

Indian Dialysis Market (Untapped Potential)

By

Savin Yadav

*Dissertation submitted for the partial fulfillment of the
MBA Hospital and Health Management*

Academic year, 2015-2017



The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: www.iihmr.edu.in

Indian Dialysis Market (Untapped Potential)

By

Savin Yadav

*Dissertation submitted for the partial fulfillment of the
MBA Hospital and Health Management*

Academic year, 2015-2017

Price WaterHouse Cooper, Gurgaon



The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: www.iihmr.edu.in

TO WHOMSOEVER MAY CONCERN

This is to certify that Dr. Savin Yadav student of MBA Hospital and Health Management from The IIHMR University, Jaipur has undergone internship training at Price Water Cooper from 13th Feb 2017 to 13th May 2017.

The Candidate has successfully carried out the study designated to him during internship training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.

I wish him all success in all his future endeavors.



Dean, Academics and Student Affairs

The IIHMR University, Jaipur



Professor

The IIHMR University, Jaipur



The certificate is awarded to

Dr Savin Yadav

In recognition of having successfully completed her
Internship in the department of

Management Consulting (Health Care)

and has successfully completed her Project on

India Dialysis Market (untapped potential)

From 13th February to 12th of May

In PriceWaterhouseCoopers Private Limited

He/ She comes across as a committed, sincere & diligent person who
has a strong drive and zeal for learning

We wish him/her all the best for future endeavors

Training & Development

Dr. Ashwani Aggarwal
Project Manager

PricewaterhouseCoopers Pvt. Ltd., Building 8, 7th Floor, Tower - C, DLF Cyber City, Gurgaon - 122 002
T: +91 (124) 626 6600, F: +91 (124) 626 6500, www.pwc.com/india

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**Indian Dialysis Market**" and submitted by **Dr. Savin Yadav** Enrollment No. **IIHMR- U/04/2015-17/0344** under the supervision of **Dr Jagdish Prasad Singh** for award of MBA Hospital and Health Management in Health & Hospital of the University carried out during the period from **13th February' 2017 to 13th May'2017** embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

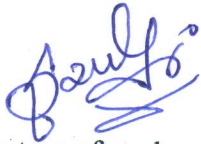


Signature

THE IIMMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that all ethical issues have been considered while collecting data for my dissertation titled Customer Perception & Buyers Characteristics Towards Healthcare Services.

A handwritten signature in blue ink, appearing to read 'Paulo', is written above the text 'Signature of student'.

Signature of student

Contents

1	Introduction:.....	3
1.1	Background:	3
1.2	Global comparison with other countries:	4
1.3	Emerging possible solutions:	5
	Aim:.....	6
	Objectives:	6
	General objective:.....	6
2	Literature Review:.....	7
3	Methodology:	11
3.1	Data collection:	11
3.2	Method used to present data:.....	13
	Statistical tool: The tools which are uses in this study are MS-EXCEL,MS-POWERPOINT, MS-EXCEL use to prepare charts and graphs. MS-WORD was used to prepare or write the whole project report.	13
	Project Duration:.....	13
4	Findings:	16
5	Result:	24
6	Discussion	30
7	Recommendation.....	32
8	Bibliography	45
	Table 1- list of sources used.....	11
	Table 2 - Questionnaire.....	12
	Table 3 steps in calculation.....	14
	Table 4 list of cost per treatment in major hospitals.....	14
	Table 5 list of hospitals with dialysis charges	15
	Table 6 No. of Nephrology seats.....	17
	Table 7 district with their dialysis machine count	20

1 Introduction:

Dialysis is a process of blood filtration outside the body. It removes the “waste” chemicals and toxins that accumulate in the blood because the failed kidneys are unable to excrete them. It can be done in two ways: hemodialysis in which the blood is taken out of the body and passed through a machine, and second is peritoneal dialysis, in which a natural internal membrane lining the abdomen is used to clear the blood. Hemodialysis is typically done at dialysis facilities, whereas peritoneal dialysis is done at home. Since the “waste” accumulation is continuous, dialysis must be repeated at regular intervals. This is critical concern, since the long-term and repetitive nature of this treatment has major health and economic implications. Estimates put the number of patients on dialysis in India currently at around 1, 00,000.

1.1 Background:

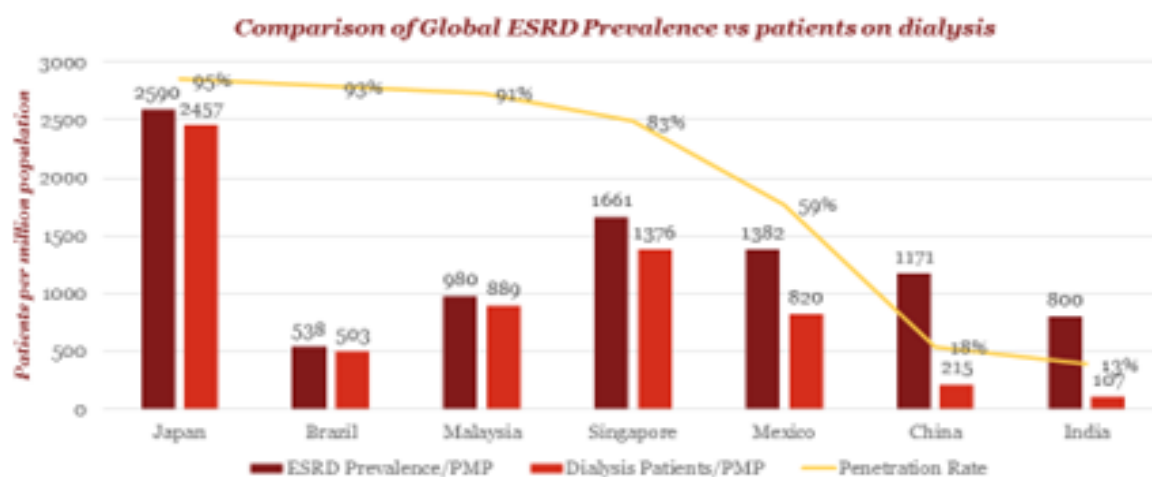
Quiteimpressive accomplishments have been made by Indian nephrology industry during the last 50 years. The first renal dialysis was performed in 1956 in a new era of modern nephrology practice in India which led to the recognition of nephrology as a distinct specialty in India. The first hemodialysis facility was established in 1961. Presently, there are 1600 nephrologists, 1200 hospitals equipped with dialysis facilities, and 170 institutions recognized for kidney transplantation, with approximately 4,500 transplantations performed every year. The majority of dialysis units are small day care facilities with fewer than 5 dialysis machines, and around 68% are in the private sector. Government hospitals provide free treatment to poor patients with chronic kidney disease, however, inadequate funding and lack of health insurance schemes pose serious hurdles in providing (RRT) renal replacement therapy. In contrast, private and corporate hospitals located in metro cities have large units with state-of-the-art dialysis

and transplantation facilities, but are accessible to only to higher income groups. Of the estimated 2 lac new patients who develop ESRD annually, less than 5% are able to gain access to renal replacement therapy. Research in the field of renal diseases has evolved slowly and its main focus is on primarily on tropical conditions. The expansion of therapeutic facilities in India is struggling by only economic constraints, not lack of specialized.

1.2 Global comparison with other countries:

India's demand for dialysis is growing fast at a rate of 31%, compared to 6 % in the US and 8 % in the rest of the world. Mathematical modelling using data from comparable countries shows that if access to treatment was not a problem, or restricted, this number would be approximately 1,100,000, highlighting a large unmet need, and therefore a good business investment opportunity.

Figure 1.1



Problems with dialysis industry:

The quality of treatment across facilities is uneven, especially poor in smaller towns and rural areas. Setting up a dialysis facility requires practically no regulatory and medical approval. Many centers adopt somewhat questionable strategies to cut costs and maximize their profits, often by compromising outcomes. Mom-and-Pop dialysis units run in several instances by non-physicians, get away with practices that would earn opprobrium in mature

medical systems. Other problems faced by patients is information asymmetry, cost and geographic limitations forces patients to accept whatever they get. Patients on dialysis have complications related to many other organ systems - the main ones being cardiovascular disease, abnormal bone health, and lack of production of red blood cells. All this requires proper regular monitoring, ideally by nephrologists, of whom there are only about 1600 in the entire country (just about 1.3 for every million Indians).

1.3 Emerging possible solutions:

There are signs, however, that things might be changing in near future.

The main drivers of this change are namely

- Changing reimbursement policies
- Increasing coverage through insurance schemes
- Empowered consumers
- Involvement of professional societies
- Consolidation of dialysis industry
- Entry of new dialysis chains

But there is not much of evidence that an increasing number of individuals are benefitting from these schemes. The Indian Society of Nephrology has published guidelines to empower nephrologist-physicians looking to set up a dialysis units and implement quality standards. The entry of dialysis chains, is likely to bring operational as well as clinical improvements, through establishment of quality measures, uniform protocol-driven practices and accountability.

Aim:

To perform a thorough and step-by-step assessment of Indian dialysis market, identify untapped potential market aspects of dialysis in India and to calculate the profitability of setting up a new dialysis unit or chain.

Objectives:

General objective: To understand and analysis Indian dialysis market.

Specific objectives: To identify untapped potential of dialysis market in India.

To study factors affecting growth of dialysis industry

2 Literature Review:

1 According to Umesh Khanna(2009)^[1](member of Mumbai kidney foundation)

Chronic kidney disease (CKD) is one of the worldwide public health problem, it creates a case of social calamity and even an economic catastrophe. In the year 2000, in the United States (US) alone, about 3 crores people were diagnosed with chronic kidney disease (CKD).while the exact burden of CKD in India still remains unknown and undefined with only limited data constraints from only three population-based studies addressing about this issue. It is hopeful that the CKD registry of India, recently established by the (ISN) Society of Nephrology, shall provide useful epidemiological information and data in the future. In the prevention study done in Chennai (TN) the prevalence at the community level is around 8600 per million population in the study group and 13900 per million population(pmp) in the control group. There is a second study based in Delhi which revealed a prevalence of CKD (on basis of serum creatinine more than 1.8 mg %) at 7852 per million population. One more study from Bhopal states an incidence of 151 pmp who are suffering from end stage renal disease (ESRD).

2 According to Global dialysis market research report:(2012)^[2]

The global dialysis market is driven by increase in the number of ESRD patient population. The market value of the dialysis market was \$61.0 billion in 2012 and is expected to be \$98 billion by 2020, at a CAGR of 6.20%.The report “Global Dialysis Market Forecast, 2012-2020”, analyzes the market in terms of two types of dialysis such as Hemodialysis and Peritoneal dialysis. The segmentation of the market experienced a positive growth till 2012 with an increased awareness for sophisticated diagnostic techniques. Hemodialysis market accounted the largest market share of 85%. The Peritoneal dialysis market is expected to grow at the highest CAGR of 7.6% during the forecast period, driven by rising utilization of PD to address the escalating demand for renal replacement therapy.

Countries like India, China, Japan, and more are the fastest growing market of Dialysis because of their increased purchasing power of their patients in India and China. Focus on the APAC countries by the investors compelled by mature western markets.

3 According to Ken Research (2016)[3]

Data has revealed that the Indian medical equipment market is witnessing exciting times in terms of growth and expansion. In fact, it is expected to report a CAGR of 9.4% and reach almost USD 17.6 billion by 2020. Specifically, the dialysis equipment market in India is showing signs of rapid growth owing to the recent announcements in the Budget 2016-2017.

The report “Global Dialysis Market Forecast, 2012-2020”, analyzes the market in terms of two types of dialysis such as Hemodialysis and Peritoneal dialysis. The segmentation of the market experienced a positive growth till 2012 with an increased awareness for sophisticated diagnostic techniques. Hemodialysis market accounted the largest market share of 85%. The Peritoneal dialysis market is expected to grow at the highest CAGR of 7.6% during the forecast period, driven by rising utilization of PD to address the escalating demand for renal replacement therapy.

4 According to Asian Hospital and Healthcare Management: (2016)^[4]

With increase in life expectancy and prevalence of life style diseases, United States has seen an increase in prevalence of CKD (chronic kidney disease) in the last Ten years. In western countries, diseases like diabetes and hypertension account for over 2/3rd of the cases of CKD. In country like India too, diabetes and hypertension today account for 40–60% patients of CKD. According to a recent study, China, India and United States of America are among the top 3 countries with a maximum number of diabetic population. While the numbers increased from 20.4 million in China in 1980 to 102.9 million in 2014, the increase has been equally dramatic in India which is from 11.9 million in 1980 to 64.5 million in India. Likely, according to a recent survey which covered 2 lakh people across 24 states in India, 1/3rd of the country's population suffers from hypertension.

ESRD (End stage renal disease), is the last stage of chronic kidney disease (CKD). This intends that the kidneys are functioning below 10 % of their normal function, and they can be no further support a person's day-to-day life. At ESRD stage, the kidneys can no longer remove or filter waste and/or excess water from the patient's body. End stage renal disease usually comes after CKD.

Current Demand Supply Gap in India in Dialysis:

As per 2011 census, population of India is 121 billion which takes the total ESRD patients number to 3.7 million (incidence rate taken as 0.304%). As per the study conducted by India Society of Nephrology, the number of patients on dialysis stood ONLY at 55,000 in 2010

An ESRD patient needs 3 dialysis sessions per week, which means 156 sessions annually till the patient gets a Kidney Transplant. To summarize, the total potential of the market stands at 577 million dialysis sessions annually (3.7Mn*156 sessions per patient annually). At even a price point of Rs 1,000 per dialysis, the potential of the market is worth Rs 577 Bn annually

However the fact is that only 30% of the patients are actually aware that they are suffering from ESRD. Also, only 10% out of these actually undergo dialysis. Hence the immediate addressable market is 3.0% of the total potential which works out to Rs1700 crores annually. As the awareness level increase, the market will keep expanding. Lower penetration of dialysis today can be attributed to lack of availability of medical practitioners, low presence of healthcare services and most importantly lower awareness about CKD. In addition, the high cost of dialysis is also a deterrent in most of the cases.

5 According to Research gate: (2015)^[5]

In the development of maintenance dialysis as a treatment for ESRD (end stage kidney disease) in the early 1960's was a landmark in human therapeutics. In the earliest days, the Nephrologists have recorded the health outcomes of cases undergoing this life saving treatment in prospective cohort studies. Over the last subsequent decades these national and international kidney clinical registries have provided invaluable data on disease burden estimates, survival rate, risk factors, treatment practices and impact of disease prevention programs.

Data repositories such as the US Renal Data Service and European Dialysis Registry have prospectively tracked the steady improvement in renal health outcomes for dialysis patients over the last 50 years. Particular mention should be made in this context of Australian and New Zealand Dialysis Registry one of the oldest exemplars in the world, which has a complete collection of health outcomes of data for patients who are treated ESKD in these mentioned countries since 1963.

6 According to Indian renal foundation: 2016^[5]

In a survey conducted by IRF in one group of educated employed/working class people with an income of more than Rs.1.2 lakhs/annum, awareness about the seriousness of kidney disease and kidney failure was as low as 10%. This lack of awareness keeps people from taking preventive steps and seeking timely and adequate treatment in the case of kidney disease. Transplantation can give a lease of new life to the recipient. Transplantation is not a very complicated procedure, however the main constraint is the availability of donor. This is the direct result of lower awareness. The facilities of dialysis, right now faces a severe crunch of trained manpower. Healthcare being a service area relies highly on people. Although the whole healthcare sector faces the problem of lack of trained and skilled manpower, this problem is more severe in specialized areas like kidney diseases. There are very few structured dialysis technicians courses being run in India.

(1) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2845186/>

(2) <http://www.micromarketmonitor.com/market-report/dialysis-reports-6941626803.html>

- (3) <https://www.kenresearch.com/blog/2016/06/indian-dialysis-equipment-market-research-report/>
- (4) <https://www.asianhbm.com/articles/is-dialysis-the-next-big-opportunity-in-indian-healthcare>
- (5) https://www.researchgate.net/publication/271215330_Dialysis_outcomes_in_India_A_pilot_study
- (6) <http://www.indiarenalfoundation.org/India-Renal-Foundation-Indian-Scenario.htm>

3 Methodology:

3.1 Study design: The research design which is used in this study is both Descriptive and exploratory. Study was conducted at PricewaterhouseCoopers, Gurugram.

3.3 Study area: Overall Indian dialysis market

3.4 Sample Technique: The technique which is used for conducting the study is a convenience sampling technique as the sample of respondents is chosen according to convenience

3.5 Sample Size:

- A total of 96 interviews were taken of people working and service providing in dialysis in India during the period of study.

3.1 Data collection:

- Primary data collection: - Data was collected from personal interview (personal and telephonic) and information gathered by discussion with staff.
- Secondary data collection: Data was collected from previous reports and industry experts.

Table 1- list of sources used

Both primary and secondary sources were used. Interview (personal and telephonic) were conducted. Many articles and journals were referred

Primary data		Secondary data
Name of the stakeholder	Number of interviews	Sources
Nephrologists	16	Journals
Equipment manufacturers	20	Articles
Hospital administration	35	Government websites
Patients	15	Company websites
Attendants of patients	10	Indian journal of nephrology
		International diabetic federation

3.7 Instrument for data collection:

- A set of Nephrologists were requested to fill in the questionnaire online.
- Nearby located ones were personally interviewed for the Details.
- Some regular Dialysis patients were interviewed for their treatment schedule, cost and experience of services provided at dialysis unit.
- Dialysis machine suppliers were very helpful in providing facts and data about current market scenario.
- Hospital administrators were also taken for personal interview

Table 2 - Questionnaire

S.no	Question	Reply
1	Total number of dialysis centers in city/country along with total dialysis machines	
2	No of machines in public/private /JV / standalone centers.	
3	Total number of nephrologist in city/country	
4	No of dialysis sessions happening per year.	
5	What is the growth in number of dialysis from last year	
6	What is the average monthly occupancy of a dialysis machine in a public and private sector?	
7	What is the average cost of setting up a dialysis center?	
8	What is the average cost of a dialysis machine?	
9	How many cycles a dialysis machine can perform in a day?	
10	What is the average cost of a reuse dialysis in a private and public sector?	
11	How has this changes over the last five years?	
12	What is the average landing cost of a reuse dialysis?	
13	Your view about the demand supply deficit in the city	
14	How is this expected to change in the coming years?	
15	What is the average downtime of a dialysis machine?	

3.2 Method used to present data:

Data Analysis & Interpretation – Classification & tabulation transforms of raw data collected from questionnaire and personal interview in to a useful information by organizing and compiling the points and response of data contained in each questionnaire and personal interview i.e., observation and responses are converted in to understandable and orderly statistics which are used to organize and analyze the collected data:

1. Simple tabulation of data for tally marks.
2. Calculating the ratio and percentage of the respondents.

Statistical tool: The tools which are uses in this study are MS-EXCEL,MS-POWERPOINT, MS-EXCEL use to prepare charts and graphs. MS-WORD was used to prepare or write the whole project report.

Project Duration: The study would be conducted for a period of 90 days (three months), from February 13, 2017, to May 5 2017, till the completion of the desired sample

3.9 Study tools used:

- Assumptions and calculations of overall market.
- We have estimated the total number of dialysis machines presently operated in India.
- We assumed that average minimum number of cycles per day is 3 for every machine.
- Working days in a year 300
- Average rate per treatment (ARPT) comes out to be around 1500

- In total 57 top hospitals of India were considered for calculation average rate of treatment
- Cost of Dialysis was calculated differently for different segment.

Table 3 steps in calculation

Steps in calculations	sources
Estimated the total machines in market	Industry sources
Identification of market segments government and private hospital, organized dialysis service providers and PPP(public private partnership)	Secondary and primary
Estimated the number of machines in different market segment (total supply)	Primary and secondary
Estimated the number of machines in different cities	Industry sources
Estimated total patients in different segments	Secondary (assuming 70% utilization, 3 sessions per day and 300 working days)
Estimated ARPT	Secondary and primary
Estimated total hemodialysis market	Total patients x estimated ARPT
Estimated total peritoneal dialysis market	10 % of total patients , 1.6 times ARPT
Total dialysis market	Total HD market + total PD market

Table 4 list of cost per treatment in major hospitals

Major Dialysis Service Providers among Hospitals

					
Year of inception	1983	2005	2001	1991	1985
Current Bed Strength	~8,200	~1,000	~4,000	~2,000	~2,200
Dialysis cost (single use) in USD	44-66	36-49	32-49	23-38	32-52
Dialysis cost (reuse) in USD	24-39	25-39	25-40	19-28	24-27
Sessions per month	20,000	3,500	14,500	11,000	12,000
Number of machines	250	50	200	150	150

Table 3.5

Table 5 list of hospitals with dialysis charges

Dialysis Charges in select hospitals of India

S.No	Name of Hospital	City	Tier	Reuse Dialysis (USD)	Single Use Dialysis (USD)
1	Medanta-The Medicity	Gurgaon	2	NA	47.8
2	Kemco Hospital	Gurgaon	2	43.0	51.8
3	Paras Hospitals	Gurgaon	2	35.1	41.8
4	QRS Central Hospital	Faridabad	2	28.9	43.3
5	AJMS	Faridabad	2	22.9	43.3
6	Shalby Hospital	Ahmedabad	1	22.4	36.8
7	P.D.Hinduja National	Mumbai	1	29.9	57.8
8	Care Hospital	Hyderabad	1	25.4	44.8
9	Metro Hospital	Mumbai	2	22.4	32.8
10	Paras Hospitals	Pune	2	35.1	41.8
11	Cydoc Hospitals	Ahmedabad	1	17.9	32.8
12	National Hrudyalaya	Jodhpur	2	18.4	29.9
13	Sita Hospital	Gurgaon	3	32.8	44.8
14	Sehara Hospital	Lucknow	2	29.1	50.7
15	Seven Hills Hospital	Jaipur	2	17.9	24.8
16	Kanani Hospital	Shimla	2	22.1	36.8
17	Kaatha Kidney Hospital	Ludhiana	2	34.3	44.8
18	Care Hospital	Nagpur	2	21.8	38.8
19	Manipal Hospital	Coimbatore	2	20.4	38.8
20	Praxi Hospital	Ahmedabad	2	19.4	35.1
21	Shanti Hospital	Gangoli	2	17.2	35.8
22	HCO Hospital	Bhavnagar	2	14.2	20.8
23	Aryam Hospital	Dombivli	2	22.4	44.8
24	AMRI Hospital	Bhubaneswar	2	26.9	36.8
25	Mangala Hospital	Mangalore	2	17.2	29.9
26	Columbia Asia Hospital	Kolkata	1	38.8	48.3
27	Columbia Asia Hospital	Pune	1	28.8	43.2
28	Columbia Asia Hospital	Patiala	3	26.9	36.8
29	Columbia Asia Hospital	Bangalore	1	23.9	37.3
30	Columbia Asia Hospital	Gurgaon	2	33.8	43.3
31	Max Hospital	Greater Noida	2	29.1	38.8
32	Max Hospital	Gurgaon	1	33.8	52.2
33	Max Hospital	Patparganj	1	26.9	37.3
34	Max Hospital	Vasahat	1	41.8	50.7
35	Max Hospital	Mohali	2	32.1	38.8
36	Max Hospital	Dehradun	2	29.9	41.8
37	Max Hospital	Gurgaon	3	34.0	31.9
38	Fortis Hospital	Delhi (Nehru)	1	NA	48.3
39	Fortis Hospital	Gurgaon	2	40.3	48.3
40	Fortis Hospital	Chennai	1	NA	32.1
41	Fortis Hospital	Mohali	2	30.0	41.8
42	Fortis Hospital	Faridabad	2	24.8	34.3
43	Apollo Hospitals	Chennai	1	38.8	48.3
44	Apollo Hospitals	Hyderabad	1	37.3	52.2
45	Apollo Hospitals	Ahmedabad	1	30.0	48.8
46	Apollo Hospitals	Navi Mumbai	1	25.4	58.2
47	Apollo Hospitals	Delhi	1	37.3	66.7
48	Manipal Hospitals	Jaipur	2	27.8	37.8
49	Manipal Hospitals	Mangalore	2	19.4	34.3
50	Manipal Hospitals	Salem	2	22.8	32.8
51	Manipal Hospitals	Bang	3	23.1	38.1
52	KuR Kidney Care	Melbourne	3	29.1	38.9
53	Medi Hospital	Bikaner	3	29.9	41.8
54	Arter Aether Hospital	Kohapur	3	19.7	27.8
55	Arter Aether Hospital	Roorkee	3	17.9	29.9
56	Premiere Kidney Hospital	Bangalore	3	22.4	38.9
57	Sanjayani Hospital	Bombay	3	22.4	41.8

So now when we calculate total Dialysis market

Total market = number of sessions happening (per year) x ARPT

= number of machines x average sessions (per year)

Daily sessions x utilization rate x working days (per year)

= 21,000 x 1500 x 3 x 300 x 70 %

= 19,84,50,00,000

~20 billion

4 Findings:

Drivers of Dialysis market:

1. Increasing Affordability
2. Government initiative
3. Sector Organization
4. Nephrologists Availability

Increasing Affordability

- Average per capita healthcare expenditure grew almost four times between 2004 and 2014 in India.
- Percentage of households with income between 875-4500 Rupee/day expected to double from 25% in 2015 to 46 % in 2025; middle class constitutes 20% (267 million) people in 2016 and is expected to reach 32% (475 million) by 2030
- The main drivers of this change are the changing reimbursement policies, increasing coverage through insurance scheme, empower consumers, involvement of professional societies and consolidation of dialysis industry.

Government initiative:

- National Dialysis Program (Lowering of excise duties and 152 million rupees are allocated for setting up dialysis centers in each district under PPP model)
- The NDP has been started to provide enough financial assistance to the hospitals and medical centers in remote areas to start dialysis process for the patients who are in need of it.
- The funds will be available under (NHM) national health mission and the funding will be made through PPP mode. The medical centers, especially the district ones can register under the programme. And request for the fund to start the programme in their center.
- Under national dialysis programme, the ministry will provide all the equipment and latest infrastructure to the district hospitals.
- Health ministry declared that many of the imported machinery can be purchased in less price as the ministry will cut down customs duty levied on these on emergency purpose

Sector Organization

- Increased participation from organized players (with economies of scale and lowered COGS, improved operation, lower infection rate, lower sero conversion rate)
- Centers established in Greenfield, Brown Field and PPP sector

Nephrologists Availability

- More than 160 nephrologists added every year
- Current Scenario (1 for every million population) is expected to improve to 3 (for every million population) in next 20 years *

Table 6 No. of Nephrology seats

Supply Of Nephrologists		DM Nephrology		DNB Nephrology	
Zone	State	Institutes	Seats	Institutes	Seats
North India	Punjab	3	11	-	-
	Delhi	2	15	4	9
	Rajasthan	2	5	-	-
	UP	2	8	-	-
	Haryana	-	-	2	4
South India	AP	3	7	-	-
	Karnataka	5	9	1	4
	Kerala	5	10	2	3
	Puducherry	1	2	-	-
	TN	7	19	3	5
	Telangana	3	10	-	-
East India	Assam	1	2	-	-
	Odisha	1	3	-	-
	West Bengal	1	6	2	2
West India	Gujarat	1	4	1	3

Central India	MP	1	1	-	-
	Maharashtra	5	8	4	5
Total		43	120	24	42

4.2 Barriers of Dialysis market: 1. Low affordability
2. Accessibility Issues
3. Lack of Nephrologist

Low affordability: The cost of one session of dialysis is about Rs. 1,200 when the dialyzer and tubing's are reused. But when a new set of dialyzer is used, it can be upto Rs 2,000. This is what a probable average cost across India. It could be higher in cities like Mumbai and lower in the smaller cities. For patients who does three sessions per week which is the bare minimum, the cost comes to about Rs.15,000 per month, roughly 3lac rupees annually, which is a huge amount for a middle and lower class patient to afford.

Accessibility issues: Kidney patients always feel mentally tired after a long dialysis session. They look for the dialysis center closest to their residence or those which are well connected to the nearby location with adequate transport facility. Dialysis patients have to reach the center thrice in every week.

But unfortunately most of the dialysis units and centers are located in metro and tier 1 and 2 cities, also if we analyze its distribution state wise, we will find huge discrepancies in locations of dialysis machines as shown in figure 4.1.and 4.2. Table 4.1 has the data of 40 different districts and there count of dialysis machines.

Figure 4.1
State wise availability of Dialysis machine per million population

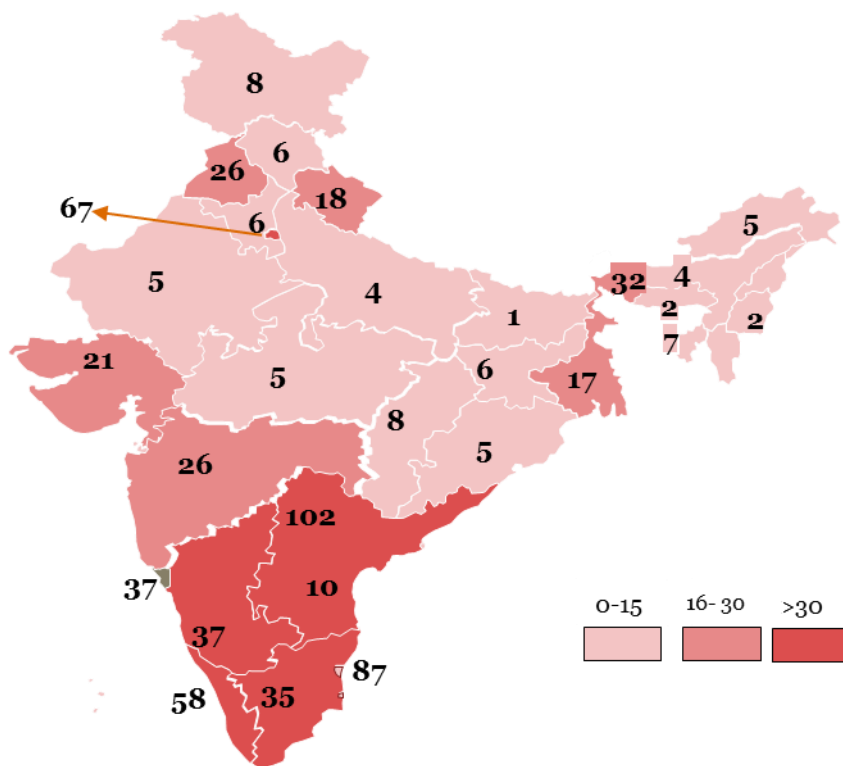


Figure 4.2

Zonal distribution of Dialysis machines

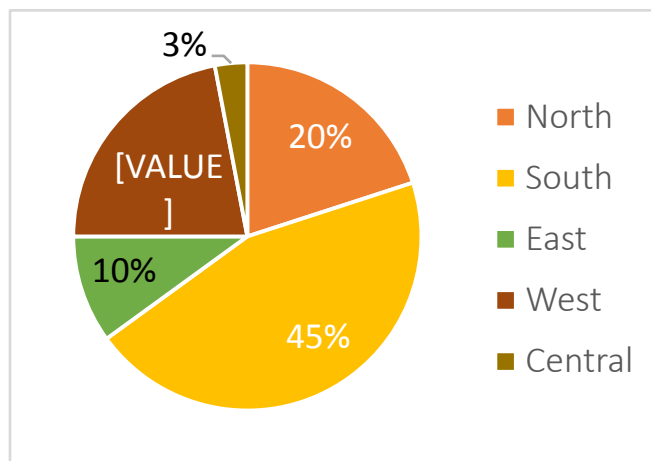


Table 4.1

Table 7 district with their dialysis machine count

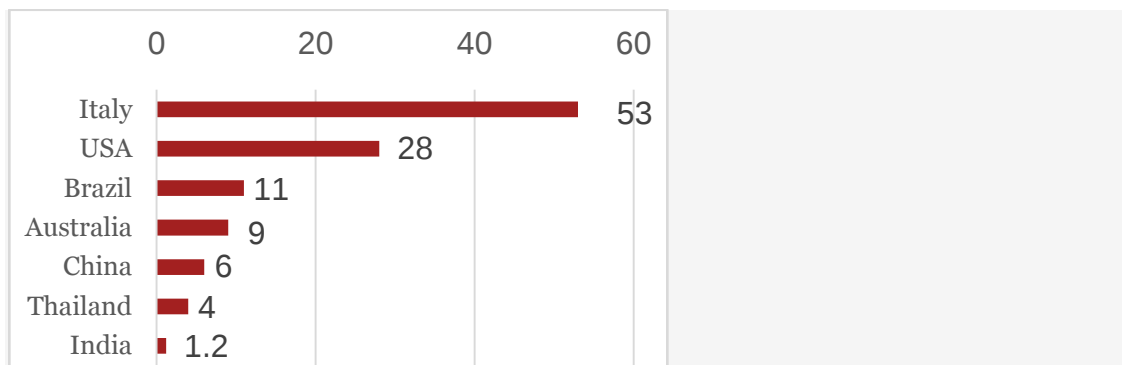
Top 40 districts with their machine count

District	Total HD Machines	District	Total HD Machines	District	Total HD Machines
Delhi	800	Bhopal	82	Alahabad	65
Mumbai	1466	Vadodara	158	Amritsar	47
Bengaluru	1243	Visakhapatnam	141	Dharwad	19
Ahmedabad	295	Ghaziabad	56	Ranchi	59
Surat	186	Patna	59	Raipur	74
Chennai	944	Ludhiana	99	Gwalior	22
Kolkata	886	Agra	51	Jabalpur	57
Hyderabad	911	Nashik	105	Jodhpur	54
Pune	481	Faridabad	100	Kota	19
Jaipur	141	Rajkot	115	Coimbatore	330
Lucknow	234	Meerut	42	Madurai	172
Kanpur	82	Gurgaon	96		
Nagpur	90	Navi Mumbai	18		
Indore	200	Varanasi	79		
Thane	127	Alahabad	65		

Lack of nephrologist: With a population of over 1.3 billion, the country has only 1600 nephrologists. A majority of these specialists are based in urban areas. It is estimated that nearly 2.2 lakh patients develop end-stage renal disease (ESRD) or chronic kidney disease (CKD) every year in India. However, over 90 per cent of them never see a nephrologist owing to lack of healthcare resources and affordability. Patients on dialysis have complications related to many other organ systems - the main ones being cardiovascular disease, abnormal bone health, and lack of production of red blood cells. All this requires proper regular monitoring, ideally by nephrologists, of whom we have only about 1600 in the entire country. If calculated per million population it will come around just about 1.3 for every million Indians.

Figure 4.3

Global comparison with other countries



4.3 Segments of Indian Dialysis market: in order to study complete Indian Dialysis in detail, we need to understand that how many segments it has divided into. So namely it can be divided into four segments which are: 1. Private Hospitals

2. Government Hospitals

3. Organized Dialysis service provider

4. Public Private Partnership

Private Hospitals: majorly dialysis machines and units are under private hospitals. Because installation and maintenance of a dialysis unit is a costly affair. This leads to monopoly of all private hospitals which leads to a higher rate of dialysis services. Quality of care is quite better in private hospital. Chances of getting infection is low, also they provide good infrastructure and other luxuries to patients like air condition, television, rest room etc.

Government Hospitals: not all district hospitals have dialysis units, problem with government set up is poor maintenance of dialysis machines and overall infrastructure. As dialysis is a free service huge waiting list is seen in many areas. Chances of getting infections and sero positive cases are quite high. Improper utilization and maintenance leads to damage and non-functioning of machines.

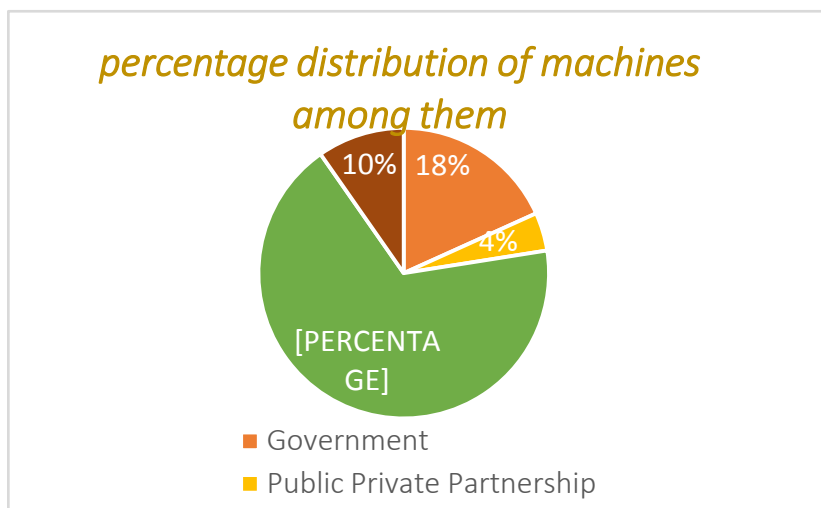
Organized Dialysis Service Provider: this is a new concept of Dialysis where will be essentially offer only and only dialysis amenities with no admission facility. Thus, they can offer dialysis at a realistically less price by cutting down the other overheads. It comprises of a full-fledged dialysis center with 10-20 dialysis machines at most, isolated and separate machines for Hepatitis B and Reverse Osmosis water plant and a resuscitation trolley with monitor and defibrillator. They also have skilled nurses, technicians and doctors trained in resuscitation of a grim patient. The patient who are screened mostly at the entry point and taken to only if they are stable for OPD dialysis. Semi-acute cases are solved by telephonic consultation between the regional medical officer and nephrologist. During an occasional acute emergency, the RMO or the paramedics resuscitate the patient and if need be transfer to a hospital .

Public Private Partnership: PPPs combine the varied skills and resources of partners in innovative ways and allow for the sharing of benefits, risks, and responsibilities. Therefore, the government looks increasingly to PPP as a model to :

1. Provide Dialysis service by tapping the expertise of the private sector.
2. Mobilize private capital to speed up the delivery of infrastructure and services and eliminate subsidies.
3. Reduce the travel time of patients by providing dialysis service at the taluka level.
4. Enable efficient use of Dialysis service by improving the identification of long-term risks and their allocation, while maintaining affordable tariffs.
5. Provide higher quality of services.
6. Access best practices.
7. Enable regular maintenance and upgrades.

Figure 4.3 shows the percentage distribution of dialysis machines among the different segments of dialysis industry. Which clearly indicates the majority of machines are under private hospital. Also it shows the discrepancy in distribution of machines. Which needs to be taken care.

Figure 4.3



4.4 Market sizing of all segments:

Now when we know the total percentage distribution of total dialysis machines in India, we can very well estimate the market size for all the segments and validate our earlier calculations. Also we can estimate the number of patients going for different price services, whichever they can afford.

Table 4.2

Market Size as per ARPT :

Player (Beds)	ARPT Segment (Per Session)	Price (INR)	Comments
Private Hospitals (14,400)	Low price	<1500	10% Beds (1400) – Most Tier 3 hospitals
	Middle price	1500-2000	70% Beds (9800) – Many Tier 1 and Most Tier 2 Hospitals
	High price	>2000	20% Beds (2800) – Most Metro and Tier 1 Hospitals
Organized Dialysis Service Providers (2000)	Low price	1400-1500	Most of the players (650)
	Middle price	1630	Single organized player (850)
	High price	2000	Only premium players (400)
PPP (700)	Low price	1000-1100	Initial stage (550)
Government Sector (4,000)	Low price	700	Government Hospitals

Government initiatives:

National Dialysis Programme:

Launched in April 2016. Amount of around 152 million was allocated to healthcare services to provide better basic dialysis facility to all citizens of India, While the budget plan was to have at least one dialysis unit in every district, the health ministry has approved around 519 proposals from district hospitals by end of 2016 to start dialysis units on the public private partnership (PPP) model. Out of this, close to 300 are already functional. The ministry plans to start the rest by end of this year. Close to 30 states have placed their proposals, with UP, Madhya Pradesh and Bihar ahead. Punjab and recently Haryana have also come up with many centers. Table 4.3 shows amount allocated to all the states. Government will monitors the scheme for speedy implementation.. However, the scheme has got no separate allocation. Instead, the centers are being cleared as state programme implementation plan under the National Health Mission (NHM). While last year there was a limited increase of Rs700 crore in the NHM budget, this year it got a jump of around

Rs2,000 crore. However, how much of it will be spent on the dialysis programme is unclear. Considering that it is a continuous and an expensive process, the programme was announced to make dialysis available in all government hospitals, which will not only offer an affordable option but more importantly benefit a significant number of BPL patients. “The idea is to make it convenient and less expensive for people,” the official said. Experts said with the increasing incidence of diabetes, burden of chronic kidney disease is only likely to go up significantly. According to the India Renal Foundation, India has very little to offer in terms of infrastructural facilities for renal care. While there are few dialysis centers, most of them are in metros. Table 4.3 shows the amount allocated to different states on the basis of their present population and need.

Table 4.3

National Dialysis Program : A total of 22.8 Mn USD has been allocated for 29 States & UT's

S.no.	States	Amount approved under NDP (in Mn USD)	Number of proposed/approved dialysis centres *
1	Bihar	3.0	24
2	Karnataka	3.0	27
3	Madhya Pradesh	2.8	48
4	Andhra Pradesh	1.8	info not available*
5	Uttar Pradesh	1.6	57
6	West Bengal	1.1	info not available*
7	Maharashtra	1.0	23
8	Jharkhand	0.9	8
9	Chhattisgarh	0.9	info not available*
10	Rajasthan	0.8	info not available*
11	Goa	0.7	-
12	Tamil Nadu	0.6	31
13	Haryana	0.6	14
14	Uttarakhand	0.6	6
15	Assam	0.5	info not available*
16	Gujarat	0.5	info not available*
17	Cebu	0.5	info not available*
18	Jammu & Kashmir	0.3	info not available*
19	Odisha	0.3	info not available*
20	Tripura	0.2	5
21	Telangana	0.2	14
22	Manipur	0.2	3
23	Arunachal Pradesh	0.2	info not available*
24	Himachal Pradesh	0.2	info not available*
25	Meghalaya	0.2	info not available*
26	Punjab	0.2	21
27	Nagaland	0.1	info not available*
28	Kerala	0.1	info not available*
29	Sikkim	0.0	info not available*
Total		22.8	281

5 Result:

Supply Demand Dynamics

After collecting Data of dialysis machine count from different cities, we can analyze that there is a huge unmet need for dialysis machines in our country. Mathematical calculations and estimations are done to represent them in tabular form. Table 4.4 shows the primary data collected during primary interviews on telephone.

Zonal demand supply gap

Table 5.1

Zone	State	Population(2016)	Demand*	Supply	Gap
North	Bihar	116,725,698	17,984	160	17,824
	Delhi NCR	18,686,902	2,879	1,255	1,624
	Haryana	27,616,702	4,255	171	4,084
	Himachal Pradesh	7,123,184	1,097	45	1,052
	J&K	13,991,468	2,156	108	2,048
	Punjab	29,673,462	4,572	784	3,788
	Rajasthan	74,791,568	11,523	343	11,181
	UP	219,722,687	33,854	890	32,957
	Uttarakhand	10,280,752	1,585	186	1,399
South	Andhra Pradesh	88,633,668	13,656	895	12,761
	Karnataka	66,076,021	10,181	2,415	7,766
	Kerala	36,640,350	5,645	2,123	3,522
	Puducherry	1,464,133	226	127	98
	Tamil Nadu	77,881,463	12,000	2,750	9,249
	Telengana	11,773,648	1,806	1,161	645
Zone	State	Population(2016)	Demand*	Supply	Gap
East	Arunachal Pradesh	1,564,735	241	8	233
	Assam	33,905,039	5,224	132	5,092
	Jharkhand	35,788,134	5,514	200	5,314
	Manipur	2,721,756	419	7	413
	Meghalaya	3,211,474	495	5	489
	Odisha	44,967,039	6,928	244	6,684
	Sikkim	644,660	99	21	78
	Tripura	3,971,032	612	27	584
	West Bengal	96,700,463	14,899	1,639	13,260
West	Gujarat	66,342,236	10,222	1,372	8,850
	Goa	2,858,545	440	105	335
	Maharashtra	121,362,092	18,699	3,139	15,560
Central	Chhattisgarh	25,540,196	3,935	208	3,728
	MP	79,965,787	12,321	439	11,881

State wise demand supply gap

Table 5.2

No.	Name of State	Population (Mn)	Annual Dialysis Required (Mn)
1	Uttar Pradesh	199.81	2.62
2	Maharashtra	112.37	1.48
3	Bihar	104.10	1.37
4	West Bengal	91.28	1.20
5	Andhra Pradesh	84.58	1.11

6	Madhya Pradesh	72.63	0.95
7	Tamil Nadu	72.15	0.95
8	Rajasthan	68.55	0.90
9	Karnataka	61.10	0.80
10	10 Others	344.00	4.52
	Grand Total	1210.57	15.90

Figure 5.1

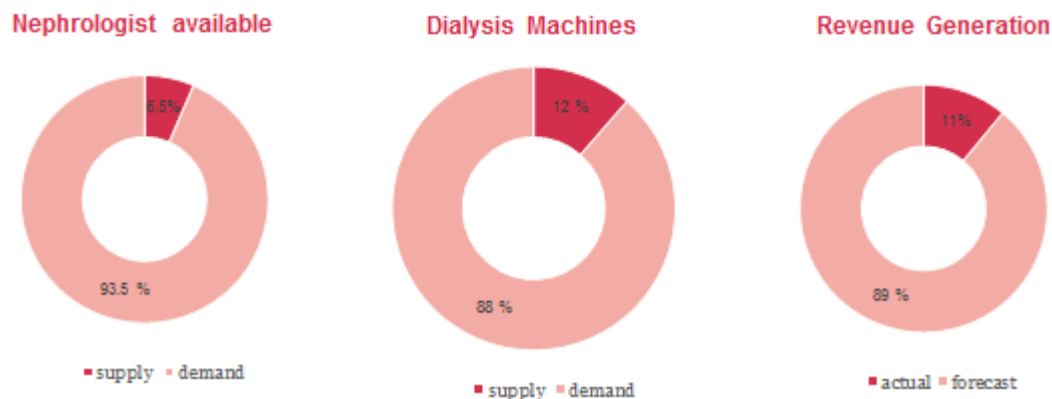


Figure 4.4 shows the supply demand gap of machines, nephrologists and revenue that could be achieved. Basically we have compared the number of actual machines available to the number of machines required to cater all patients who are suffering from ESRD and need Dialysis. Similarly other pie chart shows the available nephrologists to the actual number of nephrologist required to cater the total population suffering from ESRD and CKD. Lastly we have estimated how much possible revenue could have been generated if the actual number of machines were there serving the total patients suffering. Which actually comes around to be 89 % which is huge number. This proves that there is a profitable market which need attention by good investors.

5.2 Calculation of CAGR compound annual growth rate:

Table 5.2

Comparison of how the dialysis charges have grown over the past few years across various hospitals in the country and CGHS centres

Dialysis Charges across hospitals						
	Hospital	Year	Dialysis Charges (USD)	Year	Dialysis Charges (USD)	CAGR
1	Artemis, Gurgaon	2010	40.4	2016	42.8	1.0%
2	Max, Gurgaon	2010	34.3	2016	38.8	2.1%
3	Medanta, Gurgaon	2010	34.3	2016	40.3	2.7%
4	Paras, Gurgaon	2010	27.4	2017	38.8	5.1%
5	Batra Hospital, Delhi	2014	32.8	2017	41.8	8.4%
6	Columbia Asia, Delhi	2010	34.6	2016	33.6	-5.3%
7	PSRJ, Delhi	2015	31.6	2016	35.8	6.7%
8	Holy Family, Delhi	2013	23.9	2016	28.4	5.9%
9	Apollo, Hyderabad*	2014	38.8	2016	43.3	5.6%
10	Apollo, Chennai*	2014	38.6	2017	49.3	7.6%
11	Hinduja Hospital, Mumbai	2015	27.6	2017	29.9	4.0%
12	Nanavati, Mumbai	2014	20.9	2016	20.9	0.0%
13	Jupiter, Mumbai	2013	22.4	2016	28.4	8.2%
14	HN Hospital, Mumbai	2015	22.4	2016	22.4	0.0%

CGHS Dialysis Charges						
	Region	Year	Dialysis Charges (USD)	Year	Dialysis Charges (USD)	CAGR
1	Delhi	2010	18.0	2015	24.0	5.9%
2	Kolkata	2010	18.0	2015	21.9	3.9%
3	Ahmedabad	2010	16.5	2015	23.2	7.1%
4	Bangalore	2010	18.0	2015	21.6	3.7%
5	Chennai	2010	18.0	2015	24.0	5.9%

Average growth rate : 5.3% per year

Table 4.5 shows a comparative analysis of total number of dialysis sessions per year, all these data points are taken from the indicus site. After getting these data points ,it is easy for us to calculate their CAGR (compound annual growth rate). And we can compare them with one another.

Secondly we considered CGHS (central government health scheme), which is wide spread in our country and is being updated regularly. So it was easy to understand how the growth has been in last 3 years. Now we can say that dialysis market is on rise with time.

5.3 Revenue Calculation:

After estimating the total number of machines and average rate per treatment, we can easily calculate the revenue for each of the segment. In table 4.6 we have put all the segments along with their number of machines and total patients they provide service to in a year. We have also calculated the ARPT (average rate per treatment), so we can multiply them to calculate the revenue generated per year. Also we can distribute the total revenue among them to find out how they are performing.

Service Providers	Dialysis Machines		Patients on Dialysis	Revenue per Treatment	Revenue (in Million) (2016-17)	
	Number	Percentage			Number	Percentage
 Private Hospitals ^{AI}	14,300	68%	87,000	1700-2000	160 m	80%
 Government Sector ^B	3,800	18%	23,000	600-700	14 m	7%
 Organized Dialysis Service Providers ^{***}	2,000	10%	11,500	1400-1700	20 m	10%
 Public Private Partnership ^{**}	900	4%	5,400	900-1100	6 m	3%
Total	21,100	100%	1,27,000	NA	200 m	100%
 Growth Rate (For last 5 years)	~15% CAGR		~15% CAGR	~4.5% CAGR	~10.5% CAGR	

5.4 Actual costing of a single Dialysis: we should use our data to calculate the actual cost of a single dialysis, which will help us in calculating the profit gained per dialysis. it includes all minor consumables, electric bills, staff salary, maintenance etc. the nearby total comes around 750 -950 rupees. While we know that what are the average charges are quite high or merely double for the dialysis. It is quite evident that the dialysis industry is a huge profit making business.

Table 5.4

Requirements	Cost
Consumables	Rs 350
Electricity	Rs 50
Water, telephone, Insurance	Rs 10
Annual Maintenance - dialysis machine RO plant, premises	Rs 20
Repairs & wear & tear	Rs 20
Depreciation	Rs 100
Honorarium to nephrologist	Rs 100-200
Staff Salary	Rs 100-200
Total	Rs 750-950

Actual costing of Dialysis

Consumables	Rs 350/-
Electricity	Rs 50/-

Water, telephone, Insurance	Rs 10/-
Annual Maintenance - dialysis machine	Rs 20
RO plant, premises	
Repairs & wear & tear	Rs 20
Depreciation	Rs 100
Honorarium to nephrologist	Rs 100-200
Staff Salary	Rs 100-200
Total	Rs 750-950

#Interest on capital Expenditure - Variable

No table of figures entries found. After calculating the cost of single dialysis session, we should know how much one time investment is required for setting up a single unit dialysis center. Here we have to calculate the cost of machines, water supply, reverse osmosis plant installation etc.

Table 5.5

Essentials	Cost
Hemodialysis machine	Rs 6,00,000 (depends on the brand)
Reverse Osmosis Water Treatment Plant	Rs 1,00,000 (depends on the brand)
Electrical wiring plumbing and miscellaneous	Rs 1,00,000
Other expenses	Rs 50,000
Total	Rs 8,50,000

After evaluation table 5.5 we can say a single dialysis unit installation cost around 8,50,000 rupees, which is no wonder a huge amount . but if we calculate the profit part it comes out to be a reasonable good investment as the invested money can be recovered within 2 years of successful running of a dialysis center.

6 Discussion

1. Projections of world population changes conclude that End Stage Kidney Disease(ESKD) is becoming more and more common, and there will be disproportionate increase in the number of patient of End Stage Kidney Disease(ESKD) in countries like India, Nepal, China etc, as the cases of elderly people and those with hypertension and diabetes increase. This increase in incidence is also followed by an increase in large demand for effective treatments. In India, a landmark inflation point was reached in around 2001. In the same year NGH (national government health) survey recorded that deaths from the NCD (non-communicable diseases –kidney failure, diabetes, stroke, heart disease) had overtaken deaths from CD (communicable diseases) like malnutrition, prenatal mortality, infectious diseases, as the leading causes of most mortality in national health statistics .

2. In 2012, India had launched a National Prevention & Control for NCD (NonCommunicable Diseases), which includes chronic kidney disease. As a natural consequence, members of most middle and upper classes of Indian society has come forward to expect that their elderly or old relatives might have access to renal replacement therapies, when their kidneys fail, like other developed countries do. Such changes in healthcare seeking behavior of Indian patients with their growing incomes and increased accessibility to online information has made a dramatic rise in demand for renal replacement therapy RRT, as suggested the rapid growth of number of dialysis centers and units. The annual age-adjusted incidence of end stage kidney disease ESKD in India has been estimated about 150 pmp per million populations annually .

3. In India currently there are some reports who states that there are around 1500 dialysis units or centers run by around ~1000 nephrologists, serving to 50,000 patients. Some of these dialysis units providing services are in government or public hospitals which offer limited free and subsidized dialysis. There are also some small-scale philanthropic programs who provide dialysis to the needy patients. Many state government funded insurance schemes are also running which fund dialysis.

There are some players in market just for profit centers, who have offers only for dialysis and renal transplantation to patients in some patients with on full cost recovery base. There has been some new innovative models for latest dialysis centers with PPP (Public Private Partnership) in which the dialysis units are established by the private player inside a public health service delivery system which provides dialysis services at a preapproved rate which is subsidized by the government, however such models are still to be properly evaluated. These clinical capacity should be considered in light for the estimated population of 2,00,000 new patients entering ESRD category each year.

Demand of dialysis services in India is estimated to be growing at the rate of 31% per year, while the total size of the hemo dialysis and peritoneal dialysis constituting the total dialysis market is calculated to have increased in value from \$100 million in 2007 to \$150 million in near future of 2012. It is the time for introduction of standardized systems for calculating dialysis outcomes in India .

There is no proper systematic prospective national level renal and kidney data and information collection system for India. To add complication to this matters, in the absence of a systematic data for referral system for all ESRD patients, follow up of patients is quite difficult as they might change and shift their dialysis units. This could be one of the biggest reasons why there are not much of long term studies done on dialysis patients. As the total numbers of people requiring and getting access to dialysis increases with time, prospective data on their baseline characteristics and positive outcomes will be considered essential for measuring service quality .

4. Critical success factors for this health care offering are: As with other health care service, PPP is the key element for patients and relatives of patients. Quality care and service is extremely important as this creates “Word of Mouth” publicity for the health care provider brings in more business. As mentioned earlier this is a “Weekly spend of the entire life/ till the kidney transplant is done successfully; low cost is very vital.

Other essential factors include the following

- Empanelment with Government:

Dialysis is a costly affair for patients of lower and middle class cases. To tap this large number of segment, it is of utmost value to get government empanelment through wide range of schemes and sources run by central and state government. E.g. ECHS, ESIC, CGHS. Various state governments also run different insurance schemes for lower class and middle class patients who are not able to pay for such high cost dialysis services. By getting empanelment, dialysis centers can protect continuous source of dialysis patients.

- Convenience: is also a major factor as patient has to travel three times a week to avail dialysis services. Also the availability of slot is required in government set up.

- Sterile (Hygienic) environment, Skilled staff:

A typical dialysis session runs for about 3 to 4 hours. Also these sessions are also required 3 times a week on an average basis. Hence maximum of time is spent by the patient in the dialysis center. Therefore staff should be well skilled and trained for his job as well as friendly. The treatment involves different steps related to blood of its transfusion during dialyzer and dialysis machine. The dialyzer is also stored in most of the time for repeat use. Hence hygiene is also critical and important factor.

- Tie-ups with multispecialty hospitals:

Tie-ups with multispecialty hospitals is vital to get patients assurance and feel them relaxed with services of dialysis center. When it comes to health, patients believe only well-known hospitals. They do not put their trust directly on standalone centers unless there is a strong back support of a reputed Nephrologist or hospital.

5. Key challenges to this industry: As it was mentioned earlier that one of the biggest problem today is the lack of awareness about this kind of disease and even lower awareness about dialysis. Also providing reasonably priced treatment to the lower income groups and make

sure business sustainability is a key challenge that players need to beat. Other key challenges for the industry are as follows: -

- Penetration:

The healthcare infrastructure is noticeably limited to large towns. Due to the lack of availability of skilled medical service, the patients get detected with Chronic Kidney Disease CKD at very late stages. In addition, the low quality of infrastructure of the hospitals and lack of skilled staff leads to patients travelling from long distances for dialysis. Given their LIG (low income group), they will find it very difficult to afford the higher costs of dialysis and the time to time travelling expenses.

- Credit Period - Empanelment:

The various schemes initiated by the many government bodies are aimed to make possible and support the treatment cost of dialysis for this patient from these kind of group. But the healthcare institutions empaneled on these schemes regularly face a challenge due to low charges per dialysis presented under the scheme coupled with delays in the payment. The average credit period around the board is around 45 days

Private Equity funds generally invest in businesses that have a very large market opportunity. The healthcare opportunity in dialysis offers that to these funds. As a result in India we have seen quite a few deals in this sector despite the size of business being low. To conclude, the demand for dialysis services in India is huge and players need to innovate and come up with business models to cater to this opportunity. Volumes can be really large in the lower and middle income groups. However Government empanelment's are critical to service that segment. A lot of PPP models have also been started in this segment especially in North India.

7 Recommendation

A systemic data was collected for top 10 metro cities of India, about their per capita income and demand supply gap of dialysis treatment. Then we have plotted a graph with demand supply gap on y-axis and per capita income of the city on x-axis. So this way we can rule out cities with maximum potential of future dialysis center hub. So we can suggest our client where to invest in future and set up new dialysis set up.

So the potential cities come out to be Delhi, Ahmedabad, Jaipur and Surat.

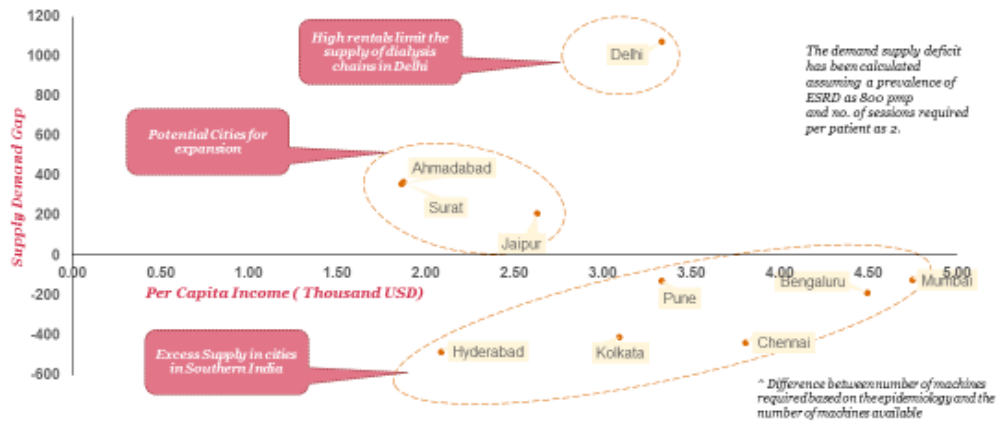
Same way we calculated the demand supply gap and paying capacity of tier 2 and 3 cities. In total 40 tier 2 and 3 cities were taken into consideration. Their prices and supply was asked on telephonic interview. Per capita income data was collected from census 2011 and other online websites.

Lucknow, Kanpur, Thane and Nagpur came out to be most potential tier 2 cities in case of future investment purpose.

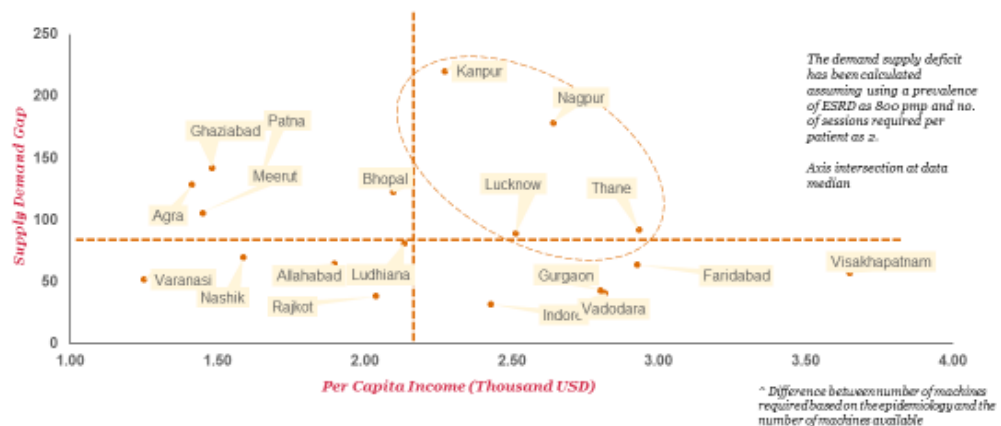
1. Proper registration and evaluation of patients with CKD and ESRD should be done.

2. Every district should be allotted dialysis machines according to their population.
3. Quality of service should be standardized in all segments of dialysis industry.
4. Insurance schemes for the BPL and lower class people should be launched to help them.
5. More PPP models should be opened for benefit of both patient and government.

Recommendation: Amongst the top 10 cities in India by population, cities in Southern India have an excess supply



Kanpur, Nagpur, Lucknow and Thane are best suited for expansion in next top 20 cities of India



PwC

Row Labels	Sum of Total HD Machi nes	2016	Per capita	ESR D	Patie nt Dema nd	Session Deman d	Machin es require d	Gap
Delhi	800	18,241,234	223,295	14,593	14593	1517671	1874	1074
Mumbai	1466	13,059,065	318,254	10,447	10447	1086514	1341	-125
Bengaluru	1243	10,250,330	301,314	8,200	8200	852827	1053	-190
Ahmadabad	295	6,353,339	124,844	5,083	5083	528598	653	358
Surat	186	5,420,548	125,430	4,336	4336	450990	557	371
Chennai	944	4,912,696	255,274	3,930	3930	408736	505	-439
Kolkata	886	4,632,859	207,383	3,706	3706	385454	476	-410
Hyderabad	911	4,156,099	139,931	3,325	3325	345787	427	-484
Pune	481	3,451,324	223,507	2,761	2761	287150	355	-126
Jaipur	141	3,420,231	176,061	2,736	2736	284563	351	210
Lucknow	234	3,150,759	168,421	2,521	2521	262143	324	90
Kanpur	82	2,943,472	152,287	2,355	2355	244897	302	220
Nagpur	90	2,611,813	176,984	2,089	2089	217303	268	178

Indore	200	2,259,426	162,844	1,808	1808	187984	232	32
Thane	127	2,135,053	196,516	1,708	1708	177636	219	92
Bhopal	82	1,989,953	140,625	1,592	1592	165564	204	122
Vadodara	158	1,938,131	188,770	1,551	1551	161253	199	41
Visakhapatnam	141	1,927,767	244,624	1,542	1542	160390	198	57
Ghaziabad	56	1,927,767	99,250	1,542	1542	160390	198	142
Patna	59	1,834,488	110,096	1,468	1468	152629	188	129
Ludhiana	99	1,751,573	143,076	1,401	1401	145731	180	81
Agra	51	1,751,573	94,675	1,401	1401	145731	180	129
Nashik	105	1,699,751	106,340	1,360	1360	141419	175	70
Faridabad	100	1,596,108	196,104	1,277	1277	132796	164	64
Rajkot	115	1,492,465	136,568	1,194	1194	124173	153	38
Meerut	42	1,440,643	97,122	1,153	1153	119861	148	106
Gurgaon	96	1,357,728	187,786	1,086	1086	112963	139	43
Navi Mumbai	18	1,337,00	333,33	1,070	1070	111238	137	119

		0	3					
Varanasi	79	1,274,813	83,740	1,020	1020	106064	131	52
Allahabad	65	1,264,449	127,049	1,012	1012	105202	130	65
Amritsar	47	1,254,085	162,810	1,003	1003	104340	129	82
Dhanbad	19	1,243,720	107,500	995	995	103478	128	109
Ranchi	59	1,191,899	106,087	954	954	99166	122	63
Raipur	74	1,181,534	127,771	945	945	98304	121	47
Gwalior	22	1,181,534	85,088	945	945	98304	121	99
Jabalpur	57	1,171,170	159,292	937	937	97441	120	63
Jodhpur	54	1,171,170	143,363	937	937	97441	120	66
Kota	19	1,150,441	144,144	920	920	95717	118	99
Coimbatore	330	1,129,713	136,926	904	904	93992	116	-214
Madurai	172	1,088,255	89,177	871	871	90543	112	-60
Chandigarh	126	1,067,527	296,117	854	854	88818	110	-16
Moradabad	24	1,014,669	75,281	812	812	84420	104	80
Solapur	47	1,012,59	67,554	810	810	84248	104	57

		6						
Mysore	144	1,009,486	131,417	808	808	83989	104	-40
Bareilly	44	1,004,304	94,737	803	803	83558	103	59
Jalandhar	151	956,628	145,179	765	765	79591	98	-53
Salem	145	905,843	70,481	725	725	75366	93	-52
Saharanpur	14	833,293	78,109	667	667	69330	86	72
Noida	77	823,965	122,893	659	659	68554	85	8
Warangal	50	781,471	128,912	625	625	65018	80	30
Guntur	74	751,414	140,690	601	601	62518	77	3
Gorakhpur	86	714,103	80,552	571	571	59413	73	-13
Bikaner	7	707,884	98,389	566	566	58896	73	66
Amravati	30	704,775	80,000	564	564	58637	72	42
Bhilainagar	5	674,718	110,292	540	540	56137	69	64
Cuttack	47	658,135	101,417	527	527	54757	68	21
Bhavnagar	46	658,135	78,268	527	527	54757	68	22
Dehradun	116	648,808	141,374	519	519	53981	67	-49
Jamnagar	30	637,407	65,528	510	510	53032	65	35
Nellore	138	621,860	137,167	497	497	51739	64	-74

Jammu	32	616,678	203,361	493	493	51308	63	31
Tiruppur	19	607,350	91,458	486	486	50532	62	43
Gulbarga	32	603,204	72,509	483	483	50187	62	30
Kolhapur	66	587,658	108,642	470	470	48893	60	-6
Ajmer	6	579,366	137,030	463	463	48203	60	54
Ujjain	17	562,784	124,494	450	450	46824	58	41
Jhansi	8	551,383	79,699	441	441	45875	57	49
Belgaum	55	535,836	94,004	429	429	44582	55	0
Gaya	12	521,326	63,022	417	417	43374	54	42
Kurnool	23	517,180	102,004	414	414	43029	53	30
Tirunelveli	52	511,998	74,291	410	410	42598	53	1
Jalgaon	19	509,925	70,935	408	408	42426	52	33
Patiala	59	508,889	165,580	407	407	42340	52	-7
Udaipur	28	488,160	118,259	391	391	40615	50	22
Davanagere	39	475,723	67,756	381	381	39580	49	10
Agartala	25	463,286	35,347	371	371	38545	48	23
Bellary	43	460,177	70,946	368	368	38287	47	4
Akola	52	449,812	89,631	360	360	37424	46	-6
Bokaro steel city	23	436,339	113,53	349	349	36303	45	22

			9					
Bhagalpur	18	435,302	100,476	348	348	36217	45	27
Latur	23	427,011	73,544	342	342	35527	44	21
Rohtak	18	416,646	123,383	333	333	34665	43	25
Bilaspur	43	412,501	134,171	330	330	34320	42	-1
Bhilwara	20	401,100	89,406	321	321	33372	41	21
Dhule	10	400,063	76,166	320	320	33285	41	31
kadapa	18	387,626	121,123	310	310	32251	40	22
Muzaffarpur	15	384,517	75,741	308	308	31992	39	24
Thanjavur	61	378,298	90,667	303	303	31474	39	-22
Ahmadnagar	36	378,298	115,890	303	303	31474	39	3
Mathura	12	378,298	89,315	303	303	31474	39	27
Kollam	122	376,225	116,804	301	301	31302	39	-83
Bijapur	12	365,861	90,368	293	293	30440	38	26
Junagadh	12	355,497	86,880	284	284	29577	37	25
Shimoga	65	351,351	80,531	281	281	29232	36	-29
Karnal	16	344,096	166,867	275	275	28629	35	19
Gandhinagar	22	342,023	146,970	274	274	28456	35	13
Chandrapur	6	342,023	87,576	274	274	28456	35	29

Barddhaman	124	334,768	104,644	268	268	27853	34	-90
Parbhani	11	334,768	70,588	268	268	27853	34	23
Hisar	17	333,732	149,689	267	267	27766	34	17
Tumkur	46	331,659	92,188	265	265	27594	34	-12
Nizamabad	40	329,586	85,220	264	264	27422	34	-6
Thrissur	203	326,477	202,222	261	261	27163	34	-169
Bathinda	28	321,294	114,194	257	257	26732	33	5
Panipat	5	318,185	114,007	255	255	26473	33	28
Darbhangra	8	316,112	76,066	253	253	26301	32	24
Jalna	5	313,003	76,490	250	250	26042	32	27
Sagar	6	298,493	65,972	239	239	24835	31	25
Anantapur	43	292,274	95,745	234	234	24317	30	-13
Durg	34	291,238	115,302	233	233	24231	30	-4
Ratlam	10	289,165	110,036	231	231	24059	30	20
Etawah	20	282,946	63,736	226	226	23541	29	9
Sikar	11	274,655	81,509	220	220	22851	28	17
Rewa	6	263,254	68,898	211	211	21903	27	21
Pali	6	253,926	62,449	203	203	21127	26	20
Raichur	16	251,853	58,848	201	201	20954	26	10

Vizianagara m	6	250,817	130,99 2	201	201	20868	26	20
Alappuzha	87	249,781	76,349	200	200	20782	26	-61
Panchkula	12	247,708	176,15 1	198	198	20609	25	13
Anand	24	243,562	89,362	195	195	20264	25	1
Nadiad	16	242,525	115,38 5	194	194	20178	25	9
Bidar	7	238,380	91,304	191	191	19833	24	17
Ongole	38	236,307	123,68 4	189	189	19661	24	-14
Yamunanaga r	27	234,234	128,31 9	187	187	19488	24	-3
Ambala	36	223,870	163,42 6	179	179	18626	23	-13
Dindigul	12	218,688	83,412	175	175	18195	22	10
Mahesana	38	216,615	130,14 4	173	173	18022	22	-16
Mahbubnaga r	7	216,615	105,26 3	173	173	18022	22	15
Sambalpur	5	209,360	102,47 5	167	167	17419	22	17
Khammam	13	203,141	111,22 4	163	163	16901	21	8
Sirsa	8	196,922	75,263	158	158	16384	20	12
Vellore	153	194,850	65,426	156	156	16211	20	-133
Jaunpur	5	193,813	57,219	155	155	16125	20	15
Vapi	6	189,667	125,13	152	152	15780	19	13

			7					
Cuddalore	52	184,485	67,416	148	148	15349	19	-33
Hoshiarpur	12	181,376	93,143	145	145	15090	19	7
Navsari	32	180,339	72,414	144	144	15004	19	-13
Moga	5	179,303	102,890	143	143	14918	18	13
Faizabad	5	178,267	93,023	143	143	14832	18	13
Nalgonda	17	176,194	128,824	141	141	14659	18	1
bharuch	10	176,194	84,706	141	141	14659	18	8
Hassan	23	173,084	116,168	138	138	14401	18	-5
Chittoor	74	168,939	128,221	135	135	14056	17	-57
Raigarh	5	167,902	109,259	134	134	13969	17	12
Erode	71	164,793	94,969	132	132	13711	17	-54
Pathankot	12	159,611	125,974	128	128	13280	16	4
Porbandar	5	159,611	72,078	128	128	13280	16	11
Chitradurga	10	158,574	102,614	127	127	13193	16	6
Dibrugarh	40	157,538	109,868	126	126	13107	16	-24
Udupi	52	156,501	162,914	125	125	13021	16	-36
Greater Noida	14	156,501	181,457	125	125	13021	16	2

Tiruvannamalai	28	155,465	85,333	124	124	12935	16	-12
Bid	5	154,429	81,208	124	124	12848	16	11
Kolar	22	152,356	91,156	122	122	12676	16	-6
Bhiwadi	8	152,356	146,939	122	122	12676	16	8
Valsad	33	150,283	131,724	120	120	12504	15	-18
Srikakulam	7	150,283	172,414	120	120	12504	15	8
Patan	46	145,101	124,286	116	116	12072	15	-31
Bankura	16	145,101	76,429	116	116	12072	15	-1
Mandya	20	144,064	90,647	115	115	11986	15	-5
Jagdalpur	6	137,846	118,045	110	110	11469	14	8
Palakkad	29	130,591	161,905	104	104	10865	13	-16
Amreli	5	130,591	85,714	104	104	10865	13	8
Satara	19	128,518	84,677	103	103	10693	13	-6
Chikmagalur	11	128,518	74,919	103	103	10693	13	2
Darjiling	106	127,481	69,512	102	102	10606	13	-93
Barnala	5	127,481	154,472	102	102	10606	13	8
Osmanabad	5	127,481	53,089	102	102	10606	13	8
Bagalkot	18	123,336	85,714	99	99	10262	13	-5
Azamgarh	6				97	10089	12	6

		121,263	85,470	97				
Nandurbar	5	121,263	67,521	97	97	10089	12	7
Gonda	12	116,081	68,571	93	93	9658	12	0
Aurangabad	75	114,008	71,818	91	91	9485	12	-63
Jalpaiguri	11	114,008	132,727	91	91	9485	12	1
Buxar	5	114,008	65,091	91	91	9485	12	7
Malappuram	190	109,862	85,755	88	88	9141	11	-179
Wardha	10	108,826	124,762	87	87	9054	11	1

8 Bibliography

Books

1. US Renal data system. USRDS 2000 Annual Data Report: Atlas of End Stage Renal disease in the united states. Bethesda, MD: National institutes of health, national institute of diabetes and digestive and kidney Diseases; 2000.
2. Mani MK. Experience with a program for prevention of chronic renal failure in India. *Kidney Int.* 2005;67:75–8. (Suppl) [PubMed]
3. Agarwal SK, Dash SC, Irshad M, Raju S, Singh R, Pandey RM. Prevalence of chronic renal failure in adults in Delhi, India. *Nephrol Dial Transplant.* 2005;20:1638–42. [PubMed]
4. Modi GK, Jha V. The incidence of end stage renal disease in India, a population based study. *Kidney Int.* 2006;70:2131–3. [PubMed]

Websites:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2845186/>

<http://www.micromarketmonitor.com/market-report/dialysis-reports-6941626803.html>

<https://www.kenresearch.com/blog/2016/06/indian-dialysis-equipment-market-research-report/>

<https://www.asianhbm.com/articles/is-dialysis-the-next-big-opportunity-in-indian-healthcare>

https://www.researchgate.net/publication/271215330_Dialysis_outcomes_in_India_A_pilot_study

<http://www.indiarenalfoundation.org/India-Renal-Foundation-Indian-Scenario.htm>
[www.Reevolv](http://www.Reevolv.com) Research, Census 2011