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Assessment of
Factors Determining Accessibility of Medical Devices in India

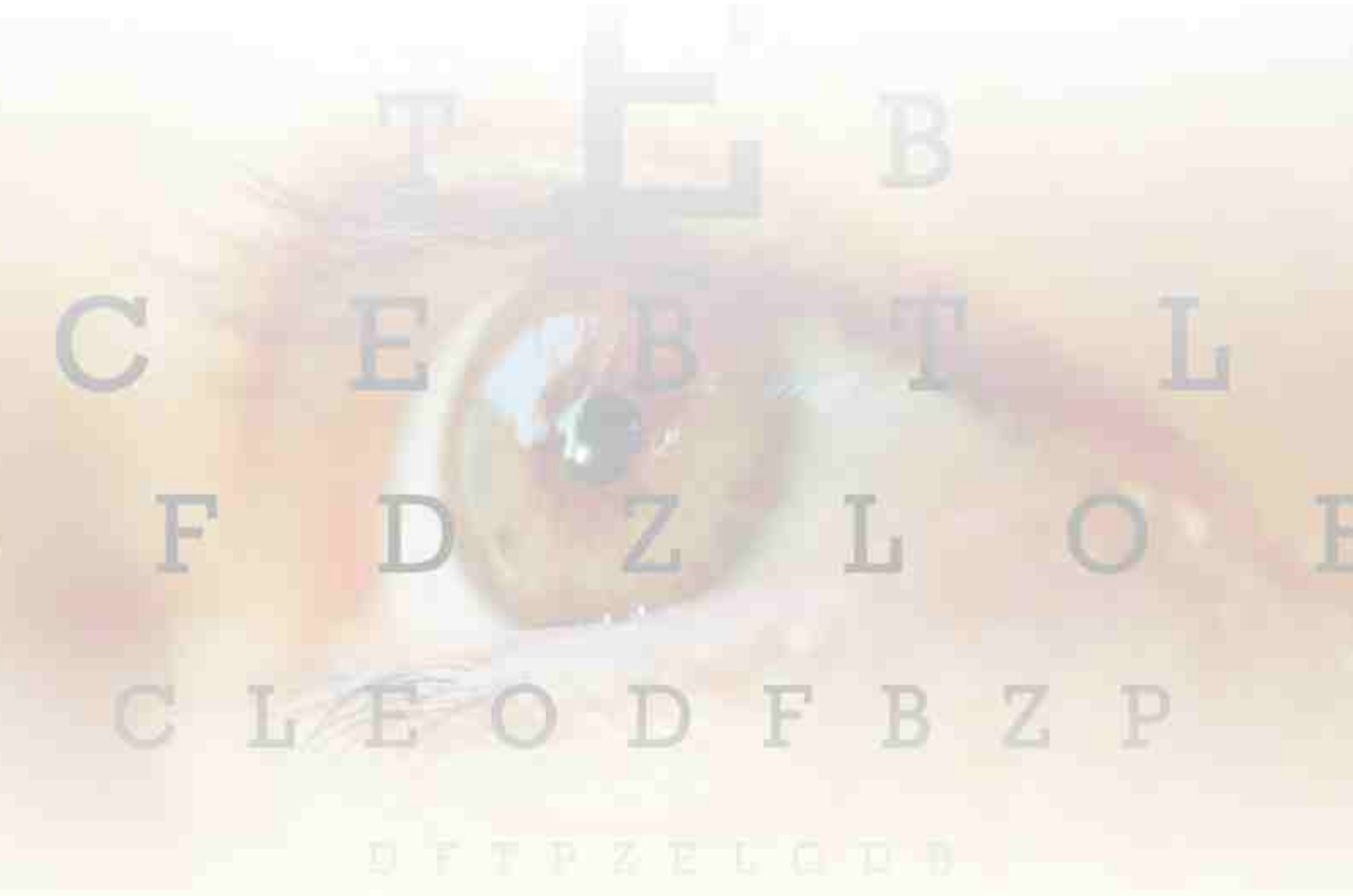


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Preface

FICCI Medical Device Forum and Frost & Sullivan are pleased to present the report entitled "Assessment of factors determining the Accessibility of Medical Devices in India".

India is currently in the limelight for its expertise in the Medical Devices and Equipment Industry and the rising influx of this sector has reinforced the existing Healthcare in our country. In the past years, innovation in medical devices has contributed to reduction in death rate by playing a significant role in treatment of several diseases. The Medical Devices sector has significantly reduced the disease burden of patients, families, society and also the country's health system. With the kind of fast pace in this sunrise domain, there is a need for a single platform, where healthcare providers, experts from Medical Device industry, key decision makers from various Government bodies Academicians and other stake holders can together deliberate towards a successful healthcare ecosystem.

Working towards Medical technologies and the penetration of medical devices in India, FICCI- Medical Devices Forum and Frost& Sullivan together present this Report, which is intended to serve as a comprehensive document for Accessibility of Medical Devices in the Indian Healthcare sector.

Through the FICCI-F&S report, we have tried to unravel the relative importance of factors driving growth of therapies that play a significant role in decreasing mortality or in improving quality of life. The following therapies were considered to be a part of this research study and were analysed qualitatively and quantitatively on two different sets of factors:

- Cataract surgeries using intraocular lenses.
- Cardiac Intervention using implants- Bare metal stents, Drug eluting stents
- Knee and Hip replacement surgeries using implants
- Heart Valve Repair/Replacement

The conclusion of the report provides ranking of factors in terms of their importance, with respect to the four therapies covered for this research study. Furthermore, suggestions on improving the penetration strategies for the above mentioned therapies have also been discussed in the report.



Contents

S.NO.	TOPIC	PAGE NO.
	Executive Summary	1
Chapter 1	Defining Health: A Holistic View Point	7
Chapter 2	Comparative Analysis	13
Chapter 3	Research undertaken and its Analysis	29
Chapter 4	Analysis and discussion of Primary Research	33
Chapter 5	Inferences and Conclusion	65

Index

S.NO.	TOPIC	PAGE NO.
FIGURE 1	The Healthcare Pie	2
FIGURE 2	Health Expenditure as % of GDP	15
FIGURE 3	Per capita spend on healthcare (2008)	16
FIGURE 4	Global Disease Burden	16
FIGURE 5	India Diseas Burden	17
FIGURE 6	Evaluation of various diseases by ICRIER	17
FIGURE 7	Global Disease Burden by DALY	18
FIGURE 8	Hospital Beds-Population Ratio	19
FIGURE 9	Beds/Lakh Population	19
FIGURE 10	Doctors/Lakh Population	20
FIGURE 11	Number of Medical Seats : 1998-2007-08	20
FIGURE 12	Projected New Doctor in Health system assuming a 15% YoY growth	21
FIGURE 13	Trends in hospital bed-population	22
FIGURE 14	Number of policies and its beneficiaries	23
FIGURE 15	Inequitable distribution of health infrastructure	25
FIGURE 16	Diabetes in urban and rural areas	26
FIGURE 17	Disease profile	28
FIGURE 18	Source of patients	35
FIGURE 19	Referral patterns in Government Hospitals	36
FIGURE 20	Referral patterns in private hospitals year 2009	36
FIGURE 21	Health outcomes wrt place of Residence-Government settings	38
FIGURE 22	Health outcomes wrt place Residence-Private settings	38
FIGURE 23	India Blindness	41
FIGURE 24	Indian Blindness : causes as proportion of total blind, 2004	41
FIGURE 25	Relative importance of factors1	42
FIGURE 26	Cost vs. Benefit of the therapy	42
FIGURE 27	Increase in choices due to availability	43
FIGURE 28	Price of therapy has not acted as a barrier for adoption	44
FIGURE 29	Relative importance of factor 2	47
FIGURE 30	Increase in choices due to availability of multiple options at varying price points	47
FIGURE 31	Cost vs benefit of therapy	49
FIGURE 32	Relative importance of factors 3	52
FIGURE 33	Cost vs benefit of therapy 3	53
FIGURE 34	Increase in choices due to variability of multiple options at varying price points 3	55
FIGURE 35	Relative importance of factors	57
FIGURE 36	Cost vs benefit of the therapy	57
FIGURE 37	Prevalence of VHD in ages 6-16 years	59
FIGURE 38	Increase in choices due to availability of multiple options at varying price points 4	62
FIGURE 39	Decrease in price of consumables without a simultaneous increase in other factors will result in higher penetration	63
FIGURE 40	Self rating on current health	68
FIGURE 41	What people do to stay healthy	69

Executive Summary

Defining Health: A Holistic View Point

Health, as defined by the World Health Organization, is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Health and wellness today have given rise to the word 'healthcare', which is not only seen as a treatment of illness but also focuses on prevention, health and hygiene. Furthermore, healthcare implies ensuring proper health of the society/nation as a multidimensional issue involving a number of stakeholders.

Components of a Successful Healthcare Eco System

- Doctors and Hospitals
- Insurance companies/reimbursement/reimbursement authorities/Self Help Groups (SHGs)
- Industry: Pharmaceutical and medical device companies
- Various departments/Ministries of Government
- Non Governmental Organizations (NGOs)
- Regulatory authorities
- Society

The relative importance of one component over the other is a matter of debate. However, evidence suggests that all the components are equally important for a successful healthcare model.

It is essential for every stakeholder to have a defined role in a successful healthcare system as evident in a progressive healthcare model of a country like Germany, which also ensures competition amongst each of them. This in turn, results in improvement of healthcare standards, lowering of costs with more people availing the health services.

Some key factors that define a healthcare model as success are as follows:

- Free access to healthcare delivery services
- High number of providers and medical technology equipments and devices
- Shift in focus from obsession with cost containment

The Indian Healthcare Model

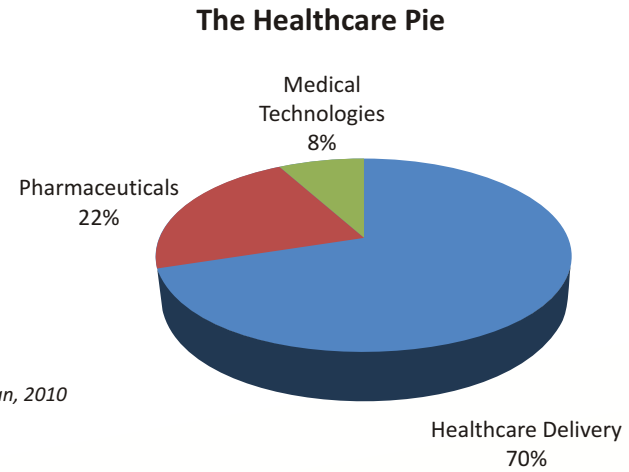
On paper at least, the Indian healthcare system is based on some very successful models, according to which all the necessary health services are delivered to the public effectively.



This model is trifurcated into three categories: public health services, primary & secondary ambulatory care and secondary & tertiary hospital care. But in reality there is inadequate access mechanism for services, leave alone delivering quality healthcare.

Indian Healthcare Market

- The Indian healthcare market was valued at US $60-62 Billion in the year 2010, and is estimated to touch US$ 90 billion by 2013, continuing at a CAGR of 15 per cent. 70-72% comprised of healthcare delivery services, 20-22% was considered to be the pharmaceutical market and the remaining 8-10% comprised of medical technologies and other components. (Source: Frost & Sullivan Primary Research)



Source: Frost and Sullivan, 2010

Figure 1 the Healthcare Pie

Despite having the 2nd largest population, the size of the Indian health care market is abysmally small, when compared to similar and dissimilar economies. The per-capita spend on healthcare in India was 50-55 USD, three times lesser than China and 120 times lower than US.

According to the available data, the total health spend of the country hovers between 4.8%- 5.1%. A comparative analysis of GDP figures shows that a developing nation like Brazil is ahead with its health expenditure at 7.5 % of its GDP, even though it has a low population size. Germany spends 10 % of its GDP on health of its people, while the figure for the US is 16 %.

Further, the existing system in India is heavily skewed in favor of the urban areas, which account for only 22-25 % of population. This disproportionate distribution of health services also results in increasing the cost of treatment, delayed and sub-optimal treatment, thus leading to a preventable mortality in large numbers.

A detailed analysis of the system reveals that our health care model needs further augmentation on certain vital parameters, namely:



- Health expenditure as percentage of GDP
- Per capita spending on healthcare
- Doctor -Population & Hospital Bed-Population ratio
- Infant and maternal mortality ratio
- Size of the healthcare market

This lopsided development of the healthcare system has resulted in overburdening of the existing centers and more importantly restricting access to health services. The restriction to access can take various forms namely:

- Geographical access barrier
- Awareness related access barrier
- Gender related access barrier
- Cost access barrier

Comparison between the Global and the Indian Disease Burden

Evaluation of the global and Indian scenarios on the basis of disease burden by Disability-Adjusted Life Year (DALY) has drawn some important findings. As per DALY, India bears about 20% of the global disease burden, which varies according to the disease conditions. The break-up is 4% in the case of blindness, 10% in the case of diabetes, 18% in the case of CVD and as high as 25% in case of injuries.

There have been various other significant factors that determine the accessibility of medical devices in India, one of them being healthcare infrastructure. A sound and well-equipped infrastructure ensures better delivery of healthcare services to the public.

However, India ranks quite low when compared with other developing nations like Brazil on this front. There is a great deal of disparity with other developing economies in terms of doctor-population ratio, hospital beds-population ratio and capacity building in healthcare centers or hospitals.

The assessment reports or data over the years and the research underline the fact it is important for India to have a strong healthcare system, higher public spending, increase in investments in healthcare, improvement in economic access through insurance and have innovative models of healthcare delivery.



Detailed analysis of the determining factors like accessibility, availability, affordability and awareness in combination with understanding of the present Indian healthcare system may lead to actions that can give rise to significant short or mid-term results.

A Brief on the Research Methodology

To summarize, a research was conducted, where a total of 135 respondents including cardiac surgeons, orthopedic surgeons, ophthalmologists and medical devices companies across India were interviewed.

The respondents were asked to express their qualitative and quantitative opinion on the following two sets of factors:

- Source of patients
- Referral practices
- Variation in the healthcare outcomes with respect to residential setting of patients
- Reasons for long distances traveled by patients to avail healthcare services

The second set of factors related to the usage of medical technologies for various therapy areas and their analysis on the basis of following factors:

- Cost vs. benefit of the therapy
- Availability of multiple options at varying price points
- Cost of consumables used for the therapy
- Presence of hospitals having the requisite facility to administer the therapy
- Timely referral
- Reimbursement
- Number of doctors required for administering this therapy
- Presence of support staff for administering therapy
- Optimal diagnosis

A number of different therapies were considered to be a part of this research study. These therapies were:

1. Heart valve repair/replacement
2. Cardiac intervention using implants- bare metal stents, drug eluting stents
3. Knee and hip replacement surgeries using implants
4. Cataract surgeries using intraocular lenses

The Response of Different Respondents and the Research Findings



For the first set of factors, there was a concerted perspective of different respondents.

- Around 80-85% of the total patients were from urban and sub-urban areas and patients from rural areas account for not more than 8-12%.
- 50-75% of the patients were coming via a referral and only a small 10-20% of the patients were coming on their own.
- The health outcomes for urban patients was considered to be better , however in absence of proper record keeping it was considered more of a perception issue.
- Lack of faith in the local system coupled with absence of a health center was the primary reason for patients traveling long distances to avail health services.

In conclusion, the above discussion suggests that in spite of constant efforts, the primary beneficiary of the existing system is the urban population and the fruits of these efforts have yet not reached the rural population. This contrast is even starker in light of the fact that 70-80% of the Indian population is rural.

For the second set of factors the opinions expressed by the respondents are enlisted below:

1. **Cost vs. benefit of the therapy:** There was unanimity of view point that the use of modern system of medicine and technology has resulted in immense benefits for the patients albeit at an increased cost. These benefits are either in terms of reduced mortality, increased life expectancy or a better quality of life.
2. **Availability of multiple options at varying price points:** Majority of the respondents were satisfied with the range of offerings available to treat a particular disease, these varied from oral medication to surgical intervention tools. For example, intraocular lenses are available from 100-5000 INR. Similar opinion was expressed by cardiologists for various classes of stents ranging from a bare metal to drug eluting stent.
3. **Cost of consumables used for the therapy:** This accounted for small fraction of the total cost of therapy, ranging from 12-20% depending on the type of therapy. Another conclusion was that the overall cost of the therapy rather than the cost of consumables alone acts as a big economic access barrier.
4. **Presence of hospitals having the requisite facility to administer the therapy:** With a difference of opinion, the ophthalmologists said that the current set-up was sufficient to cope with the prevalence of cataract whereas majority of the cardiologists ended up with a different perspective. This debate can be attributed to the infrastructure cost required to set up a cardiac center, which is approximately 40-50 Million INR for a bare bone set-up.



5. Timely referral: Since 60-70% of patients come via referral, the respondents were of the opinion that there was a strong need to strengthen the referral system, which will result in timely initiation of treatment and better outcomes.
6. Reimbursement: This factor was considered to be an important driver for penetration of various therapies, and this could soon assume an important position in the short or midterm.
7. Number of doctors required to administer this therapy: It is considered to be a permanent problem of the Indian health system by all respondents. However, the respondents also observed that this factor is not pinching us presently as the absolute penetration of health services is abysmally low. Once, more people start exhibiting a proactive health seeking behavior, the existing infrastructure might not be able to cope with the workload.
8. Presence of support staff for administering therapy: A viewpoint similar to the above was observed for this factor too.

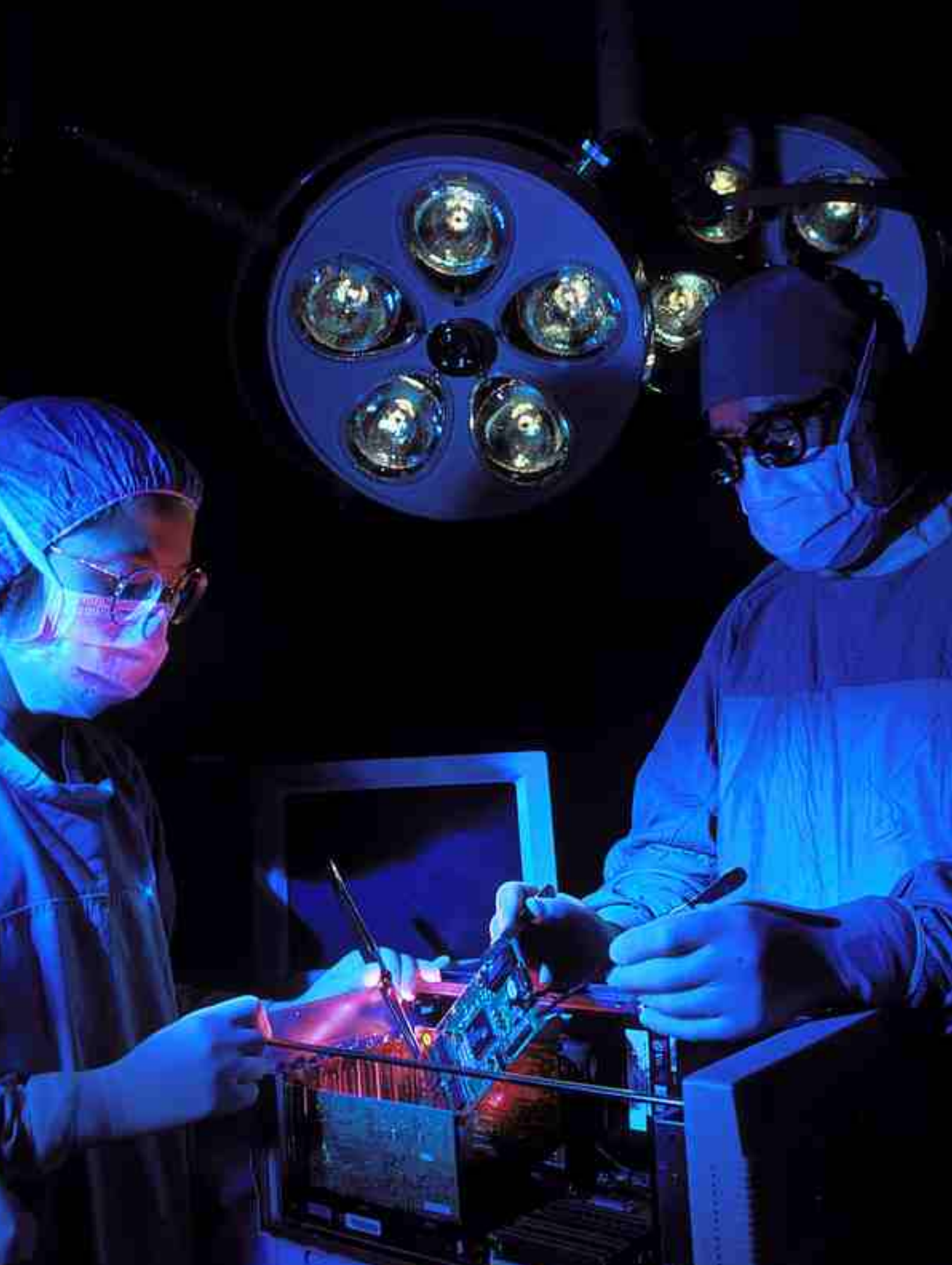
The respondents were also asked to rank the aforementioned factors in terms of importance. Although, there was a difference in ranking with respect to a particular therapy area; nevertheless on an overall level the three most important factors to increase the penetration of these therapies were listed as mentioned below:

1. Presence of hospitals having requisite facilities to administer these therapies
2. Availability of multiple options for treatment
3. Timely referral

CHAPTER 1

Defining Health: A Holistic View Point





Health, as defined by the World Health Organization, is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.



This definition suggests that healthcare is not just limited to providing curative treatment but should also focus upon prevention, fitness and hygiene. Furthermore, it means ensuring proper health of the society/nation as a multidimensional issue involving a number of stakeholders.

1.1 Stakeholders Involved in Healthcare Ecosystem

The various stakeholders involved in this ecosystem are:

- Doctors and hospitals
- Insurance companies/Reimbursement authorities/Self Helps Groups (SHGs)
- Industry: Pharmaceutical and medical device companies
- Various Departments/Ministries of Government
- Non Governmental Organizations (NGOs)
- Regulatory authorities
- Society

Realistic evidences from ideal healthcare model which has an adequate healthcare delivery mechanism, suggests that creation of a proper ecosystem with well-defined role for each stakeholder is an imperative of successful model.

Such an ecosystem addresses multiple issues effectively. For example, insurance/reimbursement ensures affordability; NGOs and Government address awareness issue and ensure appropriate regulatory mechanism.

Close examination of a few successful healthcare delivery systems shows that they have undergone many intermediate transitory phases and emerged stronger post each transition.

The progressive model has seen a recent transition from being a cost containment model to an all pervasive, co-payment system. The objective of healthcare is achieved by working on a range of issues like strengthening of primary care, necessary requirements for technology assessment, quality assurance and supporting patients' right.

1.2 Determinants of a Successful Healthcare System

Few determinants of this model are:

- Awareness



- Accessibility
- Affordability
- Availability
- Food safety and nutrition
- Adequately defined standards of care
- Government interventions

Ensuring healthcare for all calls for a multidisciplinary, approach. Significant improvements in the delivery mechanism cannot be brought about by just changing or applying pressure on one factor and leaving the others unchanged.

A model obsessed with controlling costs without paying attention towards changing other determinants will not lead to a creation of successful delivery system. Determinants like accessibility, reimbursement simultaneously need to be worked upon to produce visible changes.

1.3 Overview of a Successful Healthcare Delivery Model

The healthcare delivery model in these geographies can be broadly trifurcated into:

A. **Public Health Services**: The focus of the public health services is to improve health and quality of life through prevention and treatment of diseases and other health conditions. These Government owned delivery mechanisms, primarily look after areas like prevention and monitoring of communicable diseases, health education and promotion, supervision of employees in healthcare institutions etc.

B. **Primary and Secondary Ambulatory Care:** The primary and secondary health care is delivered by self-employed doctors, dentists and medical auxiliaries working in their own practices, and to a lesser extent, salaried staff in hospitals and health centers. The physicians offer almost all major clinical specialty services ranging from a general practitioner to radiology on an outpatient basis.

C. **Secondary and Tertiary Hospital Care:** Healthcare services provided by medical specialists, usually for inpatients for advanced medical investigation and treatment. These hospitals treat inpatients, with some exceptions of day surgeries.

1.4 Water-Tight Model: Key Success Factor

The separation among these three care areas is strictly followed in letter and spirit. On comparison, we realize that the Indian model is almost similar to the above with the

sole difference of the separation existing mainly on paper and dividing lines between the categories blurring in practice.



A clear trifurcation of services and responsibilities will result in a strengthened healthcare delivery service at all levels i.e. primary, secondary and tertiary. It will also help in achieving the dual objective of preventive and therapeutic care. Currently, in India we observe that tertiary care hospitals are overburdened due to a weak chain of primary and secondary care.

In summary, it can be inferred that a successful model works on following premises:

- Free access to healthcare delivery services.
- High number of providers and medical technology equipments and devices.
- Shift in focus from obsession with cost containment.

This model has received good support from public and if they are used as a criterion for judging the effectiveness of healthcare delivery mechanism, it seems to work well.

1.5 The Indian Healthcare Model

On paper at least, the Indian healthcare system is almost similar to the one described above barring an exception of universal coverage.

Despite being a model similar to the most successful models, the system has not been able to ensure proper access to healthcare services, leave alone delivering quality health services.

A deep analysis of the Indian system reveals that with the help of government and private sector, a reasonably good tier wise healthcare system has been created with differing utilization levels and wide difference in quality of care at every tier.

There is a marked difference between Government and private delivery systems as per the public perception about care and quality. Lack of faith in the government health systems, barring a few exceptions at tertiary care level has forced the general public to avail expensive healthcare services at private settings.

Further, issues of affordability and absence of insurance coverage also restrict the patient's access to healthcare delivery systems. Even if patients/relatives manage to reach the private systems, the cost of care leaves them in a state of continued indebtedness.

Absence of a universal system and an all inclusive health agenda has resulted in hospitalization being a nightmarish experience rather than creating a feeling of general



well being. This aspect has been also accepted by the Government.

The Ministry of Health and Family Welfare acknowledges the poor state of public health and inadequate funding of medical care in rural India, despite almost 70% of the population residing in Rural India.

Mr. Ghulam Nabi Azad, Honorable Health Minister of India also emphasized that, "Rural health needs a lot more attention and the government spending of just one percent of the GDP on health is too low".(Source: Times of India, 2010). A silver lining is the Government's willingness to accord priority to healthcare and an increase spending on the same.

The Governments, both at the Center and State have started paying attention to healthcare and exploring ways of increasing access to healthcare. Persistent efforts by activists, social workers, NGOs have acted as a helping hand in this direction.

Indian Healthcare System fails at the primary and secondary care level.

The weakening of the primary and secondary care systems results in the patients flocking to nearby towns/cities to avail treatment options. This behavior of patients results in over-burdened tertiary care hospitals and additional cost of care.

1.6 Conclusion

A thorough analysis of the Indian healthcare system on certain vital parameters reveals the fact that we have a lot to do in order to achieve parity with similar and developed economies. These parameters can be listed as:

1. Health expenditure as percentage of GDP
2. Per capita spending on healthcare
3. Disease burden: Global and Indian
4. Doctor -Population & Hospital Bed-Population ratio.
5. Size of the healthcare market

In the discussion ahead, we compare Indian healthcare system with other countries on the parameter mentioned above. The comparisons highlight the fact that we lag behind on all aspects in improving the access to healthcare services and overburden the existing health care delivery systems.

CHAPTER 2

Comparative Analysis





2.1 Health Expenditure



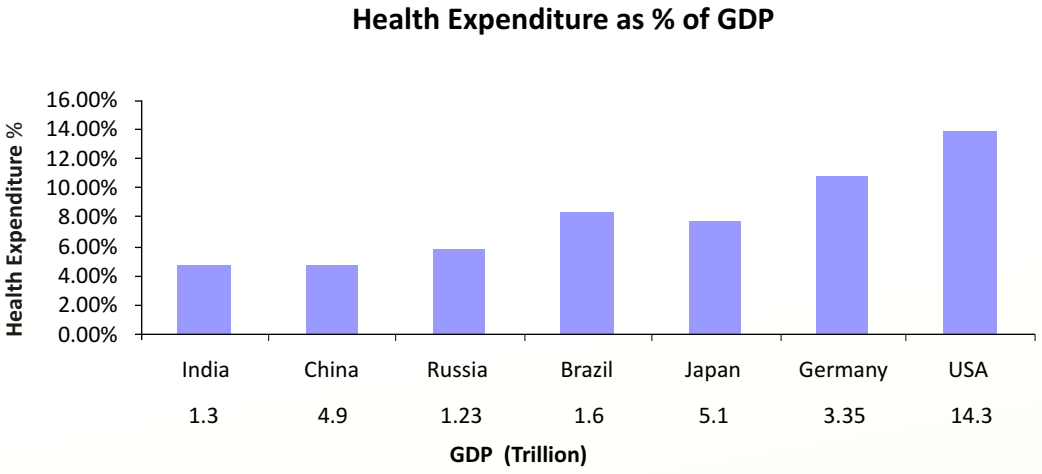
2.1.1 Health Expenditure as a Percentage of GDP: Developing and Developed Economies

As per the available data, in 2009 the total spending on health was close to 4.6-4.7% in India as percentage of GDP. In comparison, the figures for the other developed and developing economies were around 14% for USA and around 4.8% for China.

(Source: CBHI and World Health Report-2010)

However, these figures cannot be used as a strict comparison since the size of the US economy is around 14.5 trillion USD, China around 5.0 trillion USD, while the size of the Indian economy was around 1.3 trillion USD.

The closest comparison to India, in many aspects, is Brazil. The size of the both economies is almost similar. Still, Brazil spends approximately 7.5% of its GDP on healthcare despite the population size of India being much higher than that of Brazil.



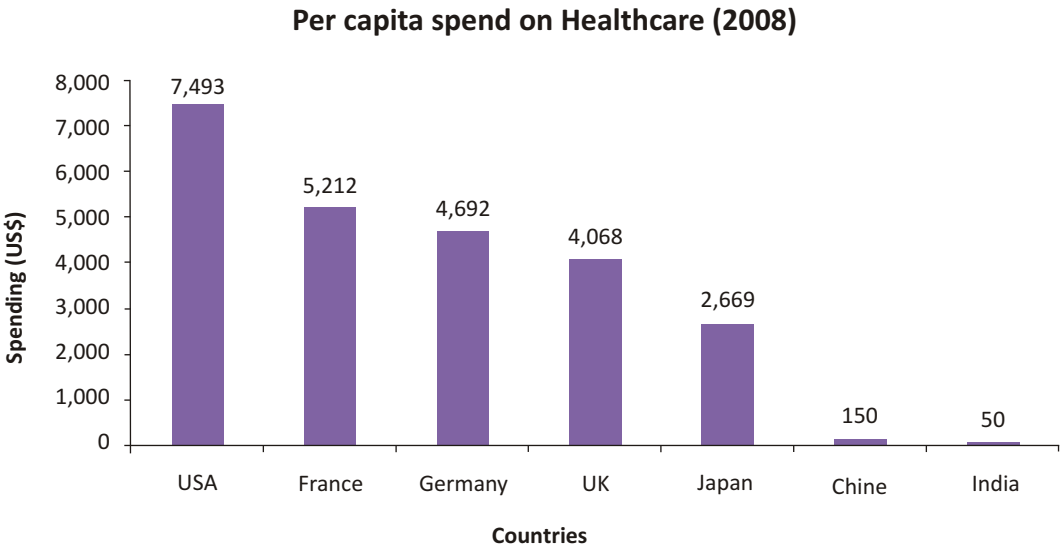
Source: OECD & EIU Base Year: 2010

Figure 2: Health Expenditure as % of GDP

2.1.2 Per Capita Spending on Healthcare: Developing and Developed Economies

The contrast is even more striking when comparison is done about the per capita spending on healthcare.



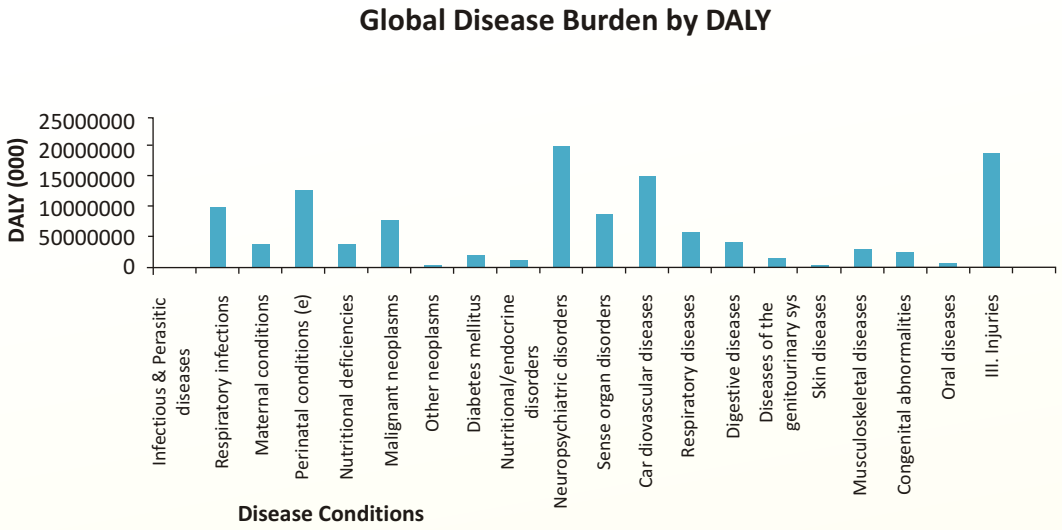


The graph above depicts per capita spend of developed as well as developing countries on healthcare in the year 2008.

Figure 3 Per capita spend on healthcare (2008)

2.2 Disease Burden: Global & Indian Scenario

2.2.1 Global Disease Burden



Source: WHO (20092.2.2 India Disease Burden)

Figure 4 Global Disease Burden

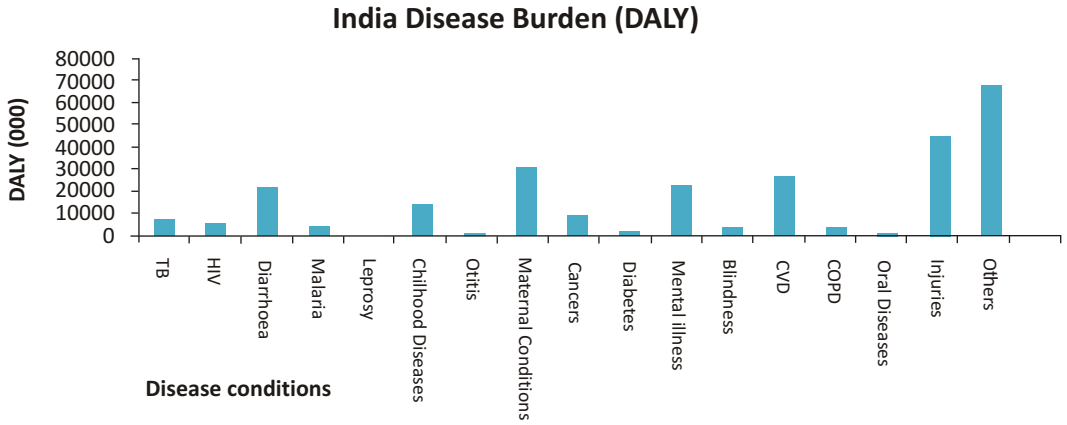




Figure 5 India Disease Burden

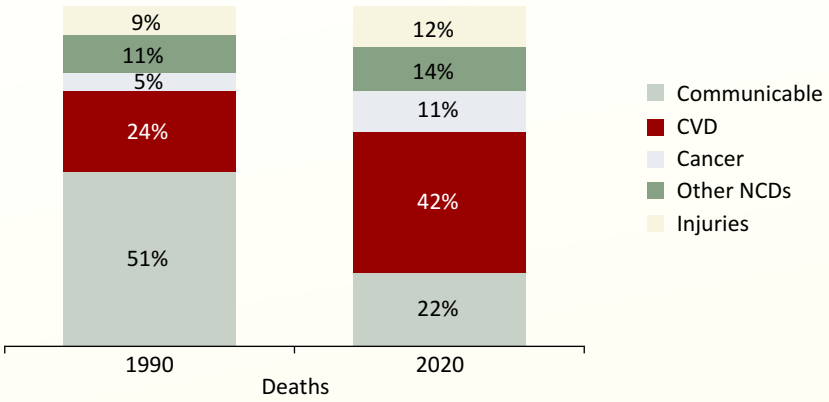
Source: WHO (2009)

India bears about 20% of the global disease burden in terms of DALY. This varies significantly with disease conditions. For example it is 4% in the case of blindness, 10% in the case of diabetes, 18% in the case of CVD and as high as 25% in case of injuries.

In terms of the breakup between non-communicable and communicable diseases, the global ratio is 3.5:1 whereas for India the ratio is 1:1. There has been a gradual shift in favor of non-communicable diseases in the last few years. With the change in the disease profile of India and changes in other social and demographic factors, this ratio is expected to follow the global trend.

2.2.3 Evolution and Transition of the Indian Disease Burden

An evaluation by Indian Council for Research on International Economic Relations (ICRIER) suggests that in the next 10 years the major cause of mortality will be communicable diseases while cardiovascular disease will be the single biggest causative factor.



Source: ICRIER Year 2008

Figure 6 Evaluation of various diseases by ICRIER



2.3 Healthcare Infrastructure in India: Numerical Strength

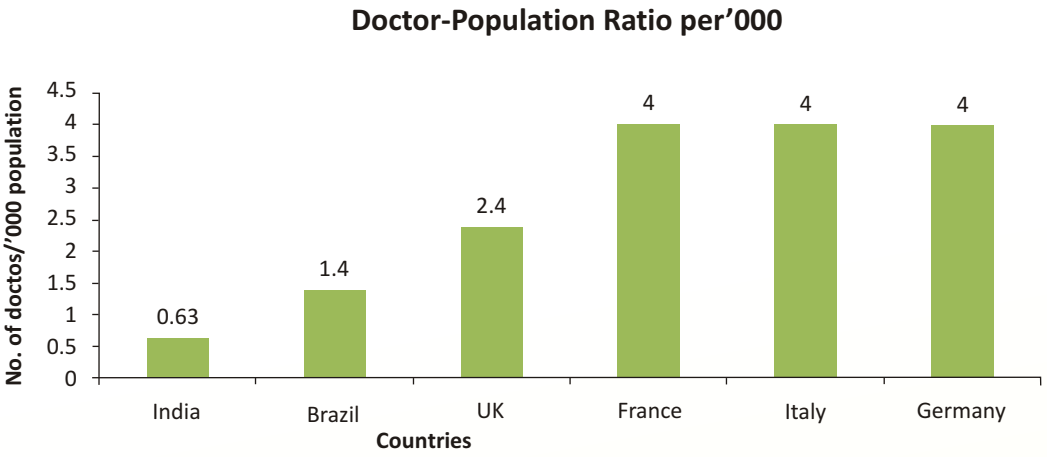
As per the Central Statistical Organization, the Ministry of Statistics and Program Implementation (MOSPI), the total number of doctors in the country is around 725,000 and the total number of hospital beds is around 500,000.

However, this data takes into account only the registered beds and other data sources indicate it to be close to 0.9-1.0 Million.

2.3.1 Comparison with Other Economies

The number of doctors and hospital beds per 1000 population in India is 0.63 and 0.7, respectively. This data from Government of India considers the registered facilities only.

The graph below provides a comparison of the Indian indices with those of other economies.



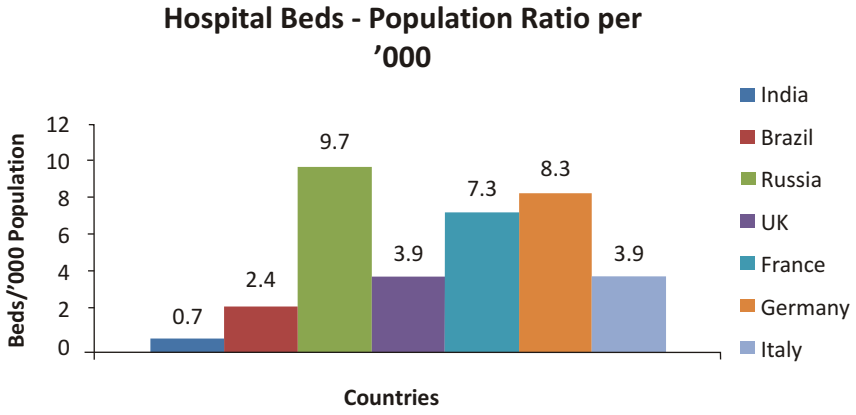
Source: EIU, UNDP

Figure 7: Doctor-Population Ratio

According to the assessment of the above graph, to achieve a figure which is even comparable to Brazil, India needs an additional number of 500,000 doctors.

But, India produces only about 31,000 (assuming all the seats in the medical colleges recognized by MCI are filled every year) doctors every year as on date.

Therefore, it will take at least 15 years to achieve parity with Brazil in terms of doctor - population ratio, assuming that the population and number of medical seats will remain static during this period.



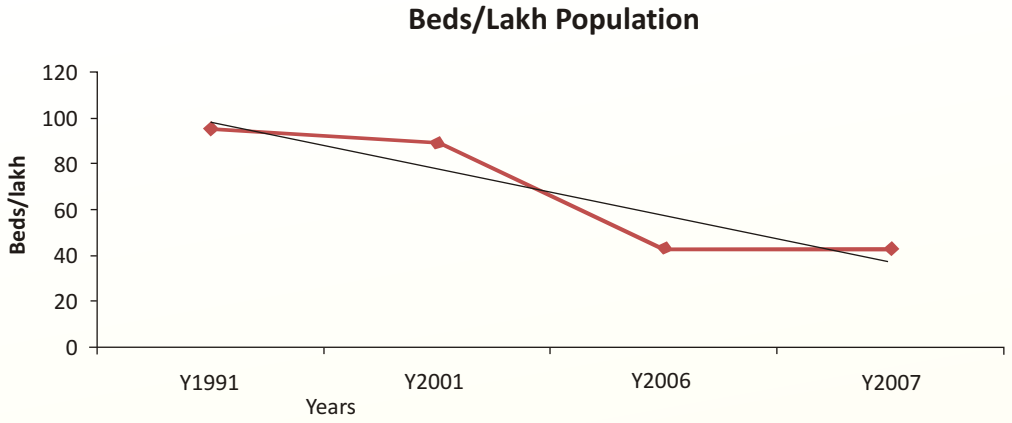


Source: MOSPI, Government of India, Year 2008 and e-health magazine, 2011

Figure 8: Hospital Beds-Population Ratio

2.3.2 Trends in Health Infrastructure Creation during 1991-2008

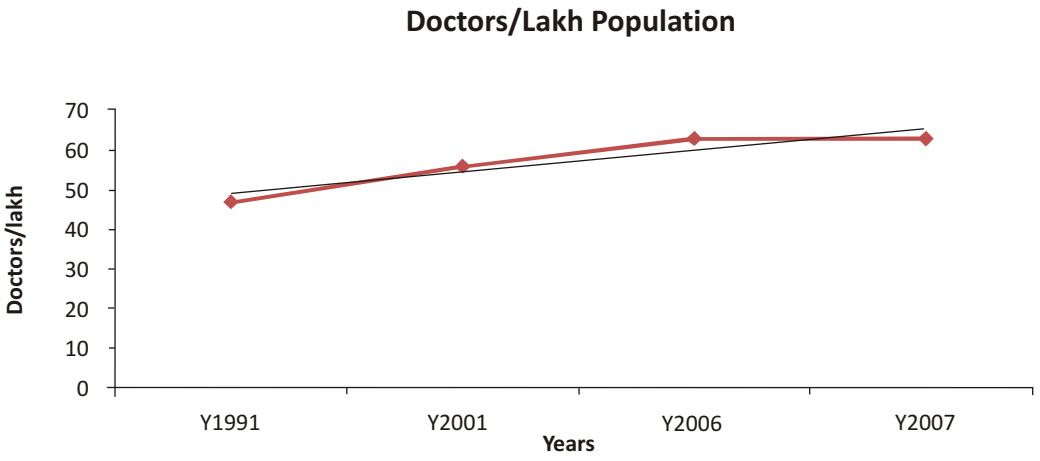
Government of India statistics reveals a disturbing trend in capacity building for healthcare. There is a significant decline in the number of hospital beds/lakh (graph says per lakh) population from 1991-2008. However, there has been a marginal increase in the number of doctors/lakh population during the same period.



Source: MOSPI, Government of India

Figure 9: Beds/Lakh Population





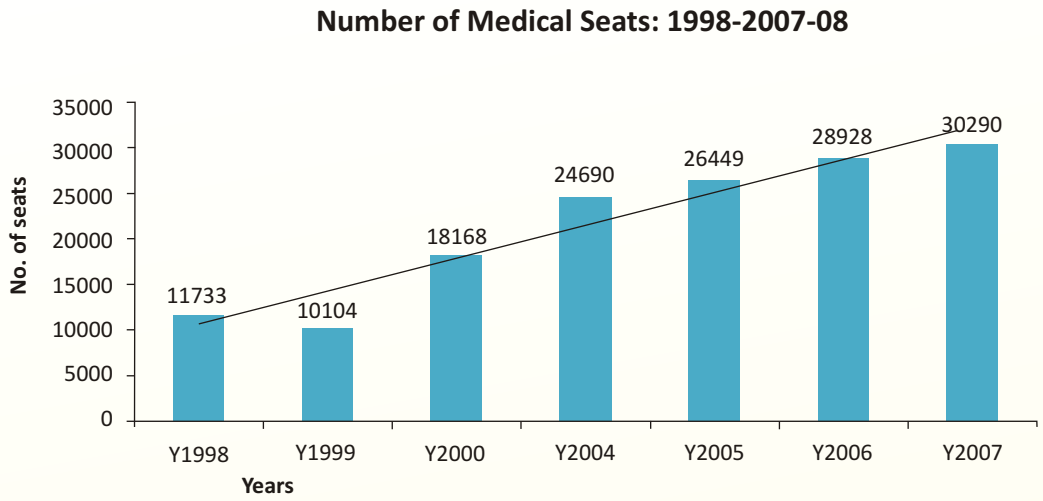
Source: EIU, UNDP Year 2009

Figure 10 Doctors/lakh population

Therefore, if these trends were to continue the objective of universal access to health for all in the country shall remain a distant dream.

It can also be concluded from the above data that India ranks well below the developing and developed economies on key parameters such as per capita expenditure on healthcare, doctor-population ratio, uniformity of distribution, etc.

Problem is further compounded as no significant steps have been taken for capacity building so far. The graph below highlights the disturbing trend during 1998-2008.



Source: MCI

Figure 11 Number of medical seats: 1998-2007-08

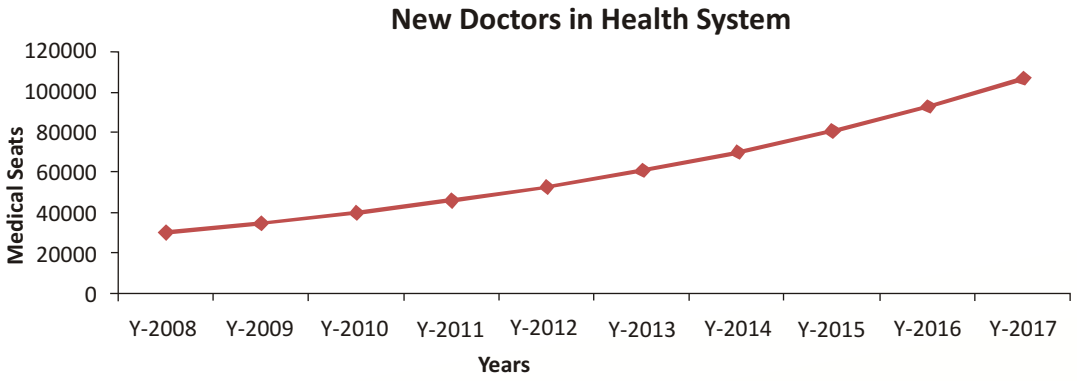
According to the trend line, the number of medical seats is on an upward trajectory on Year-on-Year (YoY) basis. However, in terms of absolute numbers the annual increase in seats is only about 2000, which is small. Additionally, our doctor-population ratio is one of the lowest among the developing economies. According to the Planning Commission, India is short of six lakh doctors, 10 lakh nurses and two lakh dental surgeons (Source: The Economic Times; April 4, 2008).



2.3.3 Projection for Medical Seats: An Optimistic Hypothetical Scenario

Even an optimistic projection of 15% YoY growth in the number of medical seats will not enable us to achieve parity with comparable economies.

The Y axis of the graph that is no of medical seats gives numbers in thousands and ten thousands, whereas as per the line, it says 615,000 new doctors will be added in the health system of the country by 2017. There is some problem with the figures. This is correct as discussed yesterday



Source: Frost and Sullivan

Figure 12 Projected New doctors in health system assuming a 15% YoY growth

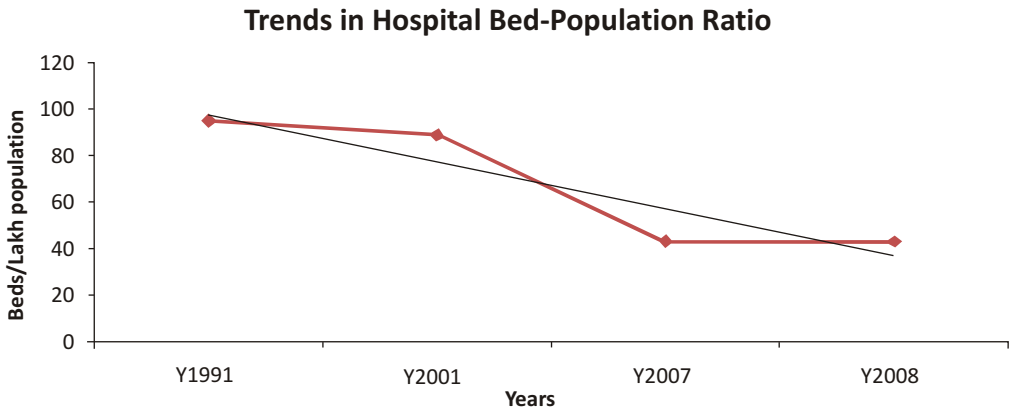
The above chart assumes that the medical seats will grow at a CAGR of 15% for 10 years; if we are able to achieve the mentioned growth rate then 615,000 new doctors will be added in the health system of the country by 2017.

This over optimistic growth expectation will only lead to achieving some parity with economies like Brazil, which has already achieved a healthy ratio of 2.4 doctors/1000 population.

Ten years down the line the Indian figures will still be at the halfway mark of what Brazil has already achieved.

In terms of capacity building for healthcare delivery services, the Government of India data paints a pessimistic picture. The latest statistics compiled by the Government of India highlights the steep decline in the number of beds –population ratio over a period of almost 20 years i.e. 1991-2008 (however, this data only takes registered facilities into account).





Source: MOSPI, Government of India Year 2009

Figure 13 Trends in hospital bed-population ratio

This problem gets compounded due to the inequitable distribution of the health infrastructure in the country. Empirical results suggest that around 80% of the infrastructure is centralized in urban areas and only 20% of it is present in rural areas. Anomalous situation where 70% of the Indian population is rural but only 20% of health infrastructure is situated in rural areas.

The shortage of doctors and beds may lead to further deterioration in healthcare infrastructure of the country. An extrapolation of historical trends as indicator for future capacity building will suggest no significant improvement in the situation.

Capacity building in these two vital areas will call for huge investments; factual evidence suggests that creation of one bed in the tertiary sector requires an investment of 4.5-5 Million INR and the comparable figures for a secondary care bed are 1.2-1.5 Million INR.

To achieve a decent ratio of 1bed/1000 population, 570,000 new hospital beds need to be created. Furthermore, assuming a split of 70:30 between secondary and tertiary care, an investment of gigantic proportion is required.

Mobilizing a capital spending of this order for capacity building is neither possible for the Government nor for the private sector if they work in isolation. Hence, this calls for out of the box solutions and development of new business models.

In a nutshell, the Government and the private sectors need to think radically in order to provide a solution to this problem. The integration of both these sectors can take place if each sheds the mutual suspicion and works together towards better capacity building.

The Government has created massive tier-wise healthcare delivery infrastructure across the country, but the quality of services beyond the district hospitals is questionable. This results in under or non-utilization of the infrastructure. A Public-Private-Partnership could be explored as a possible solution.

Furthermore, PPP integration model will also ensure the savings on capital expenditure for land and building which can be transferred to the patient in the form of low cost health services.



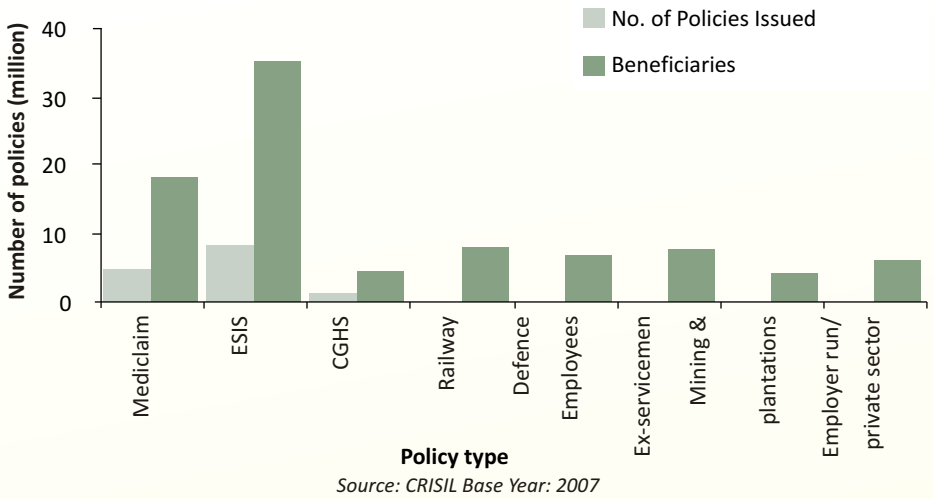
There are sufficient examples to prove that a low cost healthcare center may be a viable business proposition, provided the volume equation is in the right place. One such classic example is of Merry Gold Hospitals in Baduan (North-Central Uttar Pradesh), which is a franchise chain run and operated by Hindustan Latex Family Planning Promotion Trust. According to latest statistics, within 2 years of launch approximately 10,000 births were registered at Merry Gold Hospitals at half the prevailing cost of delivery.

This model has proved that profitability and increased access through low cost services can go hand in hand and one need not be compromised for each other.

2.3.4 Conclusion

The Indian healthcare system may be at a quiescent stage on all major parameters namely, number of doctors, hospital beds, and paramedical staff. However, it is not all an ocean of despair and gloom, there are rays of hope like Merry Gold chain of hospitals, which has provided a way forward in terms of increasing physical and economic access to healthcare for the population of India. All we need is to strike the right balance between delivery of healthcare services and low cost expenditure.

2.4 Health Insurance/Reimbursement Scenario: Indian Context



Source: CRISIL Base Year: 2007

Figure 14 Number of policies and its beneficiaries



The above data suggests that approximately 10% of the Indian population is covered by some form of health insurance/reimbursement. The mediclaim policies have been growing at a CAGR of 22-25% for the past few years, extrapolating the figures we can infer that an additional 2.5 million policies have been sold till the end of year 2009 thus covering an additional 2-3% of the population.

This also implies that around 85-88% of the population needs to pay out of pocket for treatment of diseases; the cost of treatment is one of the causative factors for patient inertia to visit a health center for treatment. Empirical evidence suggests that providing some basic coverage/insurance will result in the removal of this inertia and the patient is more open to visit a healthcare center.

For example, the launch of Janani Suraksha Yojana, a centrally sponsored scheme under the National Rural Health Mission (NRHM) has led to an increase in the number of institutional deliveries among the poor families.

Data from the Aarogyasri scheme launched by Andhra Pradesh Government also corroborates this in Phase 1 of the launch of this scheme a total of 11,484 surgeries were performed and all the patients belonged to the economic benchmark of Below Poverty Line (BPL).

It can thus be stated that in absence of a scheme like Aarogyasri, these patients would never have opted for these surgeries since the costs of the surgeries are way above the affordability of the BPL population.

The average claim cost per surgery was around 45,000 INR. This proves that the launch of this scheme led to a competition among healthcare deliverers resulting in lower prices of therapy.

Cardiac	4712
Neuro	2850
Cancer	2434
Renal	674
Polytrauma	671
Burns	143

Aarogyasri Beneficiaries in Phase 1

From the above evidence it can be conclusively stated that a basic insurance coverage for the entire population may/will serve two purposes:

- Breaking the patient inertia of visiting a health center because of cost factors
- Lowering the cost of healthcare delivery due to increased competition and higher volumes.

In the last budget, the Government of India announced a health insurance scheme for all the beneficiaries of National Rural Employment Guarantee Scheme. Similarly, the

Government of Tamil Nadu has launched the Kalaingar scheme for health insurance. These are small but progressive steps and can act as precursors for universal health insurance in the long run.

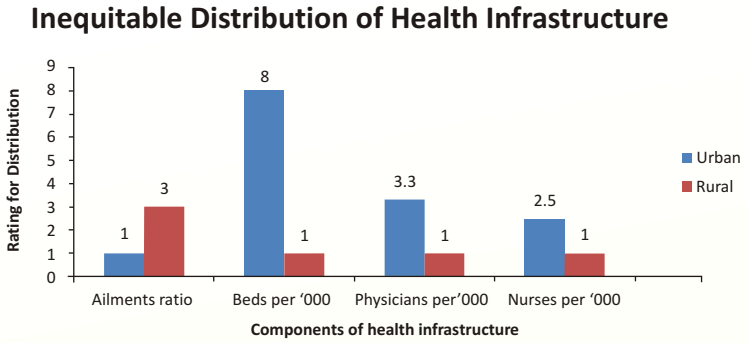


However, there are several challenges in the Indian context to achieve the objective of universal health coverage, chief among them being:

- Financing mechanism
- Operational efficiencies
- Service Partners
- Governance
- Defining proper standards of care
- Periodic audit and appraisal of services provided.

The above discussion clearly highlights the fact that increasing economic access either through insurance or reimbursement will be the biggest factor in improving health indicators and health outcomes. Recent reports on the role played by reimbursement and cash incentives in reducing Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR) reinforce the above discussion.

2.5 Inequitable Distribution of Health Infrastructure: Physical Access Barrier



Source: EIU Base Year: 2008

Figure 15 Inequitable distribution of health infrastructure

The above chart clearly indicates that there is an obvious skew in the healthcare infrastructure distribution across the rural and urban parts of India. This results in access related problems and often leading to death or disability.

The problem gets compounded by the fact that connectivity is another big challenge in the Indian context. Even if people are willing to pay money for treatment they don't have the requisite means at their disposal to reach hospitals.



2.6 Diseases Affect Urban Population Significantly: Reality or Myth

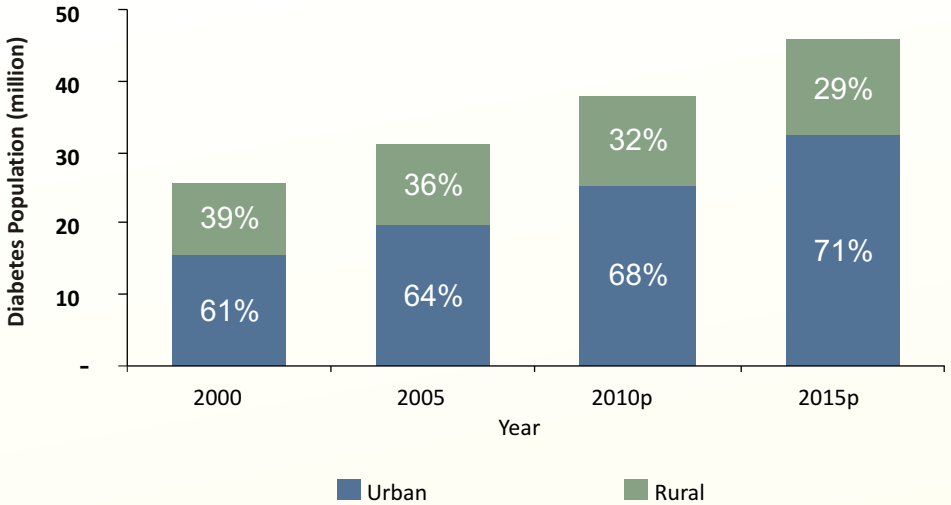
Differentials in prevalence of serious morbidity (for 1000 population by selected variables)					
			Standard of living		
	Rural	Urban	Low	Medium	High
Hypertension	3.55	3.2	3	2.7	5.3
Coronary Heart Disease	6.2	1.6	7.2	6	4.3
Malaria	14.9	14.4	18.8	14.2	11.2
Cancer	0.7	0	1.1	0.22	1
Liver and Kidney Problems	0.7	1.6	1.38	0.22	1
Other problems	1.6	1.6	2.2	0.9	2

Source : Inequities in Health, Rural Women' Education Center , Tamil Nadu,2005

The above chart indicates that there is no significant difference in the prevalence of diseases with respect to place of residence or standard of living.

Contrary to popular perception, the above data indicates that certain diseases which are considered urban traditionally, e.g. Coronary Heart Diseases, have a higher prevalence in rural areas.

Similar data for diabetes suggests that diabetes is not only an urban and rich man disease but the rural population is also affected by diabetes, though the severity of the spread is high in urban areas.



Source: NCMH, GoI

Figure 16 Diabetes in urban and rural areas

Another study undertaken by C. Aprajita and A.V. RamanKumar reaffirms the above mentioned findings. A cause of death analysis for a period of 30 years for the rural population indicates that heart attacks are the 2nd important cause of death on 1990s whereas it used to be the 4th important factor in 1980s.



1971	%	Rank	1981	%	Rank	1991	%	Rank
Violence & Injury			**1. Accident & injury**	**1.1**		**1. Accident & injury**		
Drowning	0.8	8	a. Drowning	0.9		a. Vehicular accidents	2.15	9
Accident from vehicles	0.6		b. Vehicular accidents	0.5		b. Suicide	1.87	
Fall	0.4		c. Burns			c. Drowning	1.05	
Childbirth & Complicated Pregnancy			**2. Childbirth & Pregnancy**			**2. Childbirth & Pregnancy**		
Anaemia of pregnancy	0.2		a. Anaemia	0.2		a. Bleeding of pregnancy	0.25	
Post partum hemorrhage	0.2		b. Puerperal Sepsis	0.1		b. Anaemia	0.2	
Aclampsia	0.1		c. Abortion	0.1		c. Toximia	0.14	
Digestive Disorders			**3. Digestive Disorders**			**3. Digestive Disorders**		
Dysentry	5	3	a. gastro enteritus	2.8	8	a. gastro enteritus	2.09	10
Food Poisoning	0.3		b. debility & malnutrition	1.8	10	b. Acute abdomen	1.65	
Cholera	0.3		c. acute abdomen	1.4		c.Dysentry	1.03	
Coughs			**4. Coughs**			**4. Coughs**		
Broncho	11	1	a. asthma & bronchitis	9	1	a. asthma & bronchitis	8.75	1
TB of Respiratory	6.1	2	b. Pneumonia System	5.9	2	b. TB of Lungs	5.37	3
Pneumonia	2	4	c. TB of Lungs	5.5	3	c. Pneumonia	4.5	5
Circulatory diseases			**5. Disorders of Circulatory System**			**5. Disorders of Circulatory System**		
Plague	0.5		a. Heart attack	5.6	4	a. Heart attack	8.23	2
Cirrhosis of liver	0.4		b. Anaemia	3.2	6	b.Anaemia	2.96	8
Congestive heart disease	0.4							
Fevers			**6. Fevers**			**6. Fevers**		
Tuberculosis	1.2	5	a. Typhoid	3.2	7	a. Malaria	1.87	
Septicamia	1.2	6	b. Influenza	1.8		b. Typhoid	1.84	
Diptheria	1.1	7	c. Malaria	114				
Infant deaths			**7. Causes peculiar to infancy**			**7. Causes peculiar to infancy**		
Prematurity	0.8	8	a. Prematurity	4.4		a.Prematurity	4.85	



1971	%	Rank	1981	%	Rank	1991	%	Rank
Infections to new borns	0.8	8	b. Respiratory Infections	1.9		b. Respiratory Infections	1.57	
Cyanosis	0.8	8	c. Malnutrition	1.4				
Other clear symptons			8. Other clear symptons			8. Other clear symptons		
Diseases of Urinary tract	0.5		a. Cancer	2.5	9	a. Cancer	3.89	6
Hypertension	0.5		b. Tetanus	1.8		b. Jaundice	1.29	
Cerebral hemorrhage	0.4		c. Cerrhosis of Liver	0.9				
Not Available			**9. Disorders of Central Nervous System**			**9. Disorders of Central Nervous System**		
			a. Meningitis	2.6		a.Paralysis	3.63	7
			b. Paralysis	0.6		b.Convulsions	0.6	
						c.Meningitis	0.49	

Figure 17 Disease profile

This discussion establishes the fact that the population of India is not immune from the transition in disease profile and has to realize that if not checked in a timely manner, non-communicable diseases will become as lethal for the rural population as the communicable diseases, if not more.

The skewed distribution of healthcare delivery infrastructure results in the rural population either not opting for treatment or reaching it too late.

There are major problems plaguing the healthcare sector in India. Accessibility, Affordability, Availability and Awareness all play a major role in determining the health outcome.

Lack of healthcare may lead to a fall in productivity and the country may not be able to achieve its growth targets. The WHO estimates suggest that India's GDP could pull back 5% by 2015 because of deaths and disabilities caused by various diseases.

The complexity of the above mentioned scenario is dictated by Four As:

- Accessibility
- Availability
- Affordability
- Awareness

However, the importance of these factors is hard to gauge as evidence-based research is required to provide some deeper insight.

CHAPTER 3

Research Undertaken And Its Analysis





Frost & Sullivan undertook a primary research to understand the interplay amongst various factors, which determine the health outcome. It was also aimed to understand the gaps or factors in the short, medium and long term. A detailed analysis can enable an insight into an increased access to healthcare and result in better impact.



3.1 Research Objective, Hypotheses, Methodology and Sample Size

1. **Research objective:** To understand the relative importance of the above mentioned factors in determining penetration of therapies.
2. **Hypotheses:** The hypotheses for the above study were derived from desk research and can be stated as: Four major factors determining the health outcomes of a society/nation are Accessibility, Availability, Affordability and Awareness of healthcare services. These factors, either in isolation or in interplay, play the most important role in driving/restraining the penetration of various medical/surgical therapies.
3. **Methodology:** Exploratory primary research along with some desk research was considered the most suitable method to execute this exercise.
4. **Sample Size and Split:** A total of 135 respondents were interviewed across India; the sample split 39%, 25%, 25% and 6% for South, North, and West and East regions. The sample split between Government and private setups was in the ratio of 80:20.
5. **Respondent Profile:** Respondents were mainly clinicians spread across various specialties. The specialties under the coverage were Cardiothoracic Surgeons, Interventional Cardiologists, Ophthalmologists and Orthopedic Surgeons.

In addition, the hospital administrators and medical device companies were interviewed to understand the impact of evolution in healthcare delivery and medical technology sectors

3.2 Therapies Covered

The following therapies were considered to be the focus points of this study:

- Heart Valve Repair/Replacement
- Cardiac Intervention using implants- Bare metal stents, Drug eluting stents
- Knee and Hip replacement surgeries using implants
- Cataract surgeries using intraocular lenses



The rationale behind concentrating on these therapies was the significant role they have played in decreasing mortality (e.g. heart valve surgeries and cardiac angioplasties) or in improving quality of life (e.g. cataract surgery and knee and hip replacement surgeries).

Another reason for concentrating on these therapies was that despite all the benefits associated with them, including increase in productivity of individuals, their penetration remains profoundly low. However, the degree of penetration differs from therapy to therapy.

An understanding of these therapy areas can give some ideas about what needs to be done to increase the penetration and facilitate replication on other therapies which were not under the purview of this study.

3.3 Findings

The findings of this study can be clubbed into two major heads:

1 Assessment of the following factors, which are common to all therapies. These factors were generic in nature and universally applicable across all therapy areas. These factors were:

- Source of patients
- Referral practices
- Difference in health outcomes w.r.t. residence setting of patients
- Reasons for long distances traveled by patients to avail healthcare services

2 Assessment of factors which differ from one therapy area to other. There is change in the ranking order of their importance. These factors were:

- Cost vs. benefit of the therapy
- Availability of multiple options at varying price points
- Cost of consumables used for the therapy
- Presence of hospitals having the requisite facility to administer the therapy
- Timely referral
- Reimbursement
- Number of doctors required to administer this therapy
- Presence of support staff for administering therapy
- Optimal diagnosis

CHAPTER 4

Analysis and Discussion Of Primary Research

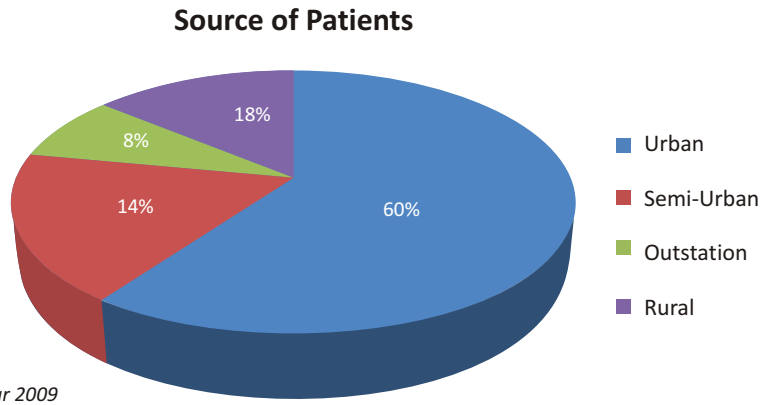




4.1 Assessment of Common Factors



A. Source of patients: More than half of the patients visiting a doctor are from urban settings and rest from suburban and rural areas. However, this varies between narrow bands of 50-60% depending upon a particular therapy. The key finding of the study is that, irrespective of the therapy area, the patients from rural areas comprise no more than 15-20% of a doctor's clientele.(In the graph it is 18% for the rural areas). This clearly shows that the benefits of healthcare delivery centers are being availed mainly by the urban population.



Source: Frost and Sullivan Year 2009

Figure 18 Source of patients

It can thus be inferred that easy availability and accessibility of healthcare services play a major role in driving penetration of any medical/ surgical therapy.

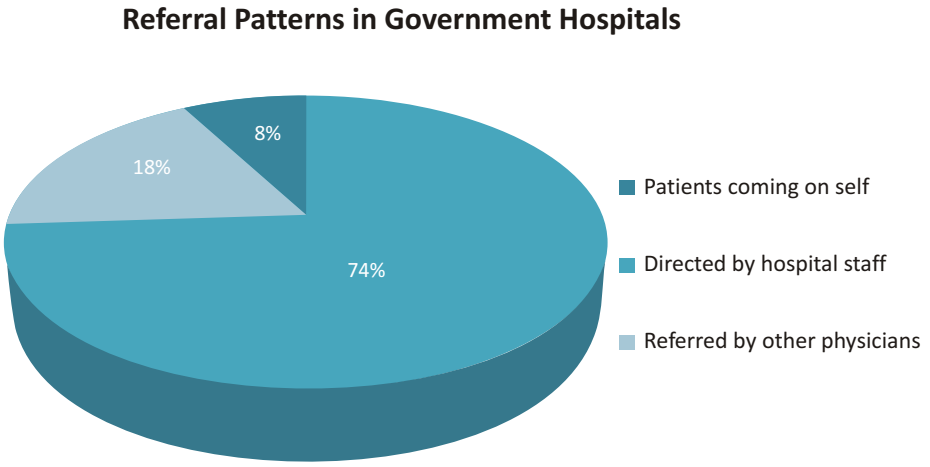
Traveling long distances for healthcare services also results in patients delaying the treatment, till it becomes life threatening. Poor connectivity in the sub-urban and rural parts of the country compounds the problem. It was also observed that majority of the patients coming from rural areas depend on public transport. In case of absence of a public transport system, patients and the families opt for alternate means such as hiring private vehicle, adding up to the cost of treatment.

Cost of accommodation in the city also adds to the expenses, raising the key question of affordability for the rural patients.

On top of it, the lost opportunity to earn income is an additional factor considered by patients and relatives. However, this factor has not been taken into consideration during the study.

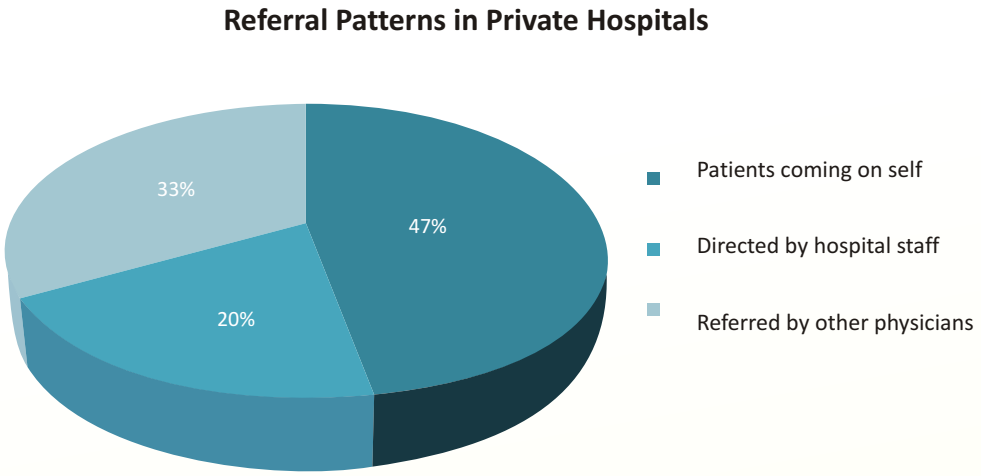
B. Referral Practices: Under this head we tried to understand the pathway for a patient to reach to the appropriate doctor. This provides a glimpse into the current referral practices and can also be an indicator of the awareness levels amongst the general population.





Source: Frost and Sullivan Year 2009

Figure 19 Referral patterns in Government Hospitals



Source: Frost and Sullivan

Figure 20 Referral patterns in private hospitals Year 2009

The above data can be inferred in two manners:

Most of the patients reach a hospital after being guided either by the hospital staff or by physician referral. The percentage of such patients ranges from 92% in government settings to 53% in private settings. This probably indicates that majority of patients/relatives are unaware of the concerned doctor providing a particular therapy.

However, another inference that can be drawn is increased awareness levels play a role in patients seeking treatment on their own. 47% of patients coming on their own in private settings provide an indicator for the same. But majority of them are in urban strata.



The reverse of the above is equally true i.e. low levels of awareness results in the patients seeking treatment option at the wrong places resulting in delayed/no referral appropriate doctor/hospital. The data also points towards the importance of a referral chain; a strong referral chain with increased awareness at every level is required for better health outcomes.

All stakeholders, viz, Government, society, healthcare providers and the suppliers need to work towards increasing awareness levels among public at large.

Difference in referral patterns: There is a clear difference in the referral patterns in a Government setting versus a private setting.

Private settings usually focus on awareness campaign on disease, therapy options and the range of services offered by them to general public and referring physician. This results in more patients coming either on their own or via a referral chain.

In contrast, in the Government settings, awareness about availability of specific services is lacking. Patients come to these hospitals under an impression that a cure for all diseases is available in one place, which may not always be the case.

This is supported by data where 74% of the patients in Government settings are guided by the hospital staff to the right doctor. Seldom are they aware of their condition and the right doctor.

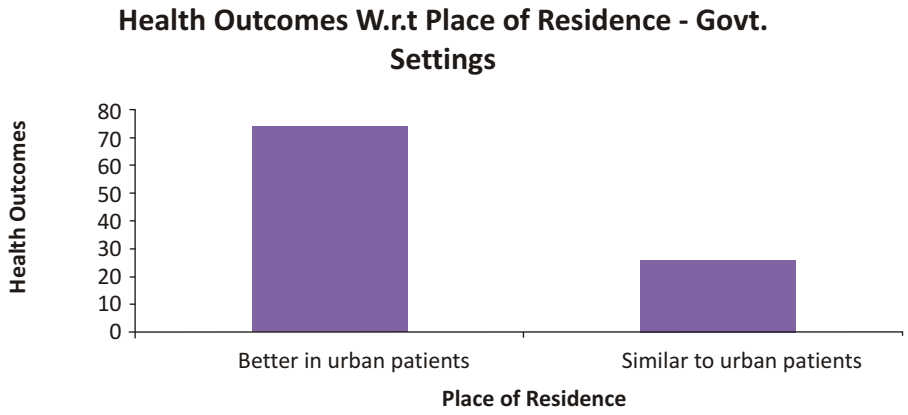
Overburdened Government setups (e.g. AIIMS and Safdarjung hospital in Delhi) highlight this phenomenon. They are supposed to act as tertiary care centers, but in reality they end up doubling as a secondary care centre as well. This puts an extra burden on the infrastructure.

C. Difference in health outcomes w.r.t place of residence

Late and inappropriate referral along with absence of awareness are the crucial gaps in defining health outcomes. These factors work commonly across any setting, urban or rural.

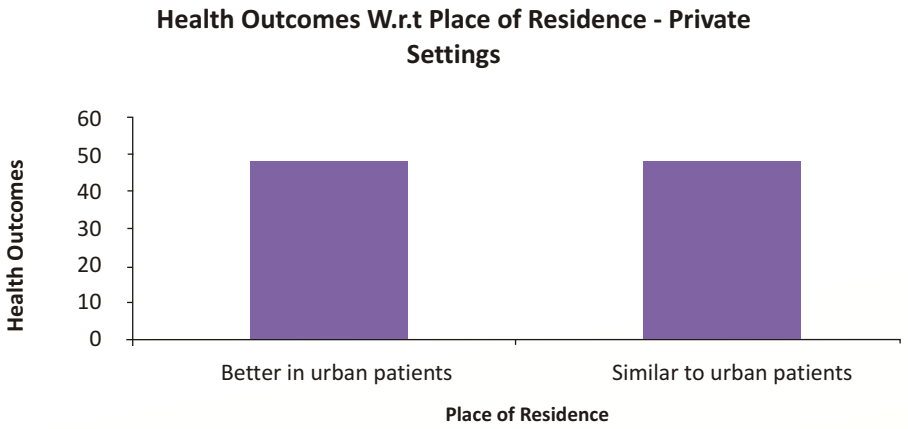
Assuming that the above mentioned factors play a similar role in defining outcomes, we tried to analyze that if there was any marked difference in the health outcomes of rural and urban patients.





Source: Frost and Sullivan Year 2009

Figure 21 Health outcomes wrt place of residence-Government settings



Source: Frost and Sullivan Year 2009

Figure 22 Health Outcomes wrt Place of Residence-Private Settings

This difference is a perception of the treating clinician, in absence of proper record keeping it is difficult to quantify the result.

Despite this, 75% of the responding doctors in Government settings believe that health outcomes are better in urban patients and 25% believe that outcomes for rural patients are similar to urban patients. In a private setting this ratio is equally split.

The difference of opinion can be attributed to the fact that the rural patients in private settings are relatively better off and more conscious than the rural patients in Government settings. This results into the first set of patients availing the right treatment options in a timely manner, a major reason for better health outcomes.

In private settings, it was also observed by respondents that patients visiting these hospitals had resident relatives in urban locations. This point reinforces the fact stated earlier that awareness creation and increasing access will play a major role in driving the growth of a therapy area.

D. Reasons for long distance traveled by patients to avail healthcare services



There was near unanimity amongst all classes of respondents irrespective of Government or private settings, on the principal reasons for patients traveling long distances to avail healthcare services. These can be listed as:

- Lack of availability of quality treatment options in the native place
- Absence of requisite facilities to administer the therapy in the native place
- Lack of faith in the local doctors/hospitals
- Word of mouth reference through friends and relatives

It can thus be concluded that accessibility and availability of the healthcare facilities play a much bigger role in driving the penetration of healthcare.

Even when the healthcare facilities are made available and more accessible, a lot of awareness creation is required to ensure optimal health outcomes.

In the next section, we will try to understand importance of affordability in driving/restraining the growth of various therapies.

We analyzed affordability from two aspects:

- Affordability of overall healthcare services.
- Affordability of various components of healthcare delivery value chain

Here we have also examined other factors, which restrain/drive the growth of the therapies. Empirical evidence suggests that following major factors drive/restrain penetration.

a) Cost vs. benefit of the therapy

b) Availability of multiple options at varying price points

c) Cost of consumables used for the therapy

d) Presence of hospitals having the essential facilities to administer the therapy

e) Timely referral

f) Reimbursement

g) Number of doctors who are required to administer this therapy

h) Presence of support staff for administering therapy

i) Optimal diagnosis



a) **Cost vs. benefit of the therapy:** This factor ascertains whether the long term benefits of the therapies outweigh the cost consideration from the point of view of doctors or patients.

b) **Availability of multiple treatment options at varying price points:** For the same disease area there are multiple therapy options available for a doctor, which range from medical management to surgical management. Also, there are multiple device/drug options available in a wide price band; this increases the choice for the physician helping him to administer the therapy to a broader segment of the population.

   For example, a clinician can manage a cardiovascular patient by lipid lowering drugs, blood thinners, and when the diseases progress to a surgical intervention stage the surgeon can opt for using a graft, bare metal stent or a drug eluting stent. The choice of the clinician is normally a function of patient's disease condition, age, affordability etc.

c) **Cost of consumables used for the therapy:** We will look into the cost of consumables used for therapy and its contribution towards its overall cost. We also have tried to understand what impact the reduction in prices of consumables will have on the overall cost of therapy. Presence of hospitals having the appropriate facilities to administer the therapy: It is a well established fact that the therapies under the purview of this study require a 'state of the art' and sterile set up for administration of therapies.

d) **Timely referral:** We analyzed from a physician's perspective, the importance of a strong referral chain and how its absence/presence results in differences in health outcome.

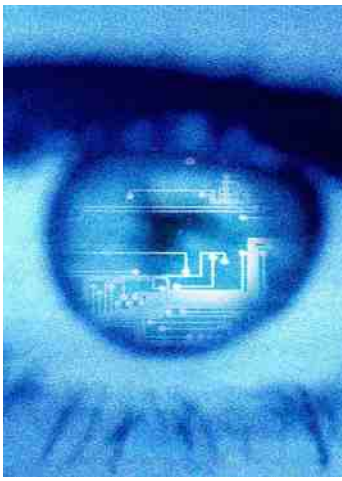
e) **Reimbursement:** It is well-understood that reimbursement of health services is a key driver for a progressive healthcare in a country. In the absence of a proper institutionalized mechanism for health reimbursement, we tried to analyze how this factor is restraining the growth of health services. Simultaneously some of the reimbursement schemes have been successful in driving the growth.

f) **Presence of doctors & support staff:** The therapies under the purview of this study require an essential set of medical and paramedical support system to successfully administer them. In the absence of any of these components of this ecosystem, administering these therapies could be a challenge, despite the patient's readiness to pay for it.

g) **Optimal diagnosis:** A majority of therapies studied require right and timely diagnosis. This is of vital importance as diagnosis at the right time helps in arresting the progress of the disease through medical/surgical management.

We will consider each therapy area one after the other and understand the relative importance of these parameters for the same. In our study the top factors to increase the penetration of these therapies have also been mentioned.

4.2 Blindness and Cataract



Incidence and Prevalence of Blindness: It was estimated that incidence and prevalence figures were 0.3% and 1.2% in the year 2004 ***(Source: Portal of Government of India)***. The leading cause for blindness was cataract accounting for almost 62% of blindness cases. ***(Source: Indian Council for Research on International Economic Relations)***

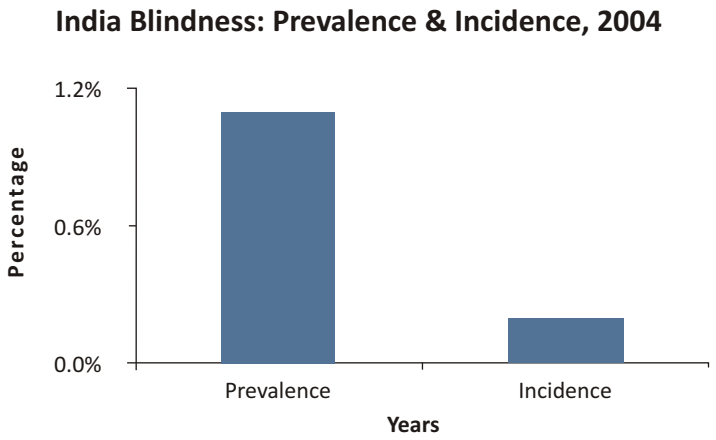


Figure 23 India Blindness

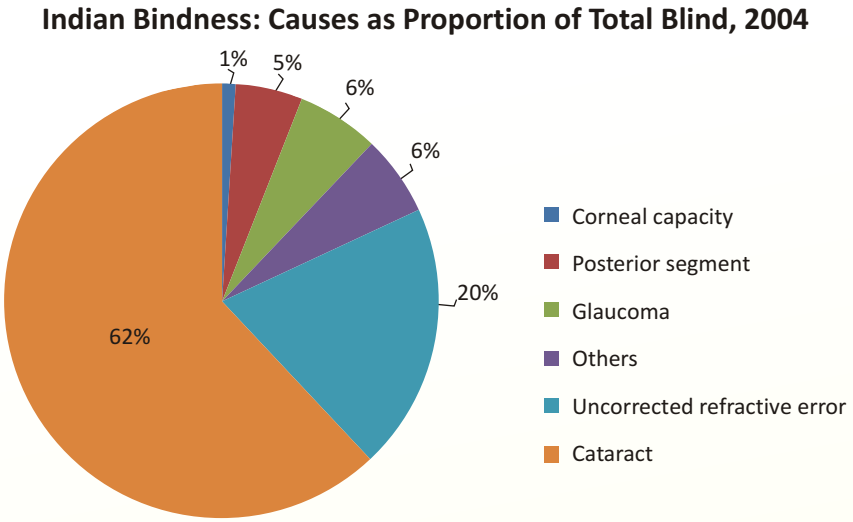


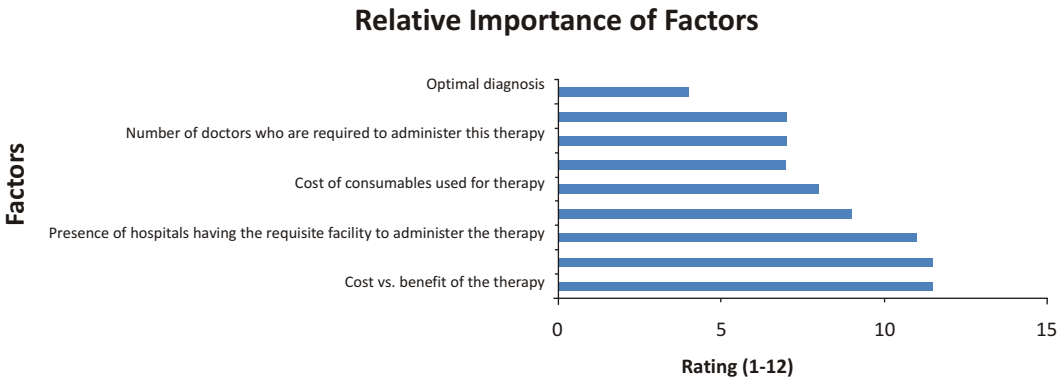
Figure 24 Indian Blindness: causes as proportion of total blind, 2004

Treatment options: Surgical intervention using Intra ocular lenses was considered to be the best option for the treatment of cataract by the respondents. However, Phaco-emulsification (a modern cataract surgery technique) was considered as an ideal treatment choice by majority of the respondents.



4.2.1 Cataract Surgery Using Intraocular Lenses:

4.2.1.1 Relative Importance of Factors Driving Penetration on Scale 1-12: Respondent Perspective

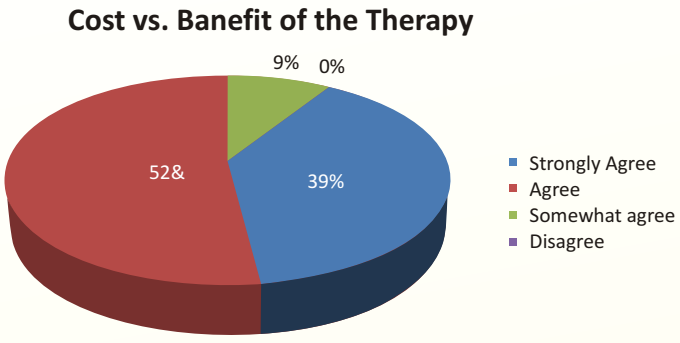


Source: Frost and Sullivan Year 2009

Figure 25 Relative importance of factors 1

We will try to understand the rationale behind these ratings and the concurrent developments in innovation. Further, the Government support and reimbursement mechanism, which simultaneously impacted the growth/de-growth of this therapy are also analyzed.

1. **Cost Vs benefit of the therapy:** This factor has been assigned the highest importance by the respondents.



Source: Frost and Sullivan Year 2009

Figure 26 Cost vs. Benefit of the therapy1

All the respondents felt that the benefit of the therapy outweighs the cost considerations. However, the degree of agreement differs amongst various classes of respondents.

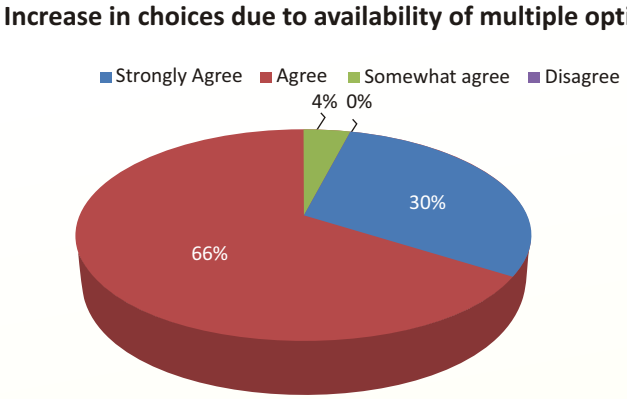


It needs to be viewed jointly, for the fact that cataract surgery using intraocular lenses is considered an absolute cure for blindness. The benefits of cataract surgery are not only clinical in terms of absolute cure, but also in terms of returning the patient to pre-disease productivity levels. (Source: Frost & Sullivan Primary Research)

Further, the factor has played a major role in growth of this therapy with more than a million cataract surgeries every year.

2. **Availability of multiple options at varying price points:** The field of intraocular lenses has seen tremendous development in the past few years. Indigenous manufacturing of the next generation products by MNCs, technology transfer by multinational companies have resulted in the creation of surplus of options for the doctors. (Source: Frost & Sullivan Primary Research)

Intraocular lenses are available in a price band of 100- 5000 INR (however lenses are also available in the price band of 40,000 INR, but are meant to be used for specific cases); this has greatly increased the doctor's choice in tailoring the treatment to patient's affordability.



Source: Frost and Sullivan Year 2009

Figure 27 Increase in choices due to availability of multiple options

All respondents observed that multiple options at different price points have helped them in a significant manner. Due to the increase in choices this factor has been rated as the second most important factor for driving the penetration of cataract surgery. Simultaneously, all the respondents noticed a great deal of improvement in their clinical practice.

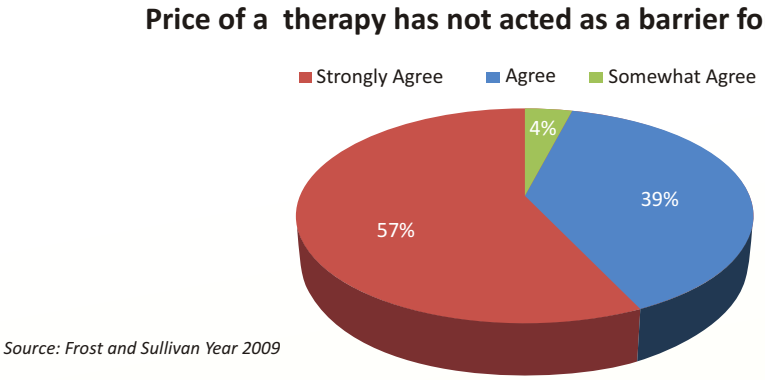


The total cost of therapy also varies in a wide price band of 1000-25,000 INR. The accessibility of multiple options and wide price band (for therapy cost as well as IOL cost) significantly increase the choice for the doctor and enable him to administer the therapy.

3. **Presence of adequate number of hospitals to administer the therapy:** Even though cataract surgery is considered as a day care treatment, patients need to get admitted in the hospital. This indicates that there is a direct correlation between the number of hospitals and surgeries performed. Once the hospitals reach saturation point, it becomes difficult to admit new patients. This will either result in denial of treatment or creation of a huge backlog.

4. **Timely referral:** Cataract surgery has a success rate of almost 100% (Source: Frost & Sullivan Primary Research and LV Prasad Eye Institute), provided the patients are brought to the treatment center on time. Since the success rate for this surgery is very high, respondents perceive timely referral to be the fourth most important factor.

5. **Cost of consumables used for the therapy:**



Source: Frost and Sullivan Year 2009

Figure 28 Price of therapy has not acted as a barrier for adoption

When posed with the question about price of therapy acting as a barrier for adoption, all respondents disagreed. This is quite understood, as the availability of a range of options for cataract surgery is one of the highest amongst the therapies studied.

This factor has been assigned a low importance due to wider variety of choices at varying price points.

6. **Reimbursement:** It has been rated as the 6th most important factor. The low economic threshold for the surgery (starting at 1,000 INR) has made this therapy more accessible. Even the absence of a proper reimbursement mechanism has not prevented the doctor from performing cataract surgeries. In addition, all available schemes provide proper reimbursement for cataract surgery. However, it was

simultaneously felt that a reimbursement scheme will help in bringing more patients under the therapy umbrella and doctors can also think of implanting advanced lenses in surgery.

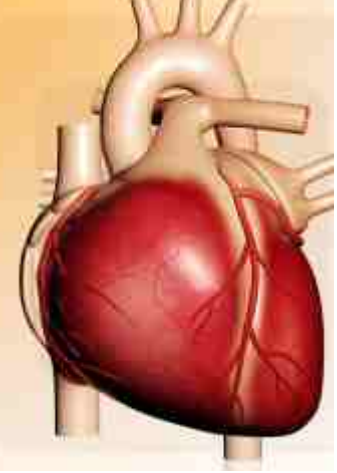


7. **Number of doctors and support staff required to administer the therapy:** There are approximately 15,000 practicing ophthalmologists in India, of whom around 60% are active as ophthalmic surgeons. The remainder serves as ophthalmic consultants. As per the respondents, this parameter is not believed to be very important in the current scenario because in the short term, i.e. by 2015, this factor is believed to be less important as the demand-supply equation for this therapy is favorable. It is projected that India will require approximately 21,000 ophthalmologists by 2015 and the current annual addition of new ophthalmologists is approximately 1,000.
8. **Optimal diagnosis:** This has been considered as the least important factor in driving the penetration of cataract surgery. This is quite reasonable as the signs and symptoms of cataract are quite distinct (blurred vision, difficulty in seeing). Furthermore, the patient himself is able to realize that something is going wrong with vision. This realistic diagnosis by the patient forces him to visit an ophthalmologist.

In addition, peer training has greatly helped in the penetration of this therapy. Institutions like LV Prasad and Sankar Netralaya have ensured that the benefits of cataract surgery and technology reach numerous people.

LV Prasad eye institute in Hyderabad is said to have trained close to 12,000 eye care professionals from India and abroad. Similarly, Sankara Netralaya in Chennai has trained about 300 ophthalmologists across the country. (Source: Primary research and information from annual reports and websites of LV Prasad Eye Institute and Sankara Netralaya)

Respondents were of the opinion that such peer training programs go a long way in capacity creation (trained surgeons) and also help in establishing the credibility of the therapy.



4.3 Coronary Heart Diseases

Burden of coronary heart diseases in India: The burden of CHD in India is expected to grow by over 70% by 2015, i.e. from 36 million cases in 2005 to 62 million in 2015, implying a burning need to improve the cardiac care scenario (Source: NCMH Background Papers—Burden of Disease in India (New Delhi, India), September 2005).

While an estimated 2.7 crore Indians were suffering from CHD in 2000, the number is expected to increase to 6.15 crore by 2015, according to Union Health Ministry's latest national health profile projections 2010.

Age	2005			2010			2015		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
20-29	2012363	4138045	6150408	2324772	5992412	8317184	2324087	8167924	10492011
30-39	3383816	3869904	7253720	3940722	5154766	9095489	4523697	7927846	12451542
40-49	4217201	4116830	8334032	5367797	5606731	10974527	5816588	8493463	14310051
50-59	4544974	3171320	7716294	5817363	4223273	10040636	6852050	6156089	13008140
60-69	3849544	2582790	6432334	4829922	3710938	8540860	5913624	5346975	11260599
Total	18007899	17878889	**35886789**	22280577	24688119	**46968695**	25430046	36092297	**61522343**

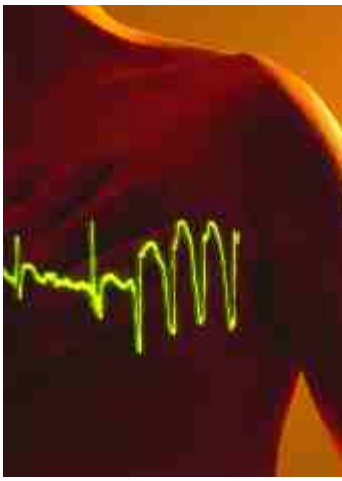
Source: Forcasting Vascular Disease Cases & Associated Mortality in India; NCMH Background Papers- Burden of Disease in India, 2005 (Latest)

Treatment options: Respondents observed that treatment of CHD is a continuum starting from medical management, lifestyle changes at early stages followed by surgical intervention and medical management at later stages.

Within surgical management, coronary bypass and interventional techniques are the two most commonly practiced techniques, coronary bypass being practiced by cardiovascular surgeons and interventional techniques practiced by interventional cardiologists.

For interventional techniques the respondents tend to favor drug eluting stents over bare metal stents.

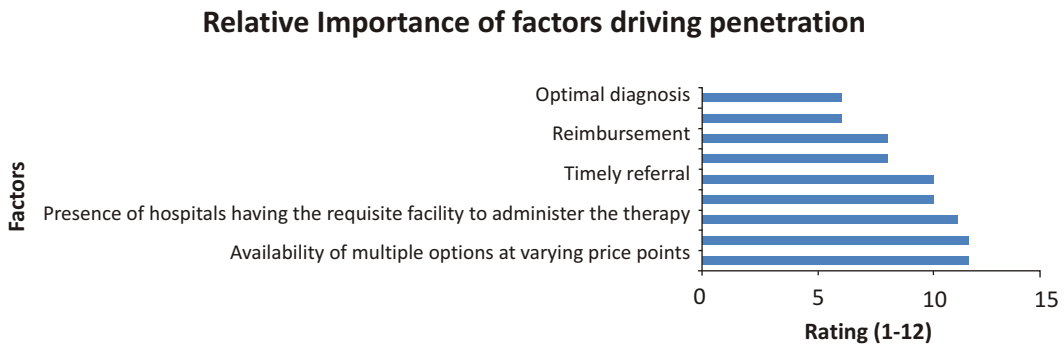
4.3.1 Interventional Cardiac Surgery Using Implants (Bare Metal Stents and Drug Eluting Stents)



4.3.1.1 Relative Importance of the Factors Driving Penetration on a Scale of 1-12: Respondent Perspective

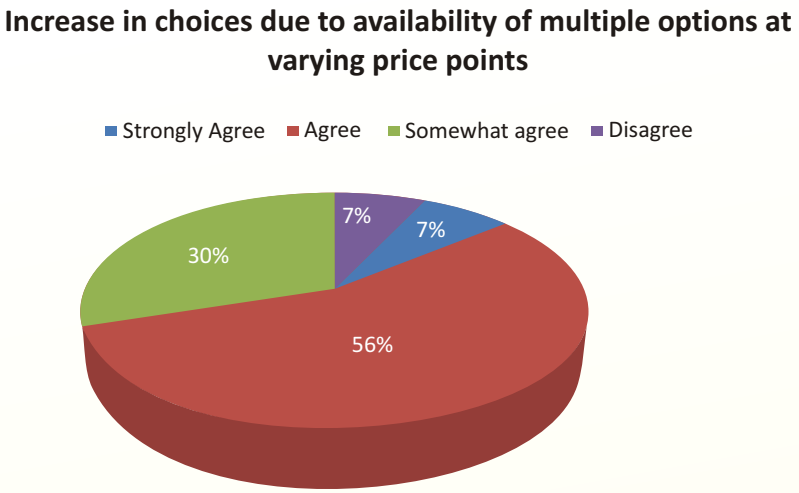
Analysis of factors in order of priority:

1 Availability of multiple options at varying price points:



Source: Frost and Sullivan Year 2009

Figure 29 Relative importance of factors 2



Source: Frost and Sullivan Year 2009

Figure 30 Increase in choices due to availability of multiple options at varying price points



Majority of the respondents (93%) were in agreement with the fact that there were multiple options for interventional cardiac surgeries at varying price points. However, the degree of agreement differed. From the respondent perspective, the price of the currently available options was in a wide band, which is as indicated:

A) Bare Metal Stents- Rupees 15,000-35,000

B) Drug eluting stents- Rupees 60,000-120,000

Simultaneously, hospital administrators and purchase managers were enquired about the evolutionary trend in prices of cardiac implants and it was observed that prices have shown a steady decline since the time these products were launched for the first time in the country.

The following price evolution was observed by the respondents during the course of the study:

Implants	Launch Price (INR)	Current Price (INR)
Bare metal stents	70,000	15,000-35,000
Drug eluting stents	135,000-150,000	60,000-120,000

It was also observed by the respondents that developments in the past few years have helped in increasing choices. These developments were better stent quality, improved outcomes and availability of progressive medical management tools.

Also, due to more options, the penetration of this therapy has grown significantly in the past few years. From a notably low number of approximately 3,000-4,000 cardiac surgeries few years ago, the number now has almost close to 110,000 for 2008-09.

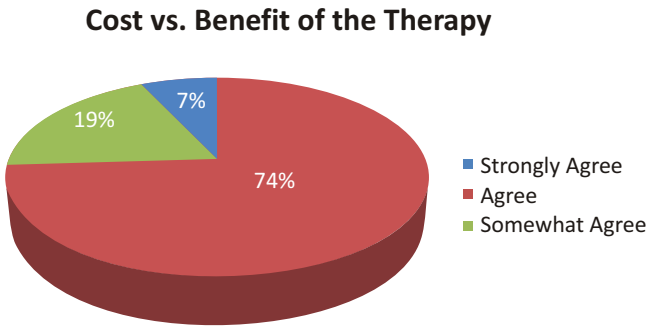
This exponential increase was also partially attributable to the innovation in the technology of stents. A transition from bare metal to drug eluting stents also resulted in lower Rest-enosis rate, less chances of recurrence and increase in durability. Hard data is not readily available, which illustrates the quality of life, recurrence rates post treatment with bare metal and drug eluting stents. However, majority of the respondents perceived drug eluting stents superior to bare metal stents when compared for health outcomes and increased longevity. This is found to be in line with published literature in the global context. The exponential increase in the number of procedures in recent years can also be attributed to greater availability of penetration options leading to increased therapy penetration (Source: Heart and Metabolism Number 31, 2006, Persistent angina: the good, the bad, and the ugly).

Incidentally the respondents also rank this as the most important factor in driving the penetration of the therapy.

2 **Cost vs. benefit of the therapy:** In the absence of cardiac intervention surgeries (bypass or angioplasties), the patient had no other option, except taking some oral medication. The introduction of techniques like cardiac bypass and angioplasties have helped to a great extent.



Most of the respondents observed the aftermath of these therapies. Patients led an almost normal life albeit with some precautions and a long dependency on medication.



Source: Frost and Sullivan Year 2009

Figure 31 Cost vs benefit of therapy 2

Furthermore, almost all respondents accepted that the benefit of the therapy outweighs the cost option. This needs to be viewed keeping in mind that in absence of either of these therapies the patient has no other option This factor has been rated as the second most important factor in driving the penetration of this therapy.

3 **Presence of adequate number of hospitals having essential facilities to administer this therapy:** Cardiac intervention surgeries are very complex and call for sophisticated set-ups. The cost of a typical set-up is in the range of 30-60 Million INR.

The prohibitively high cost of set-ups and less number of patients prevent the hospitals from putting up these centers. This data also shows that capacity building for health infrastructure cannot be left on the private sector alone.

Governments (Central & State) need to proactively work as facilitators for infrastructure creation and reduction/abolition of customs duties on equipment like Cath Labs etc.

Simultaneously, the Government should ensure that high cost of land and building doesn't act as a deterrent for infrastructure creation. It needs to be viewed that this sector is at par with other vital sectors of economy like Energy, Telecommunication and extend similar benefits to healthcare delivery sector. This may be in the form of tax holidays, easy access to credit and likewise.



Given the high prevalence of cardiac disorders in the country, 35 Million in 2005 and the expected 62 Million in 2015, the existing infrastructure seems quite inadequate (Source: NCMH Background Papers—Burden of Disease in India (New Delhi, India), September 2005).

Echoing a similar sentiment the respondents have rated it as the third most important factor in driving the growth of this therapy.

This problem seems to be a chicken and egg scenario, hospitals are not ready to invest due to low volume of patients and the existing infrastructure is getting overburdened in the due course. Thus, out of the box thinking is required to tackle this problem.

For example, stand alone leased cardiac centers run by private entrepreneurs and sharing of facilities by a large number of interventional cardiac surgeons can be a possible solution. This will help in sharing the cost of the infrastructure, optimal utilization of infrastructure and ultimately help in promoting the therapy to a wider section of the population.

4 **Cost of consumables used for the therapy:** Though the price of consumables has come down significantly in the past few years, respondents feel that it is the fourth important factor in driving the penetration of this therapy. In any case, overall high cost of delivery of this therapy (hovering in a price band of 200,000-500,000 INR) also acts as an economic accessibility barrier.

The respondents were also skeptical about the fact that the reduction in the price of consumables may not be necessarily passed on to the patient thus defeating the very point of price reduction.

But the expense of the implants constitutes approximately 15-25% of the overall delivery cost and even a 50% reduction in the cost of consumables will only result in not more than 10% decline in the cost of therapy.

This factor has been rated as the fourth most important factor by the respondents, however, the economic accessibility of the therapy as a whole need to be kept in consideration before arriving at conclusions.

To increase the economic accessibility of the therapy, efforts are required to reduce the overall cost of delivery of this therapy and a failure in doing so will restrict this therapy to a certain class of population.

5 **Timely referral:** This factor has been ranked as the fifth most important parameter.

Cardiac diseases are considered to be silent killers and people generally are not aware about them till they suffer from a heart attack or it is diagnosed by chance. It was observed by the respondents that if a person is diagnosed from a heart problem, he reaches the treatment center quite late.

This delay is either due to the inertia of the patient/relatives or lack of awareness at the first reference point, a General Practitioner. The result of this delay is high cost of the treatment and the health outcomes are also less than optimal. It was also observed by the respondents that early/timely referral would have the patient treated in a better manner and could increase the patient's lifespan.



6 **Reimbursement:** This factor has been rated as the sixth important parameter by the respondents.

It was observed that once the patients reach the right treatment center, they are able to mobilize their funds for treatment, though often the relatives have to either take loans or sell assets. However, this aspect was not analyzed further as it was not within the scope of the study.

Some more probing revealed that once the patient/relatives are made to realize the gravity of the situation, they are willing to go to any length to mobilize the funds. But still, the percentage of patients/relatives ending up in debt trap and selling assets needs to be analyzed thoroughly through some other studies.

Considering that economic accessibility is a big barrier for this therapy the low ratings for this factor need to be viewed with some caution.

7 **Number of doctors required to administer the therapy:** Cardiac interventional surgeries are complex and require specific set of skilled people (clinicians, support staff) to administer this therapy.

This factor has been rated as seventh in order of importance, which is partially attributable to the low number of cardiac surgeries in India, as compared to several other countries.

Nonetheless, the importance of this factor is going to increase significantly in the times to come due to rise in prevalence of the disease, more people opting for treatment, augmented awareness and increase in insurance coverage/reimbursement schemes.

8 **Optimal diagnosis:** There are approximately 40,000-50,000 diagnostic centers in India currently. Most of these well- equipped centers carry out a plethora of in-vitro and in-vivo diagnostics tests (lipid profile, cardiac ultrasound, CK-MB, troponin) to assess the cardiac condition of a patient.

Once diagnosed with either of these options the patient usually gets referred to the right treatment center for further treatment.

Availability of surplus options for diagnosis makes this factor the least important factor in driving the penetration of the therapy.



4.4 Osteoarthritis

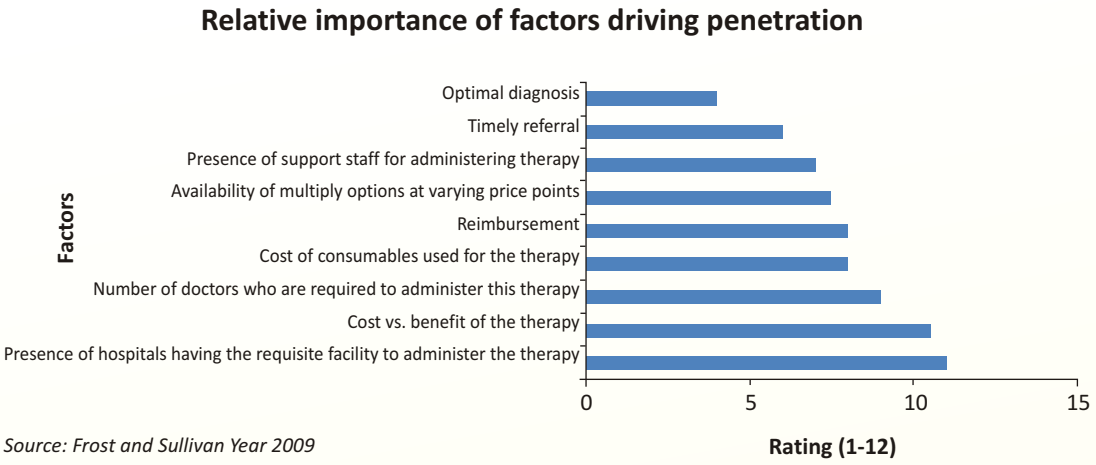
Burden of osteoarthritis: The prevalence of arthritis was estimated to be 56.6% in the Indian population aged 65 and above. It varies between 17% and 60% across different regions of India, with Amritsar (Punjab) accounting for as high as 60% and Wardha (Maharashtra) accounting for around 17% (Source: MK Sharma, HM Swami, V Bhatia, A Verma, SPS Bhatia, G Kaur: An epidemiological Study of Correlates of Osteoarthritis in Geriatric Population of UT Chandigarh; Indian Journal of Community Medicine; Vol: 32, 2007).

Treatment options: Respondents observed that treatment of osteoarthritis is a continuum starting from medical management, lifestyle changes at early stages followed by surgical intervention and medical management at later stages.

However, the respondents viewed surgical intervention as the best available treatment option for patients as on date, with affordability and co-morbidities as favorable factors.

4.4.1 Orthopedic Surgeries: Knee and Hip Replacement:

4.4.1.1 Relative Importance of the Factors Driving Penetration on a Scale of 1-12: Respondent Perspective



Source: Frost and Sullivan Year 2009

Figure 32 Relative importance of factors 3

1 **Presence of hospitals having the requisite facility to administer the treatment:** This has been ranked as the most essential factor in driving penetration of knee and hip replacement surgeries.

When probed further, the respondents replied that performing these surgeries required an extremely sterile "state-of-the-art" OT and post-operative care set-up with high end automated navigation machines. Such set-ups are currently available only in advanced tertiary care centers in India and the total number of tertiary care centers itself is low. (Source: Frost and Sullivan Primary Research)

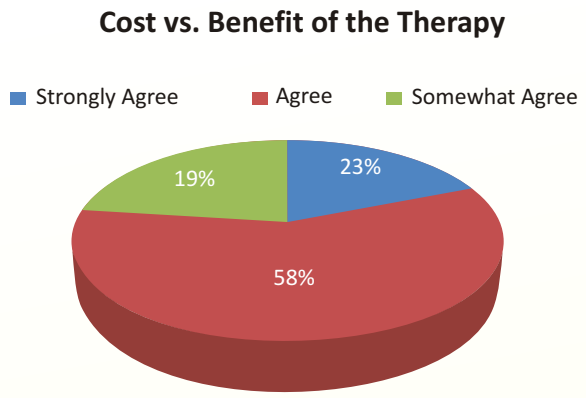


Without such set-ups, even trained doctors may not be able to administer the therapy even if the patients and/or family members can afford such surgeries. Considering that the prevalence of arthritis ranges from 20,000/Million population in the age group of 35-44 and goes up to as high as 200,000/Million population in the age group of 70-79, the present infrastructure is grossly inadequate to handle the burden of arthritis.

This also needs to be viewed in light of the fact that arthritis is a debilitating disease and can hamper the productivity of an individual significantly.

2 **Cost vs. benefit of the therapy:** Though the advent of joint replacement surgeries has been relatively recent in India, global and pragmatic evidences suggest that a patient, post treatment can return back to normalcy and productivity goes back to the pre-disease levels. (Source: Frost and Sullivan Primary research)

The debilitation of the patient is resolved by therapy and some respondents feel that the benefits of the therapy outweigh the cost consideration.



Source: Frost and Sullivan Year 2009

Figure 33 Cost vs benefit of the therapy 3

Almost all the respondents were unanimous that the benefits of the therapy outweigh the existing cost considerations. This factor has been rated as the second most important factor in driving the growth of this therapy.



Despite all the benefits attached, the respondents felt that knee and hip replacement is still considered to be an elective surgery or a surgery which is preserved for the rich section of the population. This can partially be attributed to the lack of awareness in the society about arthritis and to the prevailing socio-cultural belief regarding old age to be synonymous with diseases like arthritis.

3. **Number of doctors required to administer the therapy:** As discussed earlier, administration of this therapy requires a sophisticated set-up and skilled doctors or support staff. Majority of the respondents believed that it requires a lot of training and experience to perform the knee & hip replacement surgeries.

The respondents also felt that the overall number of trained and experienced orthopedic surgeons for such surgeries is very low in India. This factor was rated as the third foremost important factor in driving the growth of knee and hip replacement surgeries.

4. **Cost of consumables used for the therapy:** This was rated as the fourth most important parameter for driving the growth of this therapy.

   However, this needs to be viewed with a degree of caution as the respondents concurrently feel that overall high cost of delivery of this therapy (hovering in a price band of 300,000-400,000 INR) also acts as an economic accessibility barrier.

   The respondents were skeptical that the reduction in the price of consumables would be passed on to the patient due to the high cost of other companies of the package.

   This data also needs to be analyzed along with the fact that cost of implants constitute only about 15-20% of the overall delivery cost and even a 10% reduction will at least result in around 2% reduction in the cost of therapy. (Source: Frost and Sullivan Primary Research and Analysis)

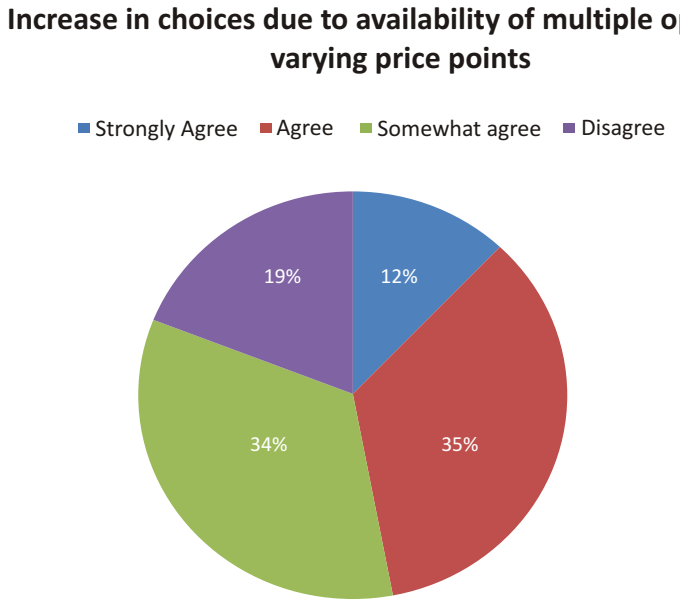
5. **Reimbursement:** It has been provided a similar ranking as the cost of consumables. This is understandable as people do not treat arthritis as a life threatening disease and tend to avoid treatment until they are no longer able to bear the pain and suffering.

Overall high cost of a knee and hip replacement surgery reinforces the inertia of the patient. Diseases, which are not considered life threatening, have many right/wrong social beliefs attached. For example in case of arthritis, delivery cases and psychiatry cases, patients tend to avoid treatment, often resorting to alternative methods of treatment, which might not be the best option many times.

A properly designed reimbursement/insurance scheme can act as a catalyst for the patients. It will also help them in shedding the inertia of visiting a right treatment center for a cure.

Programs like the National Rural Health Mission and Janani Suraksha Yojana have clearly shown this. (Source: Ministry of Health and Family Welfare) There has been a substantial increase in the number of institutional deliveries post the launch of these schemes.





Source: Frost and Sullivan Year 2009

Figure 34 Increase in choices due to variability of multiple options at varying price points 3

Approximately 85% of the respondents agreed with this statement with varying degrees of agreement. Even though approximately 85-90% of the respondents agree with the above statement they ranked this factor lower in the order.

The low ranking can be attributed to the fact that this therapy is comparatively new in India and currently occupies a very low point in the evolutionary curve. Though a few indigenous and other options have come into the market, the respondents perceive efficacy of those products not at par with what is available globally. This perception stops them from using those products.

This also in turn restricts the choice of the doctor and he has to choose between a few supplies only. However, with the increased cumulative experience over time and innovation, globally as well as in India, surgeons' choices are expected to increase.

7 **Timely referral:** This is not considered to be a very important parameter in driving growth in the current scenario. However, with the increase in workload and younger population suffering from arthritis, this factor will gain importance.



Respondents also perceive that the signs and symptoms of arthritis are quite visible. Therefore, they observe that an effort needs to be undertaken to increase awareness about treatment options.

Further, it was observed that social awareness rather than strengthening of the referral chain could be a better way of increasing the penetration of the therapy.

This will also result in patients reaching timely at the right treatment centers in the first place, which could impact outcomes more favorably.

8 **Optimal diagnosis:** This factor has been considered to be the least important in driving the growth of this therapy.

As discussed in the cardiology section there is an abundance of diagnostic centers in the country, where a patient can get his X-Ray and basic blood parameters like Uric Acid and CRP tested for a preliminary diagnosis. If any abnormality is detected the patient can be referred to the right treatment center. (Source: Frost and Sullivan Primary Research)

4.5 Valvular Heart Diseases

Burden of VHD: In 2005 a total of approximately 750,000 children in the age group of 6-16 years suffered from valvular heart diseases. It is estimated that approximately 50,000-60,000 children die every year due to valvular heart diseases. (Source: Forecasting vascular disease cases and associated mortality in India; NCMH Background Papers-Burden of Disease in India; Division of Biostatistics and Medical Informatics; University College of Medical Sciences).

Treatment options: Surgical intervention coupled with medical management was considered to be the best treatment option for this disease ***(Source: ACC/AHA 2006 Guidelines for the Management of Patients with Valvular Heart Disease; A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines).***

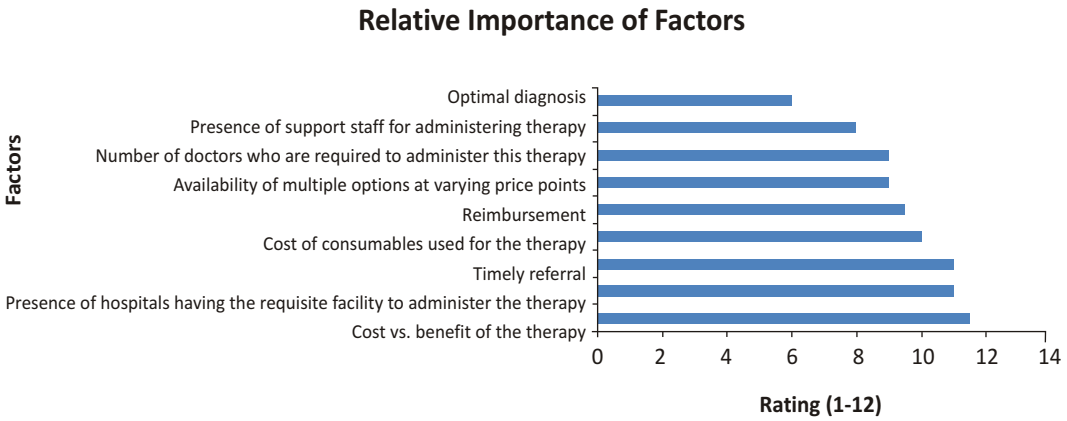
The respondents differed on the choice of surgical intervention tools in terms of mechanical vs. tissue valves.

The proponents of mechanical valve considered that some therapy is better than no therapy. However, the dependence on an anti-clotting therapy post treatment was considered to be a big drawback. On the other hand, the supporters of tissue valve considered it to be a better option as there is no need for provision of a medical management therapy for the success of the surgical technique. Still, the need to replace the valve after a period of 12-15 years was considered as a big drawback for this therapy ***(Source: Cleveland Clinic Heart and Vascular Institute www.clevelandclinic.org/heart © 2000-2008; The Cleveland Clinic Foundation).***

4.5.1 OValvular Heart Diseases / Valve Replacement



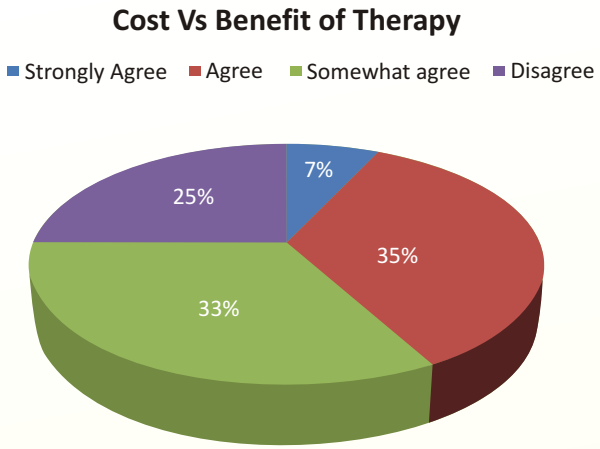
4.5.1.1 Relative Importance of the Factors Driving Penetration on Scale 1-12: Respondent Perspective



Source: Frost and Sullivan Year 2009

Figure 35 Relative importance of factors

1 Cost vs. benefit of the therapy:



Source: Frost and Sullivan Year 2009

Figure 36 Cost vs benefit of the therapy

Majority of the respondents were of the view that this therapy is especially beneficial for children suffering from valvular heart diseases, as they get a fresh lease of life.



In the absence of a valve replacement or repair, the patient has to suffer a lot since oral medications only provide partial relief from pain and other symptoms (Source: Cleveland Clinic Heart and Vascular Institute www.clevelandclinic.org/heart © 2000-2008 The Cleveland Clinic Foundation.) This is especially important as the Government of India data suggests that approximately 50,000-60,000 children die every year due to valvular heart diseases. The same data suggests that by 2015 approximately 700,000 children in the age group of 6-16 years are expected to suffer from valvular heart diseases (Source: Forecasting vascular disease cases and associated mortality in India; NCMH Background Papers-Burden of Disease in India; Division of Biostatistics and Medical Informatics; University College of Medical Sciences). Without any alternative permanent cure, valve replacement/repair remains the best treatment available.

In view of the benefits attached with this therapy, it has been assigned the highest rating for increasing penetration. However, a significant number of the respondents, approximately 25%, disagreed with this thought.

The disagreement was not with the benefits of the therapy but for skepticism about the long term management of the patients. The patients feel that surgery is a full time cure for the ailment and post surgery don't follow the medication regimen or completely stop the follow up.

This class of respondents perceived that in the inadequacy of proper long term compliance to treatment, lack of awareness for follow up, long distances from the treatment center, performing a heart valve surgery may not be of much help to the patient/family.

Few respondents amongst this class were also unconvinced about the affordability of long term medication, which is compulsory in few classes of valve repair.

However, the majority was in agreement that there are numerous benefits attached to this therapy and if a proper mechanism can be designed for post treatment follow up, then that will further help in the penetration of this therapy.

2 **Presence of hospitals having the requisite facility to administer the therapy:** As discussed in the interventional cardiology section, this therapy area also requires a sophisticated set-up for administration.

   With the dearth of advanced facilities, a cardio thoracic surgeon can't administer the treatment despite having the requisite knowhow.

   Another study by Frost & Sullivan indicates that there are approximately 400 Cath Labs (the bare minimum requirement for this surgery) installed in the country and they are centralized mostly in Tier I&II cities and towns.



Though there is no authentic data available on the geographical spread of this disease, our study indicates that majority of the patients coming for treatment are from cities, towns, village other than where the treatment center was located.

Few of the respondents also observed that their patients traveled approximately 150-200 kms to avail the treatment. This clearly highlights the fact that there is insufficient infrastructure and its inequitable distribution is of one the major factors which is restricting the penetration of this therapy.

The reverse of this statement may not be equally true; still the above argument clearly indicates that there is an urgent need for creation of more infrastructure to drive this therapy.

3 **Timely referral:** Indicated as the third most important factor for driving penetration of this therapy, the factor is particularly essential as with the passage of time, the condition of the patient worsens and the health outcomes may not be the best. A majority of the respondents expressed that a significant number of their patients come at very late stages and this, many times complicates their condition.

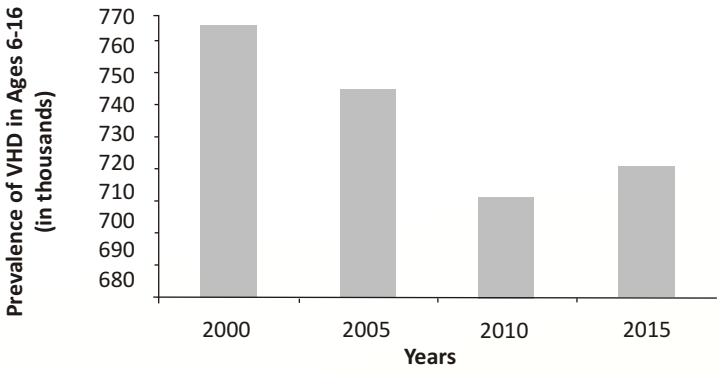


Figure 37 Prevalence of VHD in ages 6-16 years

The above data indicates the severity status of the disease in the age group of 6-16 years. In this context, timely referral becomes an important barrier/driver in ensuring optimal/sub-optimal health outcome.

This age group of children, who are supposed to contribute to the productivity of the society, may never be able to do so if they are not able to avail treatment options in the right time.

Further, it was expressed that the symptoms of this disease are not very clear (laziness, breathlessness, palpitation) at early stages and are therefore easily confused for general weakness. This leads to either the patient taking self-medication or the general physician prescribing certain medications, which are in no way related to the underlying disease condition.



Thus an awareness campaign about correctly diagnosing valvular heart diseases at early stages may significantly increase the number of patients/relatives, who would opt for valve replacement/repair.

Awareness creation is not as difficult as it sounds. In fact, a preliminary diagnosis can be performed using a simple Echo Cardio Graph (ECG) machine considering the wide base of ECG installation machines and this is easily achievable.

A Frost & Sullivan study reveals that approximately 100,000 ECG machines were installed in India in 2008 and these can be optimally utilized for timely detection of valvular heart disease, which will ultimately lead to timely referral.

4 **Cost of consumables:** This has been rated as the fourth most important factor in driving penetration. According to the respondents, there are lots of other factors which need to be taken into consideration, before looking upon cost of consumables in isolation. Economic inaccessibility is the primary factor, which the respondents perceive as a major restraint, hindering the growth of the therapy.

   The total cost of the therapy for heart valve replacement is in the range of 150,000-170,000 INR and cost of the valve ranges from 30,000-70,000 INR. This price is dependent upon the valve type i.e. mechanical or tissue valve respectively.

A set of respondents expressed that even though mechanical valves come cheaper initially and last longer, they require lifetime dosages of anti-clotting medication. Such medications like Warfarin add to the overall cost of the treatment. Non-compliance to this medication may even result in death (Source: Comparison over short term mortality and morbidity of mechanical and bioprosthetic heart valves in the Indian population Shiv Sagar Mandiye & Saket Agarwal & Himanshu Pratap & Aditya Kumar Singh; Indian Association of Cardiovascular-Thoracic Surgeons 2010).

In addition to this, patients also need to get their clotting- status diagnostic tests done at regular intervals to manage the right dosage of the anti- clotting therapy.

It can be concluded that charges for diagnostic tests and the anti-clotting mechanism need to be added to the cost of heart valve surgery using mechanical valves.

The tissue valves do not require anti-clotting medication but the respondents believe that the life of tissue valves is not more than 10-12 years. In absence of concrete data it would be hard to comment upon this.

As a conclusion we can say that there are lot of benefits and concerns associated with different methods of replacement. The cost factor needs to be calculated by attaching a cost to all the other support systems, required by the patient post surgery.

Another inference was with regards to the socio-economic profile of the patient. Majority of the respondents analyzed that a significant chunk of the patients was from a very low socio-economic background and spending even 5,000-10,000 INR was way beyond their means.



Seeing the complexity of this scenario an alternate mechanism of reimbursement needs to be designed so that the benefits of the therapy can be widespread.

5 **Reimbursement:** Rated as the fifth important factor, it needs to be viewed jointly with the cost of consumables of the therapy.

When the peculiar nature of this disease is taken in account, i.e. its life threatening nature and its wider spread in the poor section of the population, designing an appropriate reimbursement mechanism can go a long way in increasing the penetration of this therapy.

Few state governments in India have designed schemes like the Aarogyashri, which have resulted in relatives/families opting for treatment.

An illustration from Apollo hospital proves conclusively that a properly designed reimbursement scheme can ensure increased access of quality healthcare even in areas considered as remote/non-urban.

Apollo Reach Hospitals, Karimnagar successfully performed the following procedures within three months of its inauguration:

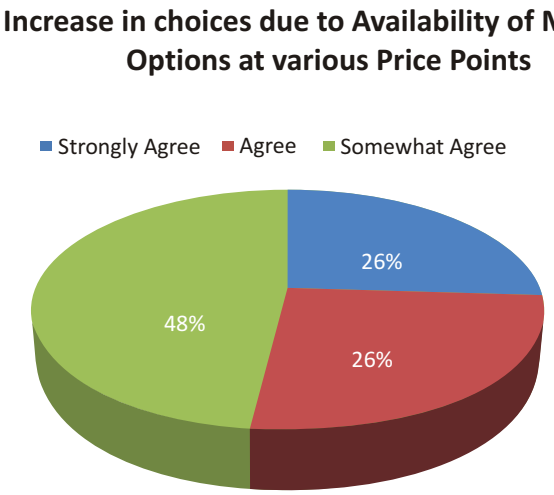
- Open Heart Surgery with Cardiopulmonary Bypass on a 14 year old girl with congenital heart defect (Ventricular Septal Defect with pulmonary Stenosis). The patient was ready for discharge 6 days after the surgery.
- Placement of a Permanent Pace Maker in a 70 year old man with Complete Heart Block. This patient was admitted in emergency with complaints of recurrent episodes of blackouts and was found to have complete heart block. He is ready for discharge.
- Mitral Valve Replacement on a 55 year old female patient suffering from severe Mitral Stenosis with LA clot. The patient was discharged on the sixth day of the surgery.
- Angioplasty through Radial Artery - a highly skilled procedure performed at very few centers
- Angioplasty with Stent placement on a 38 year old person

The beneficiaries of these procedures are from the Arogyasri scheme.

Source-Apollo hospital website



6 Availability of multiple options at varying price points:



Source: Frost and Sullivan Year 2009

Figure 38 Increase in choices due to availability of multiple options at varying price points 4

74 % of the respondents agreed that there are multiple options available ranging from mechanical tissue valves, indigenous, and imported products.

Majority of the respondents felt that absence of proper post treatment care, non-compliance to anti-clotting drug management and lack of awareness, were all factors, which defeated the basic purpose of having increased options.

They also were apprehensive that increase in treatment options without any increase in compliance to therapy will not result in any increased benefit, either for the patient or the clinician.

This was especially true for mechanical valves, where it was observed by a majority of respondents that patients don't comply with clotting medication.

Treatment with valves, except mechanical valves, does not require the patient to be dependent on anti- clotting medication. However, it was found that these valves need to be replaced after 15-20 years and the overall high cost of therapy may restrain the patient from opting for the therapy again.

Considering the peculiarity of the situation, a holistic approach needs to be adopted for optimal management of valvular heart diseases. It can be considered as a continuum of medical management-surgical management followed by medical management and diagnostics. This factor was rated as sixth important by the respondents.

7 **Number of doctors required to administer this therapy:** Even though this surgery requires super specialists, i.e. cardiothoracic surgeons, this factor has been rated very low in the pecking order.

The low ranking of this factor is attributable to the fact that total number of heart valve surgeries being performed every year is quite low and it is perceived that the existing number of doctors is sufficient to handle the current patient load However, once the patient load increases this factor might start acting as a restraint in the growth of this therapy.

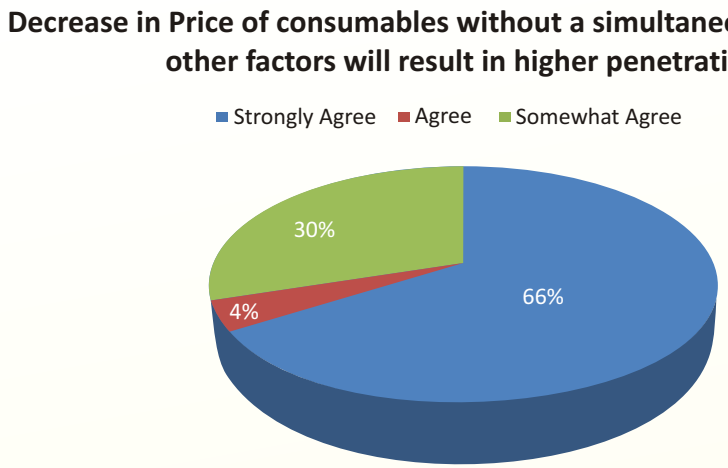


8 **Optimal diagnosis:** This has been rated as the least important factor in driving the therapy, as the cardiothoracic surgeons perceive that there are an adequate number of diagnostic facilities in the country having 2D -3D Echo (ECG) facility to diagnose this disease.

However, as discussed in the timely referral section, the basic problem is of lack of awareness at both the patient and first reference level, i.e. Gps.

Respondents perceive that general physicians, generally the first point of contact for the patient, need to be made more aware about the diseases and methods of diagnosis. This will lead to optimal utilization of the diagnostic infrastructure already present.

In addition to these factors the respondents were asked to express their opinion on the impact of reduction in prices in increasing the penetration of these therapies, without altering the other parameters:



Source: Frost and Sullivan Year 2009

Figure 39 Decrease in price of consumables without a simultaneous increase in other factors will result in higher penetration



65% of the respondents expressed the opinion that reduction in the price of consumables without concurrently acting on any other parameters will not help in achieving an increased penetration of the therapy.

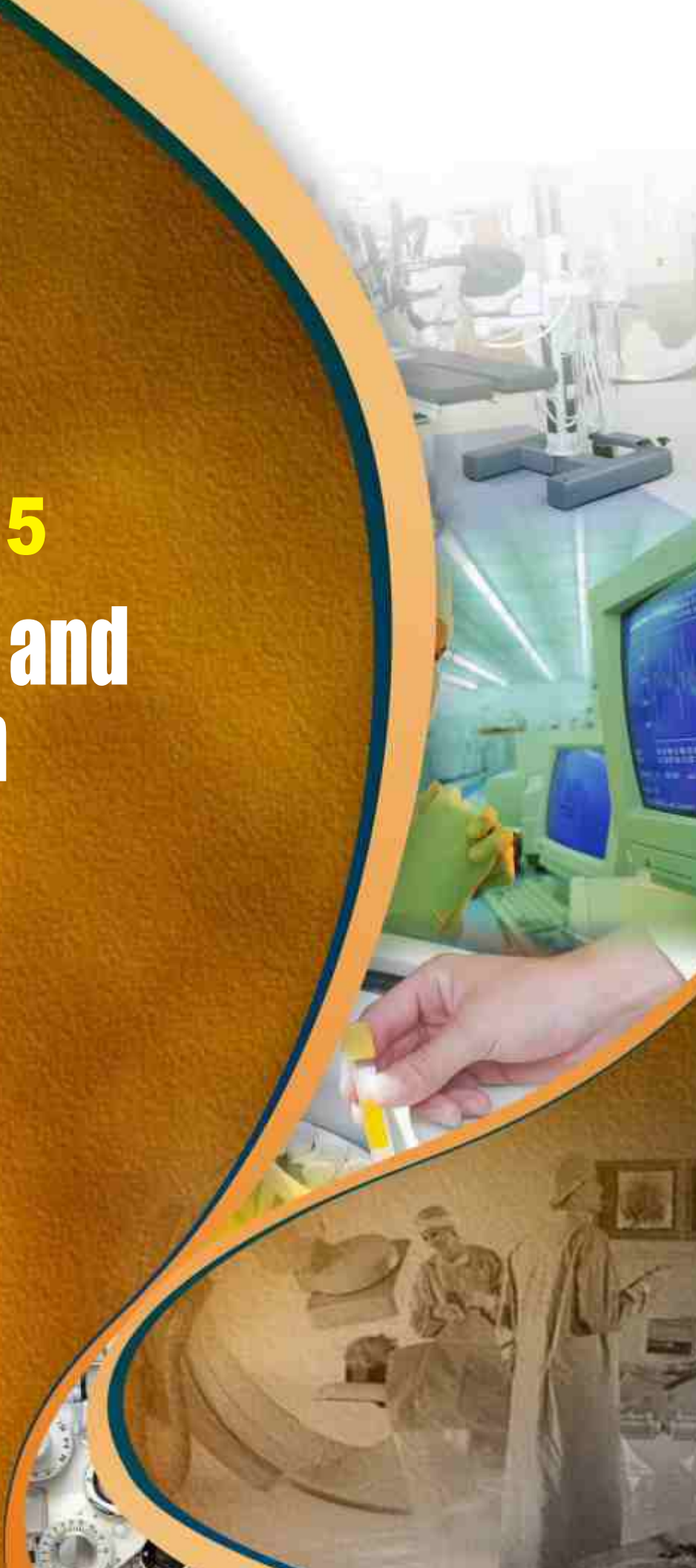
The degree of disagreement on the above statement varied from therapy to therapy, however it was found to be hovering in a narrow band of 60-66%.

Based on the above discussion it can be conclusively stated that increasing the reach of healthcare services and increasing the penetration of these therapies is a multi dimensional issue.

Acting on one single parameter without concurrently touching upon the other pressure points will not help in achieving the objective of quality healthcare to all.

CHAPTER 5

Inferences and Conclusion





The above discussion proves to validate the hypotheses of this study, i.e. Access, Availability, Awareness and Affordability in the respective order of priority play a major role in shaping the health dynamics/outcomes of a country.



Three most important factors to increase the penetration of these therapies will be:

1. Presence of hospitals having requisite facilities to administer these therapies
2. Availability of multiple options for treatment
3. Timely referral

The first two factors are primarily access related issues and the third factor points towards a weak referral chain or a weak primary and secondary care system.

1. The hospital beds/population ratio is one of the lowest in India when compared to comparable economies.

Even the available number of beds is not uniform in terms of available infrastructure, level of services offered and requirement of clinicians and nursing staff. An earlier study by Frost & Sullivan in 2006 indicated that approximately 70-75% of these hospital beds are in centers like community health centers, nursing homes and small hospitals with less than 30-35 beds. Small set-ups like these neither have the requisite facilities for the treatment of these diseases nor the required funds to invest for the costly set- up.

This effectively leaves only 20-25% of the hospital beds with requisite infrastructure to administer these therapies. In other words, of the available 500,000 beds (as per government data) only 100,000 are available for administering. Even for these 100,000 beds, the therapies have to compete with other disease conditions. This further reduces the net availability of beds for the therapies mentioned and the same is equally true for other disease conditions, which were not under the purview of this study.

Disease condition	Total no. of people affected
Valvular Heart Diseases	710,000
Cardio Vascular Diseases	48,000,000
Blindness	13,000,000

Considering the prevalence of the three mentioned diseases, the existing infrastructure available for treatment is insufficient.

This further increases problem related to accessibility and availability of health services and in the short to long run it will act as the biggest restraining factor holding back the growth of the mentioned therapy areas.



2. Availability of multiple options for treatment-

This is the second most important reason in driving the growth of these therapies and the effect of it is most visible in the area of cataract surgeries.

The cataract surgery market has seen a remarkable growth, from 3 million in 1993 to around 6.7 million in 2009. This tremendous growth is partially attributable to the availability of multiple options for cataract surgeries at varying price points.

A report by Frost & Sullivan on the ophthalmology industry suggests that in 2007 there were a minimum of 12-15 companies offering a range of intraocular lenses (PMMA lenses, foldable lenses, multi-focal lenses and Toric lenses) at prices ranging from 100 to 5,000 INR. These companies range from multinational companies to indigenous manufacturers.

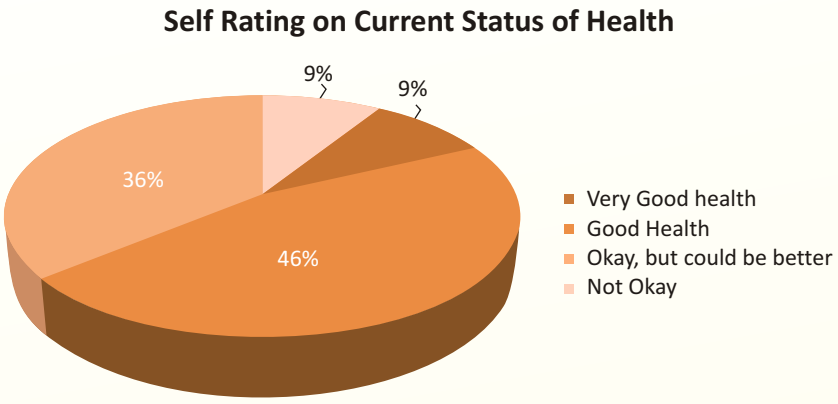
Taking intraocular lenses as a reference point, the policy makers should seriously think about creating a suitable eco system for replicating the success achieved in the field of intra ocular lenses. The Government should focus on capacity building for the medical device sector; primarily in the areas of testing, standardization and certification.

This will help indigenous manufacturers in coming up with products, which are considered at least at par with what is available globally and also in creating a true spirit of competition amongst various players which will ultimately help in increasing the choices for the doctors as well as the patients.

3. Timely referral- Relevant analysis shows that Indians as a whole are not worried about their health status and tend to act only when struck by a disease.

The problem of lack of awareness in the society gets compounded at the first reference level. This reference level is generally about disease condition, symptoms and appropriate diagnostic methods to diagnose the disease rightly and quickly.

A recent study published in Business World indicates that a majority of the population displays a denial about its health status:



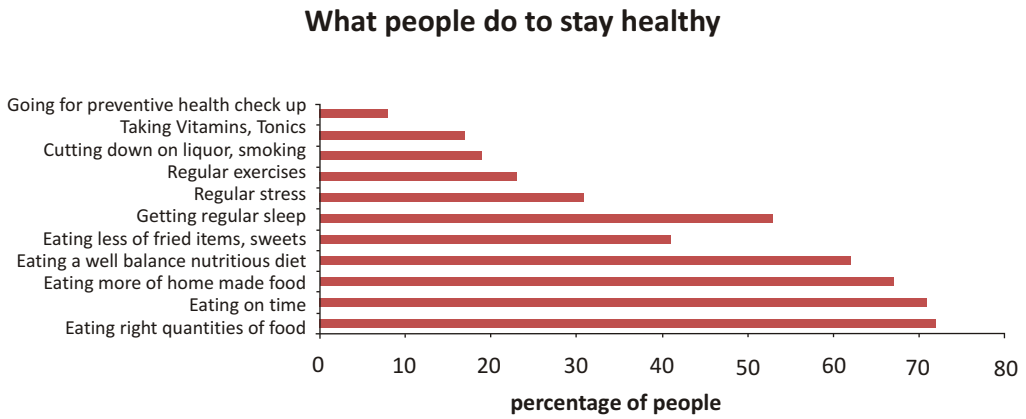
Source: Business World (year?)2010

Figure 40 Self rating on current health

Approximately 60% of the consumers perceive their status of health from being good-very good. Surprisingly none of them perceive themselves as having poor health. This is at complete variance with stated facts, which show India to be the Diabetic and Cardio Vascular disease capital of the world.



This inference gets reinforced by other data published in the same study, which reveals that only 8% of respondents/consumers opt for preventive health checkups to stay healthy.



Source: Business World (year?)2010

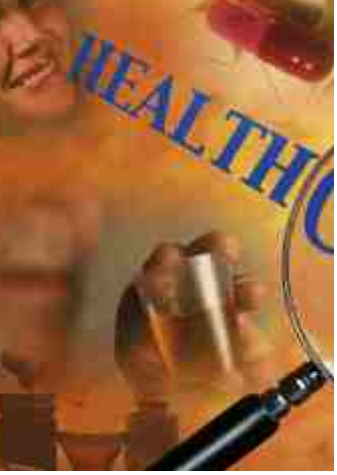
Figure 41 what people do to stay healthy

This clearly highlights the fact there is an urgent need for creation of awareness for the public at large and efforts of this level can only be undertaken by government. Other stakeholders of this industry, i.e. the medical technology and the pharmaceutical industry need to complement the efforts of the government by creating awareness at the first reference level.

This is especially important as the general physicians, who act as the first reference level, form the backbone of the nation's health infrastructure. Any effort in creating awareness without keeping this section of the clinicians in the loop will be of no help.

Medical technology companies can play a significant role in achieving this objective. They have already created a lot of awareness around the various mentioned therapies, but unfortunately the benefits of that awareness have been centralized in and around super specialists.

Centralization of knowledge has resulted in restricted penetration of these therapies, as the first reference level is either not sure about the disease condition or he is not highly aware about the referral pathway.



As a conclusion, we can say that acting on the above three mentioned factors may lead to a significant change in the penetration of not only the therapies under the purview of this study, but also will lead to increased access to healthcare for all.

A concerted effort needs to be undertaken by various stakeholders i.e. Government, medical technology industry, pharmaceutical industry, NGOs, healthcare deliverers and health education set to make this happen.

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