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A Study on the Problems and Prospects of Health Care Services in Thiruvananthapuram

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INTRODUCTION

The Indian healthcare industry is set to explode. The industry, worth today Rs.100 billion, is poised to. surge by Rs. 15,000 Crore annually.

Often it is talked about speeding up the process of socio-economic transformation but less is done for human capital formation. Even in an age of hi-tech, the proverb ―Health is above Wealth‖ is found relevant. It is the responsibility of all the institutions related to health to provide medical facilities to the mankind. Today, the major emphasis in providing health care services is on Corporate Hospitals.

The medical profession has widened its horizon world wide and India is no exception. Corporate Hospitals are emerging as new breed in health care industry in India. These hospitals are attracting a number of patients because of their super specialties. There is a keen competition among these hospitals for market share. The emphasis is not only to provide specialized services more efficiently and effectively, but also to maintain the quality of overall services.

The major concern for corporate hospitals is on consumer satisfaction. In the service marketing, it is evident that just not that four P‘s, i.e. Product, Price, Place and Promotion play a vital role, but also other P‘s like People, Physical Evidence and Process play an important role in satisfying the consumer.

Today, customer satisfaction is a growing field of research and teaching. An important reason for studying consumer satisfaction is evaluation of consumer groups with unsatisfied needs and desires. The essence of modem marketing concept is that all the elements of business should be geared for the satisfaction of consumers.

Quality Management and Patient Satisfaction:

In a significant shift toward customer focus in the health care industry, one of the hospitals recently announced that they would no longer reward physicians for controlling medical eosts(a classic production mindset) and will instead tie physician bonuses to patient‘s satisfaction. What is found interesting in the ensuing public discussions of this initiative is the almost universal confusion over just what constitutes ―Patient satisfaction.‖ Or die even more troubling term ―Patient happiness‖.

Again, such confusion is perhaps not surprising in an industry that has hardly distinguished itself by its customer orientation over the past few years. While enclaves of customer-focused health care do exist, consideration of customer needs and wants have rarely factored into the development of our current health care institutions. Instead, corporate financial objectives have driven ―growth‖. As a resultas is now being reported in the media— both patients and doctors are increasingly dissatisfied.

Much has yet to be learned about what it means to be customer-focused in the health care industry. Ask any group of physicians ―How do they define quality in health care?‖ and the following responses will be received.

Care given in a current, up-to-date, on-time service at a reasonable rate for the greatest number of people. Health care quality is a measure of customer expectations and their experience. Quality-customer satisfaction consisting of sound medical treatment and education.

Quality in health care:

The procedures that either directly or indirectly contribute to the mission of an organization in providing timely, courteous and compassionate care. Good medical care in all its ramifications. Price is a separate consideration. Providing what is known as best medical practice to patients. True quality cannot be achieved without the patient‘s willingness to receive ―quality care‖ - the benchmark for ―quality care‖ is ultimately defined by the patient.

Quality = service provided - expectations

Quality is determined by how well the services provided, fulfill the expectations of the patient receiving those services. Experience of the health care consumer results in the perception of value in receiving evidence-based treatment for a specific disorder with the goal of improving, eradicating, or preventing a disorder.

What is perceived as being quality: Quality is

1. Warranted for the specific and general conditions
2. Cost efficient and
3. Patient/Payers expectations.

Quality refers to the closeness of an actual outcome to the outcome expected by the observer, as defined or agreed to by that observer.Meeting or exceeding expectations by delivering appropriate care in a costeffective and efficient manner. Quality - the best expected outcome in the treatment of a disease process, whether medical or surgical. Quality of care is the degree to which health services for individuals and populations are consistent with current professional knowledge and reflect the preferences of well-informed consumers with regard to the trade-off between increasing desired health outcomes and reducing their consumption alternatives.

In the above responses, you see two basic quality definitions. One is focused on clinical quality as measured by outcomes and the other is focused on service quality. Just a few years ago, these would have represented the majority view of physicians when asked‖ what is quality?‖ After all, clinical quality is what is focused on and taught in medical schools. In the above (arguably small and biased) sample, however, a number of responses reflect an understanding of service quality, which has got basic customer expectations and evaluations of performance.

Numerous studies have shown that health care customers tend to ―assume‖ clinical quality form providers. That is, a diploma hanging on the wall is good enough for them. That makes sense as relatively few users of health care services are capable of evaluation clinical quality. Medical professionals themselves constantly disagree. What health care customers like customers for all other products and services do understand and base their quality evaluations4 on, however, are such things as how many times the phone rang before they got through to the office, how they were treated at the front desk and whether or not anyone seemed interested in their problem. These are customer satisfaction and service quality issues. These are the basis of patient satisfaction and, yes, patient happiness.

Management of Behavior Hospital:

Before one goes through the management of behavior in hospitals, it is essential to understand the perception of behavior. We are well aware of the fact that a theory is always based on logical reasoning. There are certain things, which represent the universal truths. Because we go through the perception of behavior of hospital management, it is right to consider behavior as a systematic effort to understand the behavior of people serving in Corporate Hospitals. Further understanding is required about the behavior of patients, users of Corporate Hospitals. Thus understanding the people serving the Corporate Hospitals and understanding the patients nurturing the hospital becomes important in the behavior. Because we find the behavior a combination of large factors, it is pertinent to go through the psychological, sociological, political and economic factors substantially influencing the behavioral profile. In Corporate Hospitals the patients are motivated to use the service of the hospital based on the profile of Doctors and the reputation of the Doctors. Today Corporate Hospital attracts even financial incentives for using the services of a hospital.

Psychological Influences:

One cannot easily understand the instrumentality of psychological factors on the behavioral profile of patients, attendants, hospital personnel and Doctors. Since we go through the behavioral influences, it is essential to make it clear that hospital personnel need to go through the psychological problems because they have to satisfy the patients and attendants. On the other hand, the hospital personnel can counter the problem related to the departmental conflicts if they are well aware of the psychological factors influencing the behavior and shaping the expectations. This focuses attention on attitudes and motivation.

Doctor- Patient Relationship:

Due weightage to the Doctor-Patients relationship in the management of hospital is given because the concept of good-patients care is based on the same. On account of conflicting perception in the minds of both, the problem is found a bit complicated. The doctors have expertise or specialization in a particular discipline.They have professional excellence and are also supposed to have ethical and human values. The patients on the other hand are found in stress with high level of expectations because they consider Doctors thoughtful and warm person and committed to do everything for the welfare of patients. Such a situation increases the responsibility of a doctor. It is his/her professional excellence, personal-touch-inservices, humanitarian approach, ethical values that play a big role in satisfying the patients

Nurse-Patient Relationship:

Another important facet of hospital personnel-relationship is the nurse-patient relationship. Of course it was found that degeneration in the perception of relationship in the field of Medicare service. It is a well know fact that the nurses play an incremental role in the treatment process and therefore even a minor degeneration in their attitudes would result into a major loss to the patients. The nurses and sisters need to work with the service motto. Of course they also need financial incentives to fulfill their essential requirement but it is not to be forgotten that patients have a high level of expectations from them and their actions and behavior should not frustrate them. They have skills, they are also found personally-committed but the existing scenario and the increasing degeneration in the environment at the work place may disturb them and to counter the same, they need to be strong enough to face the multidimensional challenges.

Hospital personnel - Patients Relationship:
The relationship of hospital personnel with the patients can be classified in two parts, viz., Doctor-patients relationship and Nurse-Patients relationship.

Behavioral Conflicts in Corporate Hospitals:
The services of hospital are based on teamwork. This requires an enormous cooperation of almost all the departments. The medical services, nursing services, food services, pharmacy services, radiology services, ward services, engineering services, outpatient services and may other services cannot be managed by a single departments would have a common goal of serving the patients. Thus, co-operation and co-ordination become essential for managing hospitals efficiently. There are different types of services and therefore, we find different
heads of different departments but they are supposed to work with a common goal. The increasing inefficiency in the government hospitals draws our attention on conflicts found in different departments in different forms. The ego-conflict, interest conflict, priority- conflict are found making the quality of environment at the workplace unfriendly which has been degenerating the qualify of hospital services. It is against this background that we need to go through the problem of behavioral conflicts. Since the hospital managers bear the responsibility of establishing and creating work environment, it is pertinent that they are serious to the problems obstructing the process.

Concept of services:
Services‘ to put in simpler terms are deeps, processes and performances. Services are not tangible that can be touched, seen and left, but rather are intangible. Hence, in corporate hospital it is very important the intangible things like ambience of hospital, caring aspect of nurses and ward boys and proper diagnosis of doctors attract more patients in that corporate hospital. The characteristics of services in corporate hospitals are:
A) Intangibility
B) Heterogeneity
C) Simultaneous production and consumption (timely)
D) Perishability

The Service Marketing Angle:
With reference to service marketing in Corporate Hospitals, three types of marketing must be successfully carried oul and that all of them revolve around making and keeping promises to patients.
1. External Marketing - setting the promise
2. Internal Marketing - Enabling the promise
3. Interactive Marketing - Delivering the promise

Health Care in India:
Health care industry in India is an emerging industry as health has become of utmost importance to all human beings. The Indian are becoming more and more health conscious. The following contribute for the growth of industry.
The national average of proportion of household in the middle and higher middle- income group has increased from 14% in 1990 to 20% in 1996 and 48% in **2010.**

Private insurance‘ will drive the healthcare revenues. Considering the rising middle and higher middle-income group we get a conservative estimate of 200 million insurable lives.
The population to bed ratio in India is 1 bed per 1000, in relation to the WHO norm of a bed per 300. In India, there exists space for 75000 to 100000 hospital beds. The Indian healthcare industry is worth Rs.100 billion today, and it is expected to grow by around 13% to 15% annually.
Corporate Hospitals failed a decade ago because they emerged in isolation and were not part of a larger phenomenon. However, now there are the insurance companies, the hospital hardware and the software companies, which have come together to create the boom.

The major thrust areas in Health Care Industry are as follows:
Factors attracting corporate to the Healthcare sector

- Locational Factors
- Marketing Strategies
- Sources of revenue
- The Future
- Role of technology
- Major corporate players
- Demographic details
- Number of hospitals

Factors attracting corporate to healthcare sector:
Recognition as an industry
In the mid 80‘s the healthcare sector was recognized as an industry. Hence it became possible to get long term funding from the financial institutions. The government also reduce the import duty on medical equipment‘s and technology, thus opening up the sector.Since the national health policy (the policy‘s main objective was _health for all‘ by the year 2000) was approved in 1983, little has been done to update or amend the policy even as the epidemiological profile of the country changes and the new health problems arise from ecological degradation. The focus has been on medical care and not on comprehensive healthcare.

Socio-Economic Changes:
The rise of literacy rate, higher levels of income and increasing awareness through deep penetration of media channels, contributed to greater attention being paid to health, with the rise in the system of nuclear families, it became necessary for regular health check-ups and increase in health expenses for the bread earner of the family.

Brand Development
Many families run business houses have set-up charity hospitals. By lending their name to the hospital, they develop a good image in the markets, which further improves the brand image of products from their other business.

Opening of the insurance sector
In India, approximately 60% of the total health expenditure comes from self paid category as against

government‘s contribution of 25-30%. A majority of private hospitals are expensive for a normal middle class family. The opening up of the insurance sector to private players is expected to give a short in the arms of the healthcare industry.Health insurance will make healthcare affordable to a large number of people.Currently, in India only 2 million people (0.2% of total population of 1 billion), are covered under medical claim, whereas in developed nations like USA about 75% of the total population are covered under some insurance scheme. General insurance company has never aggressively marketed health insurance. Moreover, GIC takes up to 6 months to process a claim and reimburses customers after they have paid for. treatment out of their own pockets.This will give a great advantage to private players like CIGNA, ICICI, SUNDARAM, etc., are planning to launch smart cards that can be used in hospitals, patient guidance facilities, travel insurance etc.The consults, financiers and insurance Agencies are to benefit from this boom. The insurers will PPO‘s that will grow into HMO‘s to assume insurance risks on client‘s behalf. Medical equipments, Medical software and Hospitals will see the biggest boom.

Locational Factors:

The major factors in deciding the location of the hospital are:

- A central place having easy accessibility.
- Space around the hospital for peacefulness and future expansion.
- Space to make provision for residential quarters for the staff.
- Hostel facility, if there is to be college on campus.

It is also beneficial if the hospital is in a place where there exists no other hospital around. For example, when Apollo opened in Delhi, there was no other tertiary care hospital around for 200 Kms, which proved to be a boon for Apollo.Also disease, which could be a characteristic of a certain region, could affect the location. For example, Fortis‘ research shows the North Indians are prone to cardiac diseases and so it has set up a 20C bed cardiac hospital and 12 smaller cardiac centers in and around Mohali (Chandigarh).It case of Mumbai, where space is anyway a problem and a lot of hospitals are already present, super-specialty hospitals make most business sense.

The Future

Healthcare industry is booming all over the world. In the US it is already the largest service sector, and worldwide it is slated to be a $15 trillion market by 2012. A World Bank report in November 1999 points at the emergence of large-scale, investor-owned hospitals in the country as a ―dramatic‖ development. The corporate Hospitals will play a positive role-in the healthcare sector by taking the load off government hospitals, whose performance hasn‘t been up to the mark.In the last 5 years, approximately 750 mergers and acquisitions have taken place in USA hospitals. Major advantages of merging are more towards more integrated health-care systems that can achieve economies of scale, by rationalizing capacity and amalgamating functions as information technology, consultants, emergency transport, database and research and development. But healthcare is primarily a local market business and it is very important to consider the following

factors before going in for mergers:

- Relative size of the hospitals
- Their geographical proximity
- Strength of ties with individual hospitals and physicians
- Degree of unity in leadership structures of separate institutions

Research in USA shows that merged hospitals in narrowly defined geographic areas few or no competitors have succeeded in exerting a factorable influence on the services. Key to success appears to be a strong orientation to performance, as well as standardizing integrating work processes, functions, suppliers and investments-but not necessarily on a centralized basis. For example, Apollo in Chennai, Hyderabad and Delhi will be separate hospitals post- merger, but functions will be centralized.Some type of mergers could be for synergy of skills -i.e. to help the merged organizations benefit form one another‘s individual strengths by applying them across the board. It also helps them to make joint investments in branding or information technology and also to react effectively to the changed market forces. Alternatively hospitals can go in for Group purchases, as in USA. The buying power of large GPOs in USA like premier, VHA/UHC and AmeriNet gives them the clout to exert price pressure on suppliers, particularly for products in lower demand. And as GPOs have consolidated, manufactures have offered bigger discounts to hang on to their contracts so there exists a lot of supply management opportunity, which will affect spending productivity.

Role of Technology

Healthcare is racing towards high-tech, automated technologies and health agencies wanting to distinguish themselves from the pack will have to opt for leadingedge technologies. And that means healthcare delivery through application of telecommunications technology, or rather telemedicine. This will help transfer of electronic medical data, including high resolution images, sounds, live video and patient records from one location to another through telephone lines, ISDN, modem,Interest, satellites, video-conferencing etc.Already healthcare systems for diagnosing and monitoring severe asthma and patients via the internet have been launched in the USA an UK. Those suffering form asthma or cardiac problems will use a portable monitoring device to record their breathing patterns. The data will be sent via a modem or a telephone line to a central management system, where it will be processed and results will be sent directly to the patient‘s consultant. The system will record the date, time temperature and humidity conditions (critical to analyzing the health of asthma patients)etc.Apollo hospitals and Escorts Heart Research already have tele-cardiology systems,which help monitor the condition of cardiac patients. Here also, all the patient needs to do is, place the gadget near his heart and dial his hospital heart command center. Image of the heart and ECGs that the hospital receives (via satellite) help them to prescribe the immediate treatment or first aid required.While there has been a frenetic activity in the global sphere to gear up for the anticipated e-commerce boom, this sector will not be left behind. One of the most noticeable elements in the internet strategy of many leading pharma companies is focusing on the key health problems or diseases which are being addressed by their products and creating content about them. For example, Novaritishealth.com gives information about hypertension and cholesterol. As it is no longer playing a supportive role, but has the power to reshape the business strategy itself, companies like Glaxo have pioneered the process of creating awareness of internet in the medical practitioners community b giving them exposure to medical applications on the Net,

Tele-medicine etc. Also, Apollo has commissioned a Rs.35 crore telemedicine project and has launched a website. All this will result in better care at lower costs and the new technologies available will help streamline processes, integrate data and monitor care.

MAJOR CORPORATE PLAYERS IN INDIA

The Apollo Group of Hospitals

The Apollo group is India's first corporate hospital, die first to set-up hospital outside the country and the first to attract foreign investment. With 2600 beds, Apollo is one of Asia's largest healthcare players. The recent merger between its 3 group companies, Indian Hospitals Corporation Ltd., Deccan Hospitals Corporation Limited and Gm Sindoori Hospitals Limited, will help the group raise money at a better rate and by consolidating inventory; it will save around 10% of the material cost. The group is planning to invest Rs.2000 crore, to build around 15 new hospitals in India,
Sri Lanka, Nepal and Malaysia.

Fortis Healthcare

Fortis is the late Ranbaxy's Parvinder Singh's privately owned company. The company is a 250 crore, 200 bed cardiac hospital, located in the town of Mohali. The company also has 12 cardiac and information centers in and around the town, to arrange travel and stay for patients and family. The company has plans of increasing the capacity to around 375 beds and also plans to tie up with an overseas partner.

Max India

After selling of his stake in Hutchison Max Telecom, Singh has decided to invest around 200 crores, for setting up world class healthcare services in India. Max India plans a three tier structure of medical services-Max consultation and Diagnostic Clinics, Maxmed, a 150 bed multi-specialty hospital and Max General, a 400 bed hospital. The company has already tied up with Harvard Medical International, to undertake clinical trials for drugs, under research abroad and setting up of Max University, for education and research.

Escorts

EHIRC located in New Delhi has more than 220 beds. The hospital has a total 77 Critical Care beds to provide intensive care to patients after surgery or angioplasty,emergency admissions or other patients, needing highly specialized management including Telecardiology (ECG transmission through telephone). The EHIRC is unique in the field of preventive Cardiology with a fully developed programme of Monitored Exercise, Yoga and Meditation for Life style management. Wockhardt & Duncans Gleneagles International also has major expansion plans. This report is prepared by Mona Pundit and Parin Mehta of Sydneham Institute of Management exclusively for India Info line as part of their project curriculum.

NEED FOR THE STUDY

It was understood that there is a need for the study of health care services of corporate hospitals in India. Today, corporate hospitals have been making lot of attempts to satisfy the patient needs by providing a variety of multi-specialty services under one roof. The expectations of patients and attendants have undergone lot of changes, the strategies of corporate hospitals have been changing frequently in response to changing expectations of patients. The legal framework relating to health care sector has also been frequently amended, as a result, the corporate hospitals have to make necessary changes in their strategies relating to health care services.Amidst this back drop, a couple of major questions emerge for consideration
1.To what extent corporate hospitals are trying to provide better and improved health care services?
2.What are the perceptions of patients towards health care services provided by the
Corporate hospitals?
An attempt is made in this study, to examine the above and to assess the problems and prospects of healthcare sendees in India, mainly based on the opinions and perceptions of the patients.

TABLE 1.1 NEONATAL MORTALITY RATE (NMR) OF KERALA

KERALA		
Year	Rural (X)	X^2
2010	7.7	59.29
2011	7.7	59.29
2012	8.0	64
2013	7.5	56.25
2014	8.00	64
2015	8.00	64
2016	7.00	49
2017	7.00	49
2018	6.00	36
2019	5.00	25
Total	71.9	525.83

Standard Deviation

$= \sqrt{\Sigma x^2/n - (\Sigma x/n)^2}$

$= \sqrt{525.83/10 - (71.9/10)^2}$

$= \sqrt{52.583 - 51.696}$

$= \sqrt{0.887}$

$= \underline{0.942}$

The neonatal mortality rate, which was highest in 2012, 2014, and 2015 at 8, has a standard deviation of 0.942.

TABLE 1.2 NEONATAL MORTALITY RATE (NMR) OF INDIA

INDIA		
Year	Rural (X)	X^2
2010	36.36	1322.04
2011	34.37	1181.296
2012	32.58	1061.456
2013	31.00	961
2014	30.00	900
2015	29.00	841

2016	27.00	729
2017	27.00	729
2018	27.00	729
2019	25.00	625
Total	299.31	9078.792

Standard Deviation
$= \sqrt{\sum x^2/n - (\sum x/n)^2}$
$= \sqrt{9078.79/10 - (299.31/10)^2}$
$= \sqrt{907.879 - 8958.647}$
$= \sqrt{8050.768}$
$= \underline{89726}$
The neonatal mortality rate, which was highest in 2010 at 8, has a standard deviation of 89726.

TABLE 1.3 MATERNAL MORTALITY RATIO (MMR) OF KERALA

LINK RELATIVE = $price\ for\ current\ year/price\ in\ just\ prceding\ year \times 100$

YEAR	KERALA	LINK RELATIVE
2010-12	66	100
2011-13	61	61/66×100=92.42
2014-16	46	46/61×100=75.409
2015-17	42	42/46×100=91.304
2016-18	43	43/42×100=102.380
2017-19	30	30/43×100=69.767

Maternal Mortality Ratio (MMR) in linked relatives was the highest in 2016-18, with an MMR of 102.38 and lowest in 2017-19, with an MMR of 69.767.

TABLE 1.4 MATERNAL MORTALITY RATIO (MMR) OF INDIA

LINK RELATIVE = $price\ for\ current\ year/price\ in\ just\ prceding\ year \times 100$

YEAR	INDIA	LINK RELATIVE
2010-12	178	100
2011-13	167	167/168×100=93.820
2014-16	130	130/168×100=77.844
2015-17	122	122/130×100=93.846
2016-18	113	113/122×100=92.622
2017-19	103	103/113×100=91.150

Maternal Mortality Ratio (MMR) in linked relatives was the highest in 2015-17, with an MMR of 93.846 and lowest in 2014-16, with an MMR of 77.844.

TABLE 1.5 UNDER 5 MORTALITY RATE (U5MR) OF KERALA

KERALA				
YEAR	RURAL (X)	URBAN (Y)	CAGR X	CAGR Y
2010	13	10	-	-
2011	14	10	0.74	0
2012	13	10	-0.74	0
2013	13	9	0	-1.05
2014	14	12	0.74	2.92
2015	14	11	0	-0.87
2016	12	10	-1.53	-0.95
2017	12	12	0	1.84
2018	11	9	-0.87	0.66
2019	9	8	-1.99	-1.17

The Compound Annual Growth Rate (CAGR) equation is:

CAGR = (End Value / Beginning Value)^(1 / Number of Years) – 1

The Compound Annual Growth Rate (CAGR) analysis from 2010 to 2019 revealed that rural areas had a highest CAGR of 0.74 in 2011 and 2014, while urban areas had a highest CAGR of 2.92 in 2014.

TABLE 1.6 UNDER 5 MORTALITY RATE (U5MR) OF INDIA

INDIA					
YEAR	RURAL (X)	URBAN (Y)	XY	X^2	Y^2
2010	63	38	2394	3969	3969
2011	61	35	2135	3721	1225
2012	58	32	1856	3364	1024
2013	55	29	1595	3025	841
2014	51	28	1428	2601	784
2015	45	28	1260	2025	784
2016	43	25	1075	1849	625
2017	42	25	1050	1764	625
2018	40	26	1040	1600	676
2019	39	23	897	1521	529
Total	497	289	14730	25439	11082

Karl Pearson‘s equation to find correlation is

$$= \frac{n\sum xy - \sum x . \sum y}{\sqrt{n \sum x2 - (\sum x)2} . \sqrt{n \sum y2 - (\sum y)2}}$$

$$= \frac{10*14730-497*289}{\sqrt{10*25439- (497)^2}}$$

$$= \frac{147300-143633}{\sqrt{254390-247009}\ \sqrt{110820-83521}}$$

$$= \frac{3667}{\sqrt{7381}\ \sqrt{27299}}$$

= 3667/85.91×165.22
= 3667/14194.05
= 0.2853

The above table shows the MORTALITY RATE between Urban and Rural in India. From the data we found out the correlation coefficient between them, we got a positive correlation.

TABLE 1.7 LIFE EXPECTANCY AT BIRTH BY SECTOR OF KERALA

KERALA							
YEAR	RURAL (X)	URBAN (Y)	dx (X-75.23)	dy (Y-75.12)	dxdy	dx^2	dy^2
2010-14	74.9	75	-0.33	-0.12	0.0396	0.1089	0.0144
2011-15	75.1	75.4	-0.13	-0.02	0.0026	0.0169	0.0004
2012-16	75.2	74.9	-0.03	-0.22	0.0066	0.0009	0.0484
2013-17	75.3	75.1	0.07	-0.02	-0.0014	0.0049	0.004
2014-18	75.4	75.1	0.17	-0.02	-0.0034	0.0289	0.004
2015-19	75.5	75.2	0.27	0.08	0.19	0.0729	0.6724
Total	451.4	450.7	0.02	-0.32	0.234	0.2334	0.7436

ẍ = ∑x/n
= 451/4
= 75.23

Ÿ= ∑y/n
= 450.7/6
= 75.12

$\frac{\sum dxdy}{\sqrt{\sum dx^2}\ \sqrt{\sum dy^2}} = \frac{0.234}{\sqrt{0.2334}\ \sqrt{0.7436}}$

= 0.234
0.4831*0.8623

= 0.234
0.416

= 0.5625

The life expectancy at birth in Kerala, by urban and rural sectors, has an arithmetic mean of 0.5625.

TABLE 1.8 LIFE EXPECTANCY AT BIRTH BY SECTOR OF INDIA

INDIA					
YEAR	RURAL (X)	URBAN (Y)	XY	X^2	Y^2
2010-14	66.7	71.5	4769.05	4448.89	5112.25
2011-15	67.1	71.9	4824.49	4502.41	5169.61
2012-16	67.4	72.2	4866.28	4542.76	5212.84
2013-17	67.7	72.4	4901.48	4583.29	5212.84

2014-18	68	72.6	4936.8	4624	5241.76
2015-19	68.1	72.9	4964.49	4637.61	5270.76
TOTAL	405	433.5	29262.59	27338.96	5314.41

Covariance (X,Y) $= \sum xy/n - (\sum x/n * \sum y/n)$

$= 29262.59/6 - (405\text{-}6*433.5/6)$

$= 4877.1 - (67.5*72.25)$

$= 4877.1 - (4876.875)$

$= \underline{0.225}$

The life expectancy at birth in India, by urban and rural sectors, has the covariance is 0.225.

TABLE 1.9 Karl Pearson's equation to find correlation is

$$\frac{n\sum xy - \sum x.\sum y}{\sqrt{n\sum x^2 - (\sum x)^2}\ .\ \sqrt{n\sum y^2 - (\sum y)^2}}$$

Year	Diabetes (X)	Cancer (Y)	XY	X^2	Y^2
2009-10	396	250	99000	156816	62500
2010-11	285	134	38190	81225	17956
2011-12	274	285	78090	75076	81225
2012-13	252	156	39312	63504	24336
2013-14	369	100	36900	136161	10000
2014-15	408	314	128112	166464	98596
2015-16	285	320	91200	81225	102400
2016-17	396	153	60588	156816	23409
2018-19	281	168	47208	78961	28224
2019-20	243	176	42768	59049	30976
Total	3189	2056	661368	1055297	479622

$\sum x - 3189$ $\sum y - 2056$ $\sum x^2 - 1055297$ $\sum y^2 - 479622$ $\sum xy - 661368$ $n - 10$

$$= \frac{10*661368-3189*2056}{\sqrt{10*1055297-(3189)^2}\ \sqrt{10*479622-(2056)^2}}$$

$$= \frac{6613680-6556584}{\sqrt{10552970-10169721}\ \sqrt{4796220-4227136}}$$

$$= \frac{57096}{\sqrt{383249}\ \sqrt{569084}}$$

$$= \frac{57096}{619.07*754.38}$$

$$= \frac{57096}{467012.71}$$

$= \underline{0.122}$

The above table shows the relationship between Diabetes and Cancer in India. From the data we found out the correlation coefficient between them, we got a positive correlation.

TABLE 1.10 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2009-2010)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	16.2	1.83	8.5
Kollam	18.5	4.67	5.4
Pathanamthitta	13.5	2.25	9.2
Alappuzha	21.2	1.52	5.9
Kottayam	21.5	1.21	10.3
Idukki	52.1	1.83	5
Ernakulam	26.5	2.08	5.9
Thrissur	21.2	1.12	5.5
Palakkad	21.3	1.98	19.1
Malappuram	30.1	1.7	6.9
Kozhikode	22.5	1.26	18.7
Wayanad	23.3	1.78	8.2
Kannur	24.1	2.03	7.3
Kasaragod	25.6	1.71	13.1
Total	337.6	26.97	129

Sources of Primary Data

During the period 2009-2010, Malappuram had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Palakkad had the highest number of thyroid patients.

TABLE 1.11 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2010-2011)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	18.5	2.32	9.3
Kollam	17.3	4.53	6.5
Pathanamthitta	14.5	2.35	8.7
Alappuzha	21.5	3.83	6
Kottayam	22.6	1.32	11.3
Idukki	27.1	1.95	6.1
Ernakulam	26.3	2.08	6.3
Thrissur	22.5	1.13	5.8
Palakkad	22.8	1.73	18.8
Malappuram	28.5	2	7.1
Kozhikode	23.4	1.32	18.6
Wayanad	24.3	2.53	9.2
Kannur	25.2	2.01	7.8
Kasaragod	30.5	1.72	13.3
Total	325	30.82	134.8

Sources of Primary Data

During the period 2010-2011, Kasaragod had the highest number of diabetes patients, Alappuzha had the highest number of cancer patients, and Palakkad had the highest number of thyroid patients.

TABLE 1.12 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2011-2012)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	19.3	4.8	10
Kollam	17.8	4.7	7.3
Pathanamthitta	15.3	2.5	8.8
Alappuzha	22.3	3.5	6.3
Kottayam	23.8	2	13.2
Idukki	27.3	2.1	7.1
Ernakulam	26.3	1.3	6.5
Thrissur	23.5	1.8	5.9
Palakkad	23.9	2.1	18
Malappuram	31.3	1.4	7.3
Kozhikode	34.5	2.6	19
Wayanad	27.3	2.1	9.5
Kannur	26.3	1.3	8.1
Kasaragod	27.5	2	14
Total	346.4	34.2	141

Sources of Primary Data

During the period 2011-2012, Kozhikode had the highest number of diabetes patients, Thiruvananthapuram had the highest number of cancer patients, and Kozhikode had the highest number of thyroid patients.

TABLE 1.13 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2012-2013)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	19.5	3.8	10.1
Kollam	18.5	4.9	7.5
Pathanamthitta	15.5	2.7	9
Alappuzha	22.4	3.8	6.5
Kottayam	23.9	2.1	13.4
Idukki	27.8	2.4	7.5
Ernakulam	26.5	1.6	6.7
Thrissur	25.5	1.9	6
Palakkad	24	2.5	18.3
Malappuram	39.4	1.7	7.5
Kozhikode	34.5	2.8	19.5
Wayanad	27.5	2.3	19.8
Kannur	27.2	1.5	8.2
Kasaragod	28	2.4	14.1

Total	360.2	36.4	154.1

Sources of Primary Data

During the period 2012-2013, Malappuram had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Wayanad had the highest number of thyroid patients.

TABLE 1.14 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2012-2013)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	19.5	3.8	10.1
Kollam	18.5	4.9	7.5
Pathanamthitta	15.5	2.7	9
Alappuzha	22.4	3.8	6.5
Kottayam	23.9	2.1	13.4
Idukki	27.8	2.4	7.5
Ernakulam	26.5	1.6	6.7
Thrissur	25.5	1.9	6
Palakkad	24	2.5	18.3
Malappuram	39.4	1.7	7.5
Kozhikode	34.5	2.8	19.5
Wayanad	27.5	2.3	19.8
Kannur	27.2	1.5	8.2
Kasaragod	28	2.4	14.1
Total	360.2	36.4	154.1

Sources of Primary Data

During the period 2012-2013, Malappuram had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Wayanad had the highest number of thyroid patients.

TABLE 1.15 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2013-2014)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	19.8	3.9	10.3
Kollam	18.8	5	7.6
Pathanamthitta	15.7	2.9	9.1
Alappuzha	22.6	3.9	6.6
Kottayam	24.1	2.3	23.5
Idukki	27.9	2.5	7.8
Ernakulam	26.7	1.7	6.1
Thrissur	25.6	2	6.1
Palakkad	24.3	2.8	18.5
Malappuram	32.3	1.9	7.6
Kozhikode	34.6	2.9	19.6
Wayanad	28	2.5	19.9

Kannur	27.5	1.8	8.3
Kasaragod	28.3	2.6	14.3
Total	356.2	38.7	165.3

Sources of Primary Data

During the period 2013-2014, Kozhikode had the highest number of diabetes patients, Thiruvananthapuram and Alappuzha had the highest number of cancer patients, and Kottayam had the highest number of thyroid patients.

TABLE 1.16 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2014-2015)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	20	4	10.5
Kollam	19.1	5.3	7.8
Pathanamthitta	15.9	3.1	9.3
Alappuzha	22.8	4.1	6.7

Kottayam	24.3	2.5	13.8
Idukki	28	2.6	7.9
Ernakulam	26.9	6.8	6.3
Thrissur	25.8	2.3	6.2
Palakkad	24.5	2.9	28.8
Malappuram	32.5	2	7.7
Kozhikode	34.8	3.1	19.8
Wayanad	28.3	2.7	10
Kannur	27.8	1.9	8.4
Kasaragod	38.5	2.7	14.5
Total	369.2	46	157.7

Sources of Primary Data

During the period 2014-2015, Kasaragod had the highest number of diabetes patients, Ernakulam had the highest number of cancer patients, and Palakkad had the highest number of thyroid patients.

TABLE 1.17 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2015-2016)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	20.1	4.2	10.7
Kollam	19.3	5.5	8.2
Pathanamthitta	16.1	3.3	9.5
Alappuzha	22.9	4.2	6.8
Kottayam	24.7	2.7	13.9
Idukki	28.2	2.8	8
Ernakulam	27.1	1.9	6.4
Thrissur	26	2.4	6.3
Palakkad	24.9	3	18.9
Malappuram	32.6	8.1	7.8
Kozhikode	34.9	3.2	19.9
Wayanad	28.4	2.9	30.1
Kannur	37.9	2	8.5
Kasaragod	29.3	2.9	15.1
Total	372.4	49.1	170.1

Sources of Primary Data

During the period 2015-2016, Kannur had the highest number of diabetes patients, Malappuram had the highest number of cancer patients, and Wayanad had the highest number of thyroid patients.

TABLE 1.18 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2016-2017)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	20.3	4.3	11.2
Kollam	19.5	5.6	8.5
Pathanamthitta	16.3	3.4	10.3

Alappuzha	23	4.3	7.1
Kottayam	24.9	2.8	14.2
Idukki	28.5	2.9	8.2
Ernakulam	27.3	2.1	7.3
Thrissur	26.2	3	6.8
Palakkad	24.9	4.2	19.2
Malappuram	32.8	3.3	7.9
Kozhikode	38	2.9	30.1
Wayanad	28.5	3.5	11.2
Kannur	28.1	8	8.8
Kasaragod	29.5	3.1	15.2
Total	367.8	53.4	166

Sources of Primary Data

During the period 2016-2017, Malappuram had the highest number of diabetes patients, Kannur had the highest number of cancer patients, and Kozhikode had the highest number of thyroid patients.

TABLE 1.19 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2017-2018)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	20.8	4.5	13.3
Kollam	19.9	5.8	9.3
Pathanamthitta	16.7	8.8	12.5
Alappuzha	23.2	4.7	7.9
Kottayam	38.1	3.2	14.8
Idukki	29.3	3.3	38.5
Ernakulam	28.5	2.8	7.5
Thrissur	27.3	3.2	6.9
Palakkad	25.2	4.5	19.3
Malappuram	33.9	3.8	8.1
Kozhikode	36.3	3.2	21.2
Wayanad	29.3	3.8	13.2
Kannur	28.3	3.2	9.3
Kasaragod	30.1	3.5	17.3
Total	386.9	58.3	199.1

Sources of Primary Data

During the period 2017-2018, Kottayam had the highest number of diabetes patients, Pathanamthitta had the highest number of cancer patients, and Idukki had the highest number of thyroid patients.

TABLE 1.20 DISTRICT WISE DIABETES, CANCER AND THYROID IN KERALA (2018-2019)

District	Diabetes	Cancer	Thyroid
Thiruvananthapuram	21.3	4.7	14.5
Kollam	20.1	5.9	10.5

Pathanamthitta	17.3	4.9	13.6
Alappuzha	25.3	4.9	8.3
Kottayam	27.2	3.5	15.2
Idukki	29.4	3.4	38.8
Ernakulam	29.5	2.9	7.9
Thrissur	48.5	3.8	7.5
Palakkad	27.3	4.7	20.5
Malappuram	35.8	3.9	8.5
Kozhikode	36.5	3.8	23.5
Wayanad	29.8	4.3	15.3
Kannur	29.5	3.5	9.8
Kasaragod	31.2	4.2	17.5
Total	408.7	58.4	211.4

Sources of Primary Data

During the period 2018-2019, Thrissur had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Idukki had the highest number of thyroid patients.

SUGGESTIONS

1. As the patients who visit the hospitals are in the age group of 40 and above, the hospitals should focus their attention on improving the medical care and design proper health schemes to benefit the above group of population.
2. It may be suggested that the corporate hospitals are advised to exploit the income range of below Rs. 1,00,000 and are required to come out with lot of value added services like loyalty packages, family packages and other health schemes to attract the population with below Rs. 1,00,000.
3. It may be advised that the sample hospitals should focus their strategies on the illiterate segment and design innovative, unique and individual health checkup packages.
4. The sample hospitals should focus on the suitable marketing approaches and practices. As a part of marketing phibsophy, the supporting staff and technician should be given advanced training related to behavioural aspects such as courtesy and empathy in dealing with patients to become more patients friendly.
5. The appraisal system of personal should invariably include the scores of patient evaluation ofthe supporting and technical staff. Hence the hospitals should make it mandatory to have the appraisal ofmedical and supporting staff.
6. It may be suggested that the hospitals may print a detailed map of location of different departments and distribute them to the patients as soon as they arrive at the admission centre.
7. It may be suggested that the structure and architecture part of the hospital should be in such a way that it is both simple and easy for the patients to negotiate their way to the desired specialists doctor/ ward / lab. The names of wards should also be mentioned in regional languages.
8. The study hospitals are advised to take necessary care in relation to staff and to motivate them to give proper answers to the queries raised by the patients. Educating patients on various aspec:s related to disease and treatment is very much necessary for the improvement of image of the hospitals.
9. The study hospitals should take necessary steps to reduce the dissatisfaction resulting from general

amenities like seating arrangements, drinking water, parking and general hygienic conditions.

10. In order to make the patients more comfortable while waiting, some of the patients have advised that piped music may be played to soothe the feelings of the patients, reduce pain of the process and allay any apprehensions that the patient might have.
11. Health management packages can be provided by hospitals to family and corporate world. For example Family Health Plan Services (FHP), a subsidiary of Apollo Hospitals carries out health management of employees of its clients in the industry, with a wide network of Hospitals and Healthcare providers countrywide, and a tie -up with General Insurance Corporation of India. Other corporate hospitals are advised to follow the example of Apollo and come out with unique health management packages.
12. All corporate hospitals are advised to conduct periodic preventive health care programs of the chronic and current diseases in general and specialized programs to the society in general.
13. As part of customer feed back, specific comments regarding the behavior of all the staff members should be collected so that appropriate measures be put in place and training programs designed.
14. In order to make the patients more comfortable while waiting, some ofthe patients have advised that piped music may be played to soothe the feelings ofthe patients, reduce pain of the process and allay any apprehensions that the patient might have.
15. It is noticed that the perception about doctors is quite positive in most of the aspects. The study hospitals are advised to streamline the patient queue and give appointments accordingly, so that the scope for dissatisfaction is further minimized.
16. All corporate hospitals are advised to conduct periodic preventive health care programs of the chronic and current diseases in general and specialized programs to the society in general.
17. Health management packages can be provided by hospitals to family and corporate world. For example Family Health Plan Services (FHP), a subsidiary of Apollo Hospitals carries out health management of employees of its clients in the industry, with a wide network of Hospitals and Healthcare providers countrywide, and a tie -up with General Insurance Corporation of India. Other corporate hospitals are advised to follow the example of Apollo and come out with unique health management packages.

FINDINGS

1. The neonatal mortality rate, which was highest in 2012, 2014, and 2015 at 8, has a standard deviation of 0.942.
2. The neonatal mortality rate, which was highest in 2010 at 8, has a standard deviation of 89726.
3. Maternal Mortality Ratio (MMR) in linked relatives was the highest in 2016-18, with an MMR of 102.38 and lowest in 2017-19, with an MMR of 69.767.
4. Maternal Mortality Ratio (MMR) in linked relatives was the highest in 2015-17, with an MMR of 93.846 and lowest in 2014-16, with an MMR of 77.844.
5. The Compound Annual Growth Rate (CAGR) analysis from 2010 to 2019 revealed that rural areas had a highest CAGR of 0.74 in 2011 and 2014, while urban areas had a highest CAGR of 2.92 in 2014.
6. The above table shows the MORTALITY RATE between Urban and Rural in India. From the data we found out the correlation coefficient between them, we got a positive correlation.
7. The life expectancy at birth in Kerala, by urban and rural sectors, has an arithmetic mean of 0.5625.

8. The life expectancy at birth in India, by urban and rural sectors, has the covariance is 0.225.
9. The above table shows the relationship between Diabetes and Cancer in India. From the data we found out the correlation coefficient between them, we got a positive correlation.
10. During the period 2009-2010, Malappuram had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Palakkad had the highest number of thyroid patients.
11. During the period 2009-2010, Malappuram had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Palakkad had the highest number of thyroid patients.
12. During the period 2011-2012, Kozhikode had the highest number of diabetes patients, Thiruvananthapuram had the highest number of cancer patients, and Kozhikode had the highest number of thyroid patients.
13. During the period 2012-2013, Malappuram had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Wayanad had the highest number of thyroid patients.
14. During the period 2012-2013, Malappuram had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Wayanad had the highest number of thyroid patients.
15. During the period 2013-2014, Kozhikode had the highest number of diabetes patients, Thiruvananthapuram and Alappuzha had the highest number of cancer patients, and Kottayam had the highest number of thyroid patients.
16. During the period 2014-2015, Kasaragod had the highest number of diabetes patients, Ernakulam had the highest number of cancer patients, and Palakkad had the highest number of thyroid patients.
17. During the period 2015-2016, Kannur had the highest number of diabetes patients, Malappuram had the highest number of cancer patients, and Wayanad had the highest number of thyroid patients.
18. During the period 2016-2017, Malappuram had the highest number of diabetes patients, Kannur had the highest number of cancer patients, and Kozhikode had the highest number of thyroid patients.
19. During the period 2017-2018, Kottayam had the highest number of diabetes patients, Pathanamthitta had the highest number of cancer patients, and Idukki had the highest number of thyroid patients.
20. During the period 2018-2019, Thrissur had the highest number of diabetes patients, Kollam had the highest number of cancer patients, and Idukki had the highest number of thyroid patients.

CONCLUSION

The healthcare landscape in Thiruvananthapuram is a complex tapestry of challenges and opportunities. As we conclude this study, it's clear that despite the city's impressive strides in healthcare, there's still much work to be done.

The struggles of inadequate infrastructure, personnel shortages, and unequal access to care are very real. Yet, amidst these challenges, we've seen glimmers of hope - innovative government initiatives, tireless efforts by healthcare professionals, and a growing recognition of the need for collaborative solutions.

As we look to the future, it's heartening to imagine a Thiruvananthapuram where healthcare is truly universal, equitable, and compassionate. Where every individual has access to quality care, regardless of their background or circumstances.

To get there, we must continue to listen to the voices of patients, providers, and policymakers. We must foster partnerships that bridge the gaps between public and private sectors, and between healthcare and community. And we must remain steadfast in our commitment to creating a healthcare system that truly serves the needs of all.

Together, we can build a brighter, healthier future for Thiruvananthapuram - one that honors the city's rich

legacy of compassion, innovation, and community spirit.