shared with Kalafong hospital. The hospital started an HIV/AIDS project in July 2001, making use of two NGO counsellors. At the time of the research, there were 8 patients in the medical ward. The hospital also runs a "right to sight" project on Saturdays and Sundays, with consultations done by a visiting doctor. Patients are admitted in the surgery ward. The laboratory housed within the hospital is completely independent of the hospital and is administered by the National Health Laboratory Services (NHLS). There are three hospital cars used by staff, and also by patients in cases of emergency. The only available ambulance is in a very bad condition. Generally, teaching in costing started in September 2000, and different sections in the hospital are starting to understand how cost centres work.

2.1.3.6 Executive Summary

Typical costs for providing a range of district hospital services are the subject of this report. The report presents cost estimates (both inpatient and outpatient) in five hospitals (in four provinces). The hospitals were purposively selected to include those with fairly good quality data and at the same time providing most of the services included in the district hospital "package". Cost analysis is an essential tool relating the inputs of resources to the outputs of services provided by the hospital. Cost information is part of the basic information needed by managers and policy makers for making decisions about how to improve the performance of a hospital and where to allocate the resources within or among hospitals. Also, it allows for performance comparison within and between different hospitals. The study can be viewed as the first of its kind in the country where a detailed costing has been done as opposed to the usual review of expenditure. The primary rationale for this study was to provide a

basis on which to compare hospital costs of individual departments and services within and across facilities. The report thus gives details of the unit costs for various services from outpatient care to various inpatient services. Along with other performance indicators, this data will be analyzed further to fulfill the second and main rationale for the study, which is to ultimately estimate the cost of the district hospital package. The Health Financing and Economics Directorate (HFE) on behalf of the Quality Assurance (QA) Directorate commissioned the study. The HFE together with DCH, Natal University did the cost analysis, with financial support provided by the European Union (EU).

2.1.3.7 The main findings of the study can be summarized as follows:

• The average outpatient visits per hospital were 62081 (range: 157896 to 7276)

• Inpatient days per hospital ranged from 78996 to 11578 (or about 40580 on average)

• Average Length of Stay was 4.6 days. By diagnosis: for Psychiatry and TB patients was as high as 37 (PWH) and 119 (Osindisweni) days respectively.

• Number of physicians varied from 26 (McCord) to 1 (Harrismith)

• Highest total hospital cost was R37, 780,736 (McCord), least R7, 014,296 (Harrismith), and R22, 876,513.37 (on average)

• Total costs by cost centre were highest in the IPD, followed by OPD and Theatre respectively.

• Total OPD costs averaged R5, 710,406.89 (ranging from R13,731,717 to R1,193,886), and IPD averaged R15,289,062.98 (R19,421,777 to R5,251,582).

• Outpatient costs per visit averaged R119.39 (R182.58 to 54.18). Inpatient cost per day was estimated at R427.25 (R634.70 to R233.24).

• Staff cost per OPD visit (R92.83), per IPD day (R326.34), per admission (R1, 312.39) and per operation (R730.32).

• Inpatient cost per admission averaged R1, 716.76 (R2, 055.40 to R1, 397.81); deliveries cost R2, 295.98 (R4, 291.85 to R1, 558.15),

• An inpatient day cost between three to four times an average outpatient visits

• An overall hospital PDE cost was estimated at R468.19 (686.34 to 248.65) based on above ratio.

• It costs approximately nine times for a single operation compared to an OPD visit and about three times the daily inpatient cost.

• McCord's OPD was relatively the most efficient, despite high total costs, suggesting scope for efficiency improvements within other hospitals.

• Total cost by input, the highest was staff 78.28% (OPD), 77.05% (IPD) and 68.61% (Theatre), the drug costs were 4.61%, 5.21% and 4.23% respectively.

• Fixed costs comprised 86.82% (OPD), 86.55% (IPD), and 82.63% (Theatre), while direct costs were 60.40%, 64.66% and 68.57 respectively.

• The high proportion of fixed costs suggests scope for efficiency improvements in resource allocation and usage.

CHAPTER 3- METHODOLOGY

3.1 TYPE OF PROJECT

The project is a descriptive, analytical desk research, comparing the existing facts, published sources and quantitative data to derive meaningful conclusions. Descriptive research studies also known as statistical research are concerned with describing the data and characteristics of a particular individual, or of a group or phenomenon being studied. Analytical desk research involves evaluation of already available secondary data, arriving at results and interpreting the same for clear understanding of derived conclusions.

3.2 TARGET RESPONDENTS

Hospitals of Coimbatore, their departments and their services are taken for the study.

3.2.1 Hospital Targeted:

GKNM Hospital

Sri Ramakrishna Hospital

KG Hospital

3.2.2 Departments Selected:

Dermatology

Pulmonology

Orthopaedics

3.2.3 Services Considered:

Diagnostic Services

Treatment Types

3.3 ASSUMPTIONS, CONSTRAINTS AND LIMITATIONS

3.3.1 Assumptions-

- The nature of services provided by the hospitals covered under the study is similar.
- The data provided by the hospitals are taken to be genuine.
- The equipments used for diagnosis and treatment are assumed to be of similar technology and working capacity.

3.3.2 Constraints-

- The study is based on the hospitals functioning in Coimbatore City only.
- The study is restricted to three particular departments only.
- Selective diagnostic services and treatments common to all the three hospitals under study are alone considered.

3.3.3 Limitations-

- The study is not applicable to specialty hospitals.
- The results of the study cannot be generalized to other hospitals in the same industry.
- Confidential information beyond access cannot be obtained.

3.4 TOOLS FOR ANALYSIS

- Rank Correlation to rank the hospitals based on cost of diagnostic services.
- Weighted Average methods to develop an index based on patient preferences and rate the hospitals treatment wise.

CHAPTER 4- DATA ANALYSIS AND INTERPRETATION

4.1 TOOLS OF ANALYSIS

4.1.1 ARITHMETIC MEAN AND WEIGHTED AVERAGE

The following table shows the comparative costs charged by the three hospitals for treatments in the Department of Pulmonology and the comparative patient preferences, treatment-wise.

Table 4.1.1.1: Cost and Patient Preference Pulmonology Treatment-wise

TREATMENTS	K.G HOSPITAL		G.K.N.M HOSPITAL		SRI RAMAKRISHNA HOSPITAL	
	COST	PATIENTS	COST	PATIENTS	COST	PATIENTS
Bronchial Asthma	2400	30	1500	42	2000	37
Lung cancer	22000	25	15000	38	18000	33
Pulmonary TB	15000	38	11000	45	11500	40
Pneumonia	12000	24	8000	36	7500	35
Pulmonary viral	9000	18	5000	32	7000	15
Arithmetic Mean	**12080**	**29.4**	**8100**	**38.6**	**9200**	**32**
Weighted Average	**11,170**		**8,166**		9,347	

Inference:

It is understood from the above table that the costs of Pulmonology treatments is reasonable and cheap for GKNM Hospital when compared to Sri Ramakrishna and K.G hospitals. The mean value of treatment cost for GKNM is Rs.8100 and stands to be the lowest. Considering the patient preference, the mean value of GKNM is 38.6 and highest when compared to the mean values 32 and 29.4 of Sri Ramakrishna and K.G respectively. In this case again, Sri Ramakrishna holds a better preference of patients with a mean value of 32, higher than K.G. Taking into account the weighted average values, GKNM again records the lowest value of Rs.8166 comparitively.

The following table shows the comparative costs charged by the three hospitals for treatments in the Department of Orthopaedics and the comparative patient preferences, treatment-wise.

Table 4.1.1.2: Cost and Patient Preference Orthopaedic Treatment-wise

TREATMENTS	K.G HOSPITAL		G.K.N.M HOSPITAL		SRI RAMAKRISHNA HOSPITAL	
	COST	PATIENTS	COST	PATIENTS	COST	PATIENTS
Hip replacement	48000	25	40000	33	44000	29
Knee replacement	43000	29	37000	35	40000	30
Arthroplasty	25000	30	23000	39	25000	35
Hand injuries	43000	28	40000	42	39000	36
Spinal injuries	50000	35	35000	50	41000	46
Arithmetic Mean	**41800**	**29.4**	**35000**	**39.8**	**37800**	35.2
Weighted Average	**41,844**		**34,884**		37,733	

Inference:

It is understood from the above table that the costs of Orthopaedic treatments is reasonable and cheap for GKNM Hospital when compared to Sri Ramakrishna and K.G hospitals. The mean value of treatment cost for GKNM is the least and stands to be Rs.35000. When the patient preference is looked into we observe that the mean value of GKNM is 39.8 and highest while the mean value of Sri Ramakrishna is 35.2 and moderate. The mean value of treatment cost stands lowest for K.G with 29.4. Taking into account the weighted average values, GKNM again records the lowest value of Rs.34884 comparitively. It is clear that the consistency of GKNM Hospital in terms of charges for treatments as well as its patient preference is the highest.

The following table shows the comparative costs charged by the three hospitals for treatments in the Department of Dermatology and the comparative patient preferences, treatment-wise.

Table 4.1.1.3: Cost and Patient Preference Dermatology Treatment-wise

TREATMENTS	K.G HOSPITAL		G.K.N.M HOSPITAL		SRI RAMAKRISHNA HOSPITAL	
	COST	PATIENTS	COST	PATIENTS	COST	PATIENTS
Psoriasis	4200	13	3000	19	3500	15
Eczema	2300	17	1500	26	1500	24
Pyoderma	4600	22	3250	31	3800	29
Acne	4500	34	3500	36	4200	30
Cosmetic Surgery	38000	11	30000	23	33000	18
Arithmetic Mean	**10720**	**19.4**	**8250**	**27**	**9200**	**23.2**
Weighted Average	**7,896**		**7,502**		**7,920**	

Inference:

It is understood from the above table that the costs of Derma treatments is reasonable and cheap for GKNM Hospital when compared to Sri Ramakrishna and K.G hospitals. The least mean value of treatment cost is Rs.8250 while the highest mean value of patient preference is 27. GKNM, again scores to be more consistent than Sri Ramakrishna and K.G having mean values of cost Rs.10720 and Rs.9200 and mean values of patient preferences 19.4 and 23.2 respectively. When Sri Ramakrishna is compared to K.G, it has a better standing in terms of cost and patient preferences. Taking into account the weighted average values, Rs.7502 of GKNM Hospital is the lowest.

The following table shows the income-based preference of hospitals as well as the departmental preference by patients.

Table 4.1.1.4: Income-Based & Department-Wise Preference of GKNM Hospital

DEPARTMENT	INCOME OF PATIENTS SEEKING TREATMENT				
	0-5000	5000-15000	15000-25000	Above 25000	Mean
Orthopaedics	62	55	41	37	**48.75**
Pulmonology	73	67	56	45	**60.25**
Dermatology	66	53	35	28	**45.5**
Mean	**67**	**58.33**	**44**	**36.67**	

Inference:

Observing the above table, it is understood that the arithmetic mean 67 is highest for GKNM hospital in case of income groups between 0-5000. People with income between 5000 and 15000 who resort to the hospital are greater rather than those under income groups of above 15000 and 25000. Hence it is inferred that GKNM is most affordable as people with below average and average income approach the hospital in greater numbers than those with high income. Looking into the departmental mean values, Pulmonology Department is preferred the highest with 60.25 in comparison with Orthopaedics and Dermatology with 48.75 and 45.5 respectively.

The following table shows the income-based preference of hospitals as well as the departmental preference by patients.

Table 4.1.1.5: Income-Based & Department-Wise Preference of Sri Ramakrishna Hospital

DEPARTMENT	INCOME OF PATIENTS SEEKING TREATMENT				
	0-5000	**5000-15000**	**15000-25000**	**Above 25000**	**Mean**
Orthopaedics	58	46	53	46	**50.75**
Pulmonology	70	25	61	59	**53.75**
Dermatology	37	51	52	32	**43**
Mean	**55**	**40.67**	**55.33**	**45.67**	

Inference:

From the above table, we infer that the arithmetic mean 55.33 is highest for GKNM hospital in case of income group 15000-25000. People with income between 0 and 5000 fall second in their approach towards the hospital. People with income 5000-15000 and above 25000 resort to the hospital services at a lesser rate as reflected by the mean values 40.67 and 45.67 that are comparitively low. Hence it is inferred that though Sri Ramakrishna Hospital is expensive than GKNM for income group 5000-15000 it is still affordable for income groups 0-5000 and 15000-25000. Looking into the departmental mean values, Pulmonology Department is preferred the highest by patients with 53.75 in comparison with Orthopaedics and Dermatology with 50.75 and 43 respectively.

The following table shows the income-based preference of hospitals as well as the departmental preference by patients.

Table 4.1.1.6: Income-Based & Department-Wise Preference of KG Hospital

DEPARTMENT	INCOME OF PATIENTS SEEKING TREATMENT				
	0-5000	5000-15000	15000-25000	Above 25000	Mean
Orthopaedics	23	35	58	69	**46.25**
Pulmonology	44	39	73	75	**50.25**
Dermatology	24	23	66	64	**44.25**
Mean	**30.33**	**32.33**	**65.67**	**69.33**	

Inference:

It is understood from the above table that the arithmetic means 69.33 and 65.67 of income groups above 25000 and 15000-25000 respectively, stand to be highest for K.G hospital. People with income of 0-5000 and 5000-15000 approach the hospital in least numbers as the mean values of income-based patient preferences-30.33 and 32.33 are comparitively less. Hence it is inferred that K.G. hospital is expensive and affordable for high-income group in the city. Taking into account the departmental mean values, Pulmonology Department is preferred the highest by patients who approach K.G.Hospital with 50.25 in comparison with Orthopaedics and Dermatology with 46.25 and 44.25 respectively.

4.1.2 SPEARMAN'S RANK CORRELATION

GKNM HOSPITAL and SRI RAMAKRISHNA HOSPITAL

The following table shows the correlation analysis of diagnostic services of GKNM Hospital in comparison with Sri Ramakrishna Hospital along with their costs.

HYPOTHESIS:

Hypothesis = 0: The cost of similar diagnostic services does not vary with GKNM and Sri Ramakrishna Hospitals.

Hypothesis ≠ 0: The cost of similar diagnostic services varies with GKNM and Sri Ramakrishna Hospitals.

EXECUTION:

Table 4.1.2.1: Rank Correlation of GKNM against Sri Ramakrishna Hospital

N value	DIAGNOSTIC SERVICES	GKNM HOSPITAL	Rank 1 (R1)	SRI RAMAKRISHNA	Rank 2 (R2)	d	d^2
1	Blood Test	600	4	850	4	0	0
2	Skin Biopsy	2000	8	2300	8	0	0
3	Blood test & Culture	1600	7	1800	6	1	1
4	Skeletal X-Ray	750	5	800	3	2	4
5	MRI Scan	5000	10	4500	9	1	1
6	Chest X-Ray	150	1	180	1	0	0
7	Sputum Culture	300	2	450	2	0	0
8	Allergic Tests	500	3	900	5	-2	4
9	Blood Analysis	1500	6	2000	7	-1	1
10	C.T.Thorax	4000	9	4800	10	-1	1
							$\sum d^2$ =12

$R = 1 - \frac{6\sum d^2}{n^3 - n}$

$= 1 - 72/990$

$= 0.93$

CONCLUSION:

The value of R falls between +1 and -1 and is fairly more positive. Since the value 0.93 is not equal to zero, the alternative hypothesis is accepted. Thus cost of similar diagnostic services varies with GKNM and Sri Ramakrishna Hospitals.

GKNM HOSPITAL and K.G. HOSPITAL

The following table shows the correlation analysis of diagnostic services of GKNM Hospital in comparison with K.G Hospital along with their costs.

HYPOTHESIS:

Hypothesis = 0: The cost of similar diagnostic services does not vary with GKNM and K.G Hospitals.

Hypothesis ≠ 0: The cost of similar diagnostic services varies with GKNM and K.G Hospitals

EXECUTION:

Table 4.1.2.2: Rank Correlation of GKNM against K.G. Hospital

N value	DIAGNOSTIC SERVICES	GKNM HOSPITAL	Rank 1	K G HOSPITAL	Rank 2	d	d^2
1	Blood Test	600	4	1000	4	0	0
2	Skin Biopsy	2000	8	2600	8	0	0
3	Blood test & Culture	1600	7	2000	6	1	1
4	Skeletal X-Ray	750	5	950	3	2	4

5	MRI Scan	5000	10	5500	10	0	0
6	Chest X-Ray	150	1	200	1	0	0
7	Sputum Culture	300	2	280	2	0	0
8	Allergic Tests	500	3	1100	5	-2	4
9	Blood Analysis	1500	6	2200	7	-1	1
10	C.T.Thorax	4000	9	4800	9	0	0
							$\sum d^2$ =10

$R = 1 - \frac{6\sum d^2}{n^3 - n}$

$= 1 - 60/990$

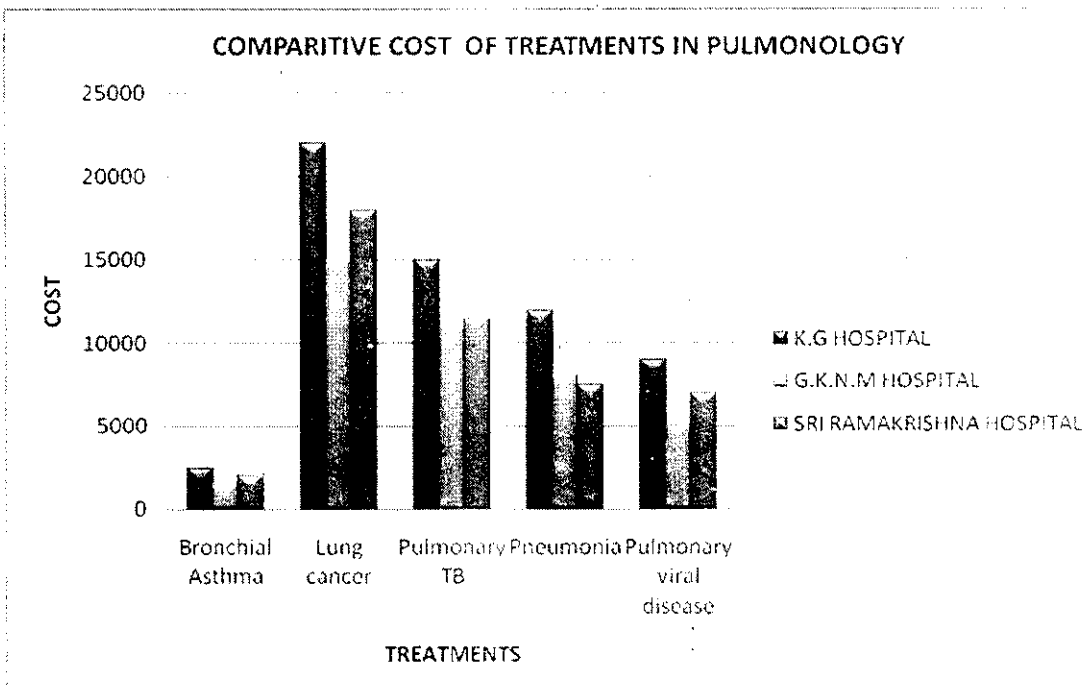
$= 0.94$

CONCLUSION:

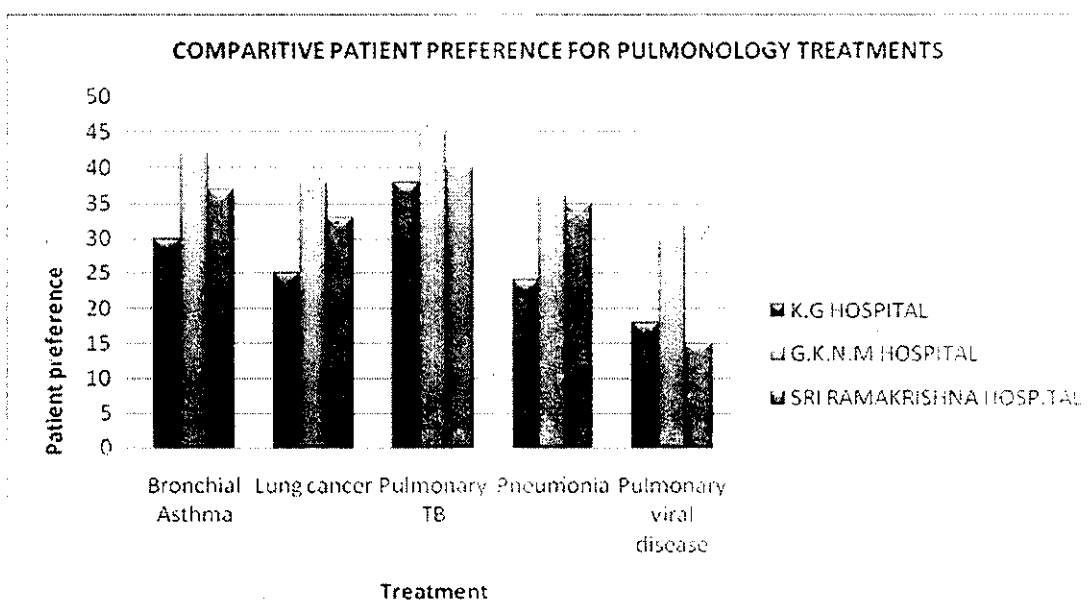
The value of R falls between +1 and -1 and is fairly more positive. Since the value is not equal to zero, the alternative hypothesis is accepted. Thus cost of similar diagnostic services varies with GKNM and K.G Hospitals.

4.2 DIAGRAMMATIC REPRESENTATIONS

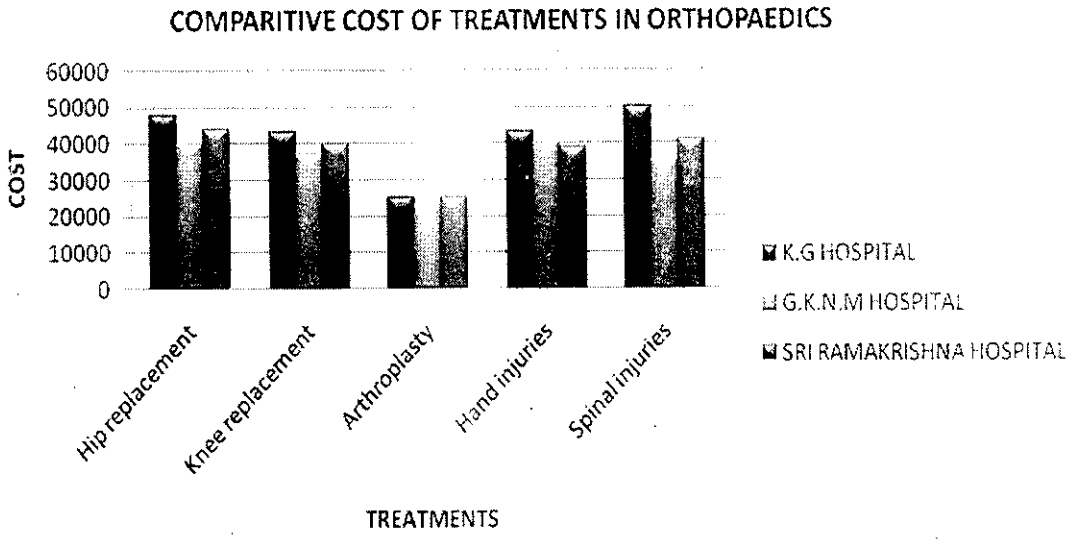
4.2.1a: CHART WITH REFERENCE TO TABLE 4.1.1.1



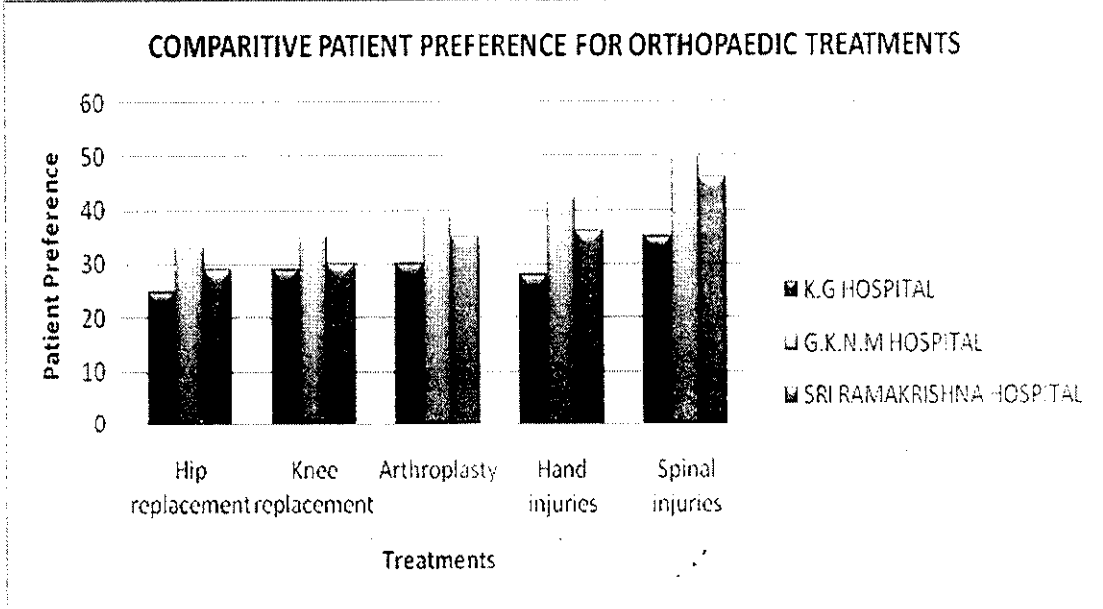
4.2.1b: CHART WITH REFERENCE TO TABLE 4.1.1.1



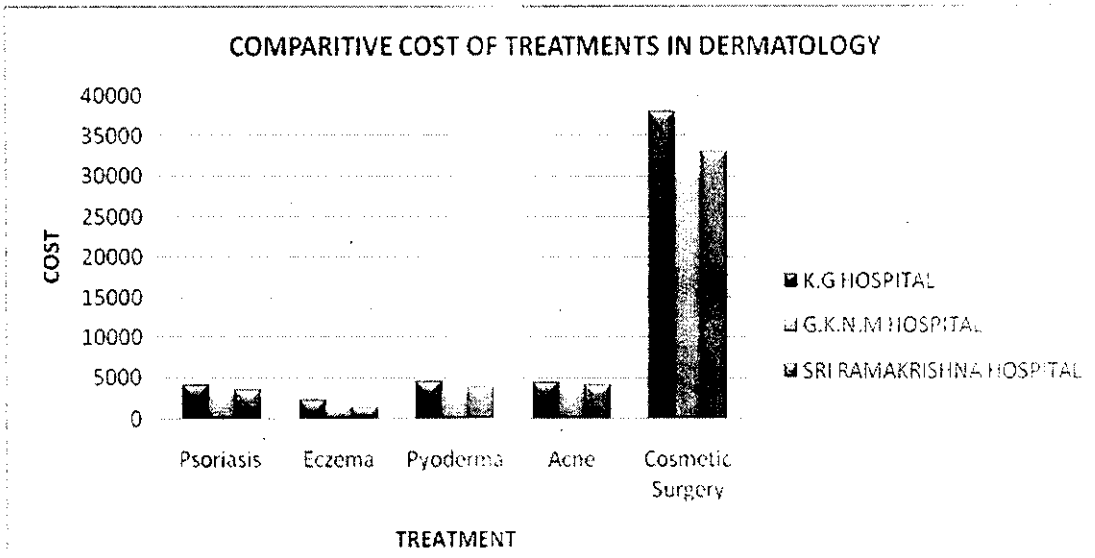
4.2.2a: CHARTS WITH REFERENCE TO TABLE 4.1.1.2



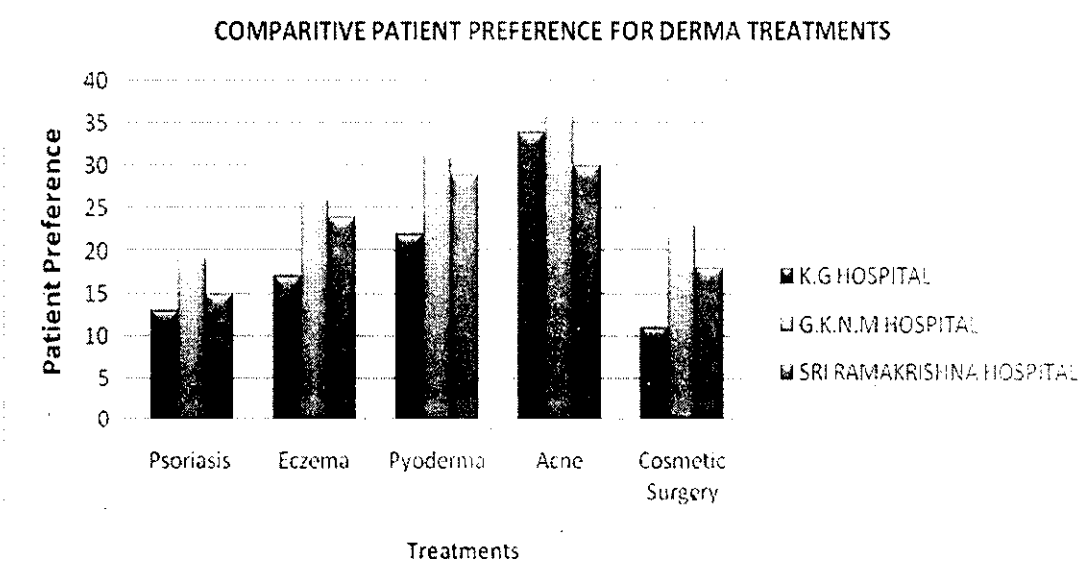
4.2.2b: CHARTS WITH REFERENCE TO TABLE 4.1.1.2



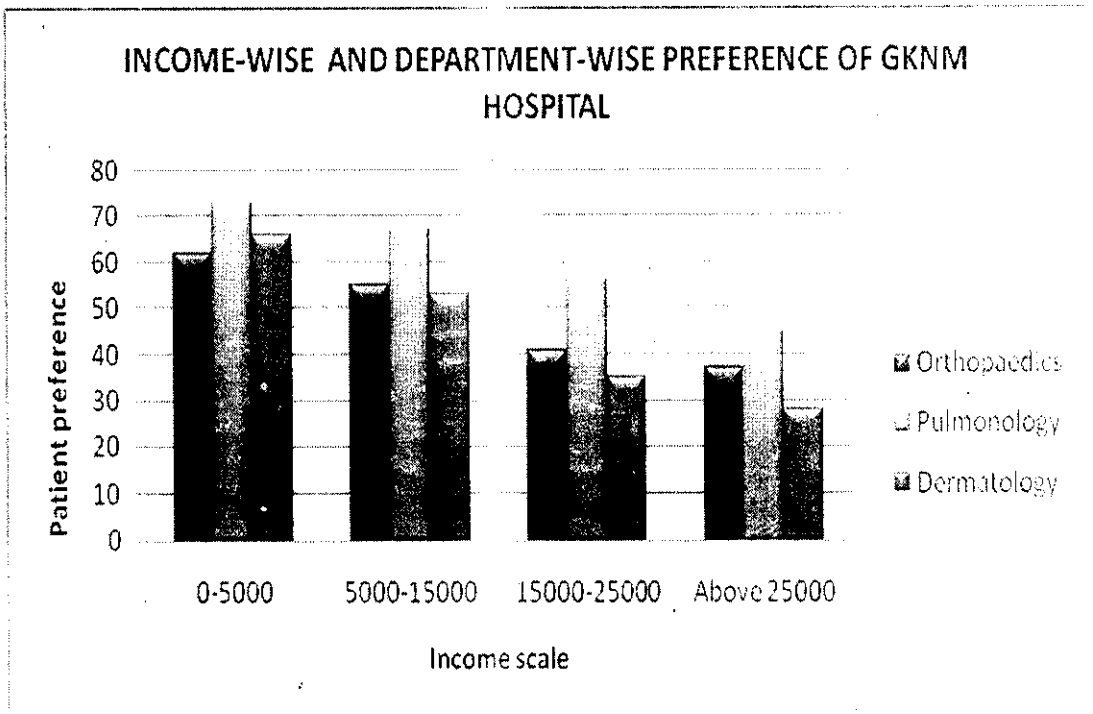
4.2.3a: CHARTS WITH REFERENCE TO TABLE 4.1.1.3



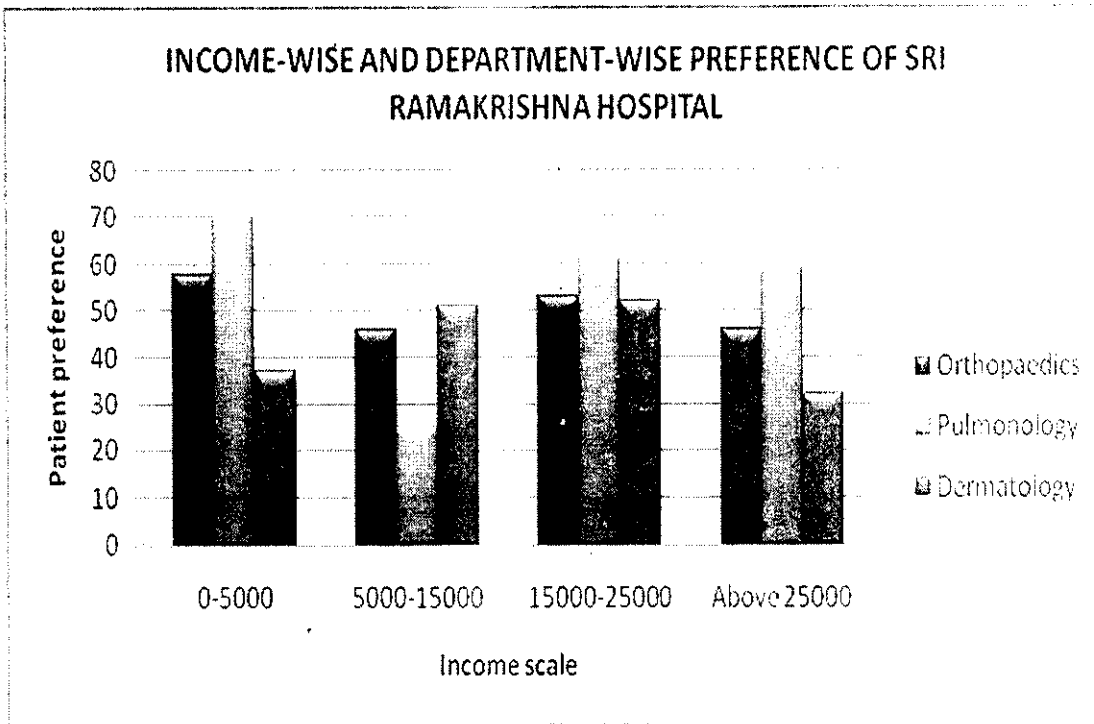
4.2.3b: CHARTS WITH REFERENCE TO TABLE 4.1.1.3



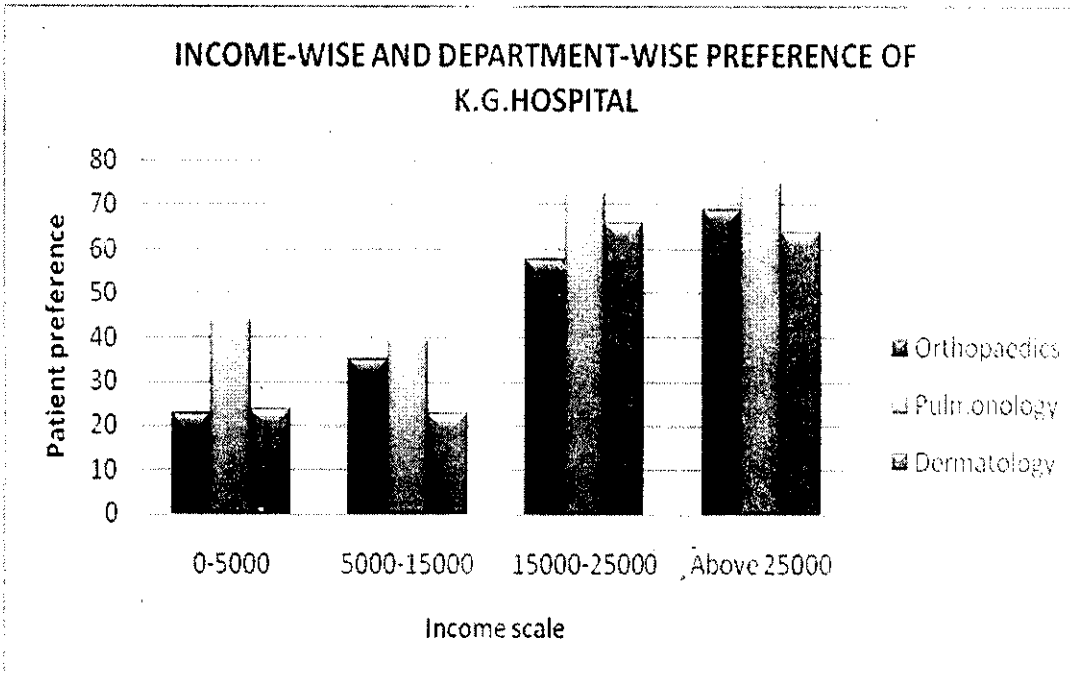
4.2.4 CHART WITH REFERENCE TO TABLE 4.1.1.4



4.2.5 CHART WITH REFERENCE TO TABLE 4.1.1.5



4.2.6 CHART WITH REFERENCE TO TABLE 4.1.1.6



4.3 DELIVERABLES

- The hospital affording best and reasonable costs for treatments in the departments of Pulmonology, Orthopaedics and Dermatology is arrived at.

- The patient preference of hospitals, treatment-wise for every individual department is obtained.

- The income-based preference of hospitals is derived.

- The department-wise, most preferred hospital is found.

- The dissimilarities in the cost of diagnostic services of GKNM Hospital against its major competitors are concluded using hypotheses.

CHAPTER 5 – CONCLUSIONS

5.1 SUMMARY OF FINDINGS

- The arithmetic mean of costs for Pulmonology treatments is lowest (Rs.8100) for GKNM Hospital.
- The arithmetic mean of patient preference for Pulmonology treatments is highest (38.6) for GKNM Hospital.
- Sri Ramakrishna falls second both by cost and patient preference for Pulmonology treatments, showing moderate mean values Rs. 9200 of cost and 32 of patient preference.
- K.G. Hospital shows a high mean value of Rs.12080 for treatment cost and records the least mean of 29.4 for patient preference.
- GKNM Hospital shows the lowest mean value of 35000 for cost and highest mean value of 39.8 for patient preference in case of Orthopaedic treatments.
- Sri Ramakrishna stands in between GKNM and K.G. Hospitals with not too high or low mean values for cost (Rs.37800) and patient preference (35.2) towards Orthopaedic treatments.
- The Orthopaedic treatments' mean value of cost is the highest (Rs.41800) and that of patient preference is the lowest (29.4) for K.G.Hospital.
- Sri Ramakrishna Hospital shows lower arithmetic mean for cost of Dermatology treatments (Rs.9200) when compared to K.G. Hospital with mean Rs.10720 but a higher mean value against GKNM Hospital which shows a mean of Rs.8250.
- Taking into consideration the patient preferences of Derma treatments, the mean values of GKNM, Sri Ramakrishna and K.G. Hospitals are 27, 23.2 and 19.4 respectively. Hence GKNM is most preferred.

- Income-wise, GKNM Hospital is mostly sought by people of income groups 0-5000 and 5000-15000 since these categories hold higher mean values of 67 and 58.33.

- Sri Ramakrishna Hospital is approached in large numbers by people with income 0-5000 (mean value-55) and 15000-25000 (mean value-55.33).

- The high income group with income between 15000 and 25000 or above 25000 resort to treatments in K.G. Hospital since their mean values are 65.67 and 69.33 respectively.

- When all the three hospitals are considered together as in tables 4.1.1.4, 4.1.1.5 and 4.1.1.6, the three hospitals are mostly sought by patients for Pulmonology treatments and off the three, GKNM Hospital stands first with an arithmetic mean of 60.25.

- As far as Orthopaedics is concerned, Sri Ramakrishna Hospital stands first with a mean value of 50.75 and K.G.Hospital falls third with mean value of 46.25.

- GKNM Hospital again gains momentum in patient preference with a mean value of 45.5 for Derma treatments in comparison with Sri Ramakrishna Hospital with 43 and K.G.Hospital which holds a better stand than Sri Ramakrishna with 44.25.

- The dissimilarities in the costs of GKNM's diagnostic services from that of Sri Ramakrishna is revealed as the value 0.93 derived using rank correlation supports the alternative hypothesis.

- The dissimilarities in the costs of GKNM's diagnostic services from that of K.G. Hospital is revealed as the value 0.94 derived using rank correlation supports the alternative hypothesis.

5.2 SUGGESTIONS & RECOMMENDATIONS

The study indicates that of the three hospitals, GKNM stands to be the most preferred in terms of cost, patient income and departmental treatments. Sri Ramakrishna has a setback in this relevance, yet enjoys preference compared to K.G.Hospital. It is suggested that K.G. Hospital which is affordable to the high income group of the city, can reduce on its costs, so that it can be approached for its healthcare services by middle as well as low income group people too.

5.3 CONCLUSIONS

The comparative study of the treatment costs as well as costs of diagnosis in GKNM Hospital, Sri Ramakrishna Hospital and K.G.Hospital reveals that costs are least expensive and public preference both department-wise and income-wise is greatest for GKNM hospital. The arithmetic mean, weighted average and correlation analyses reflect the consistency of GKNM Hospital against its major players in the city.

The hospital's rates are really affordable for average and below average income group. The hospital also leads in patient preference towards two of the major departments under study namely, Pulmonology and Dermatology against the other two hospitals. Hence it is declared that GKNM provides the best and most satisfactory services as well as treatments at reasonable rates to the people of Coimbatore City.

5.4 DIRECTIONS FOR FUTURE RESEARCH

- The study has taken into account only specific departments and selective services. This can be used as a basis to study multiple departments and services as well.
- The healthcare services of hospitals in Coimbatore as studied can be made use of as a sample study to conduct a research with the area of study elaborated.
- Future studies can make use of primary data source in place of secondary data which provides data with a wide scope.
- A comparative study on costs of speciality hospital services can be made just as a comparison of departments is done under this project.
- The project ideas may also be used to compare and contrast with traditional and modern healthcare systems, their financial benefits, monetary disadvantages, services rendered and costs.

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