Understanding the India Low Cost Model of Healthcare Delivery: A Review of the Literature

Private Sector Innovation Programme for Health (PSP4H)

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1 Introduction

The cost at which quality healthcare is delivered has been a global topic of discussion in both developed and emerging economies alike. As countries struggle to address increasing costs, poor quality and accessibility, healthcare consumers search for affordable costs and optimal value for money. The cost of healthcare delivery is of particular importance in developing countries with high incidences of poverty. Some healthcare providers, especially those operating within the private sector in developing countries, are looking to deliver healthcare at prices that are affordable to the majority of the population, who often times fall within the mid to lower income brackets. To achieve quality low cost healthcare delivery, providers have implored innovations to enable them serve lower income groups profitably. This literature review aims to contribute to an understanding of how the delivery model of Indian healthcare providers have achieved the provision of quality healthcare at affordable costs to lower income groups, and explores how the Indian model can be replicated by private for-profit sector health providers in Kenya. In doing so, the review is intended to inform the Private Sector Innovation Programme for Health and private healthcare providers in Kenya.

The rest of the report is structured as follows; Section 2 will give an overview of the India’s healthcare system, section 3 will present case studies of innovative Indian for-profit private sector providers who have been able to deliver high quality low cost healthcare, section 4 presents the comparative analysis of the hospitals in the case studies, while section 5 covers demand side healthcare financing specifically citing two Indian examples. Section 6 is a comparison of India and Kenya’s socio-economic conditions in relation to healthcare, and section 8 concludes with recommendations on how Kenyan private healthcare providers can deliver high quality low cost.
Overview of India’s Healthcare System

Located in South Asia, India is the world’s seventh largest country by area, the second most populous country and the world’s most populous democracy. Since India’s independence in 1947 and particularly over the last two decades following market based reforms in the early 1990’s, India has enjoyed robust economic growth, making it the tenth largest economy by nominal GDP (Wikipedia, 2014).

With its population of 1.2 billion, India has one of the world’s biggest healthcare industries, with every sixth individual on the planet, a consumer (Ganapathy and Ravindra, 2009). However, despite being one of the world’s fastest growing major economies, a large part of the population has little or no access to basic healthcare. India ranks among the bottom five countries with the lowest public health spending globally (Accenture, 2014).

Though India’s maternal mortality rate (MMR) has significantly dropped since the 1990’s, it still remains high at 212 per 100,000 live births, which is almost 15 times higher than other developed countries. India’s basic healthcare indicators are poor when compared to other BRIC countries. Currently, India contributes 25% of global maternal deaths and infant mortality is three times more in comparison to Brazil or China according to the WHO Healthcare Report 2012. While India has made strides to improve its healthcare indicators over the last decade, the nation still lags behind global and regional standards.

![India’s healthcare spend lags behind LMIC with a high percentage of out-of-pocket spend](image)

High Disease Burden: India accounts for 21% of the world’s burden of disease (ibid). It is home to 12 million blind people; there are 2 million Indians in need of heart surgery however less than 5% are able to get it. India has an estimated 2.5 million cancer sufferers and 63 million diabetics, a majority of whom are yet to be diagnosed, let alone seek treatment (Govindarajan and Ramamurti, 2013).

Inadequate Medical Manpower and Infrastructure: Statistics show that India has over 600,000 doctors and 1.6 million nurses (Accenture, 2014), however practitioner density is still 25% of what it is in the US and less than half in China (Govindarajan and Ramamurti, 2013). For every 1,800 people in India, there is only one doctor which presents a stark disparity in comparison to WHO’s guidelines of 1 doctor per 600 people (Accenture, 2014). India has a resource gap of approximately 1.4 million doctors and 2.8 million nurses. A clear disparity also exists between the skilled personnel present in the rural and urban areas, as 80% of India’s doctors reside in the urban areas, leaving 70% of India’s population who reside in the rural areas with few doctors (ibid).

Hospital beds are also in short supply and a good number of the medical facilities are inadequately equipped and cramped. The bed density in India is 0.9 per 1,000 people, again contrasting WHO’s recommended guidelines of 3.5 per 1,000 people.

In addition to India’s high disease burden, substantial infrastructural and manpower gap, the country’s rapid urbanization has simultaneously occurred with growing poverty in urban areas; Over 20% of the urban population is estimated to be poor (Kumar, 2013). The pace of development has increased the magnitude as well as kinds of diseases, as India has experienced a rise in lifestyle diseases such as diabetes, obesity, heart diseases etc due to altered lifestyles of people. This has exacerbated the need for affordable healthcare for India’s poor in both rural and urban areas, in a country where the nominal GDP is £960 and 80% of healthcare expenses are paid out-of-pocket due to extremely limited insurance coverage (Accenture, 2014). Some innovative Indian private healthcare providers and entrepreneurs have devised ways of providing quality healthcare services at affordable prices to India’s poor on significant scales to address the nation’s pressing demand and constrained supply.
3 Case Studies: High Quality, Low Cost Indian Private Sector Healthcare Models.

The gap between the demand and supply of healthcare in India spawned innovations within its healthcare industry. Despite the ballooning demand for affordable healthcare and the constrained supply, relatively few Indian hospitals have devised a way of delivering world-class healthcare affordably and on a large scale. In order to serve the lower strata of health consumers who earn low wages, Indian health institutions have had to devise innovative ways to dramatically lower their costs. Such businesses have been able to scale because of their low costs which attract large volumes of patients, allowing the venture to be profitable and sustainable. Through their revenues, these hospitals are able to sustain themselves without depending on grants, donations or government subsidies. Below are four case studies of successful private sector Indian hospitals that have been able to deliver world class quality healthcare at low costs. Each case study will highlight the demand for the service being provided, their business model, their innovations using technology and other factors that contribute to their success.

3.1 Apollo Hospitals Group

In 1983, Apollo Hospitals (Apollo) was established in Chennai, southern India by a cardiologist, Dr. Prathap C Reddy. Apollo started as a 150 bed private hospital and has grown to become Asia’s largest private integrated healthcare provider delivering high quality tertiary care. On a consolidated basis, between owned and managed facilities, Apollo has over 10,000 beds, across 54 hospitals and 4,000 consultants in 50 specialties. In addition to hospitals, Apollo owns and operates clinics, diagnostic centers, pharmacies, and provides healthcare management consulting, education and training, and telemedicine services (International Finance Corporation, 2012). Apollo developed services in telemedicine after a pilot in 2000 which has scaled up and currently spans across over seventy centers.

3.1.1 Critical Demand

It was estimated that 700 million Indians in 2009, did not have direct access to secondary and tertiary medical expertise, as seventy percent of the population resides in the rural and semi-rural areas, where there is limited access to medical care because eighty percent of the doctors live in the metropolitan areas, 75 per cent of dispensaries and 60 per cent of hospitals are in urban areas (KPMG, 2011). To fulfil Apollo’s mission of "providing international quality healthcare to all who need it", Apollo Reach Hospitals (Apollo Reach) was launched to serve the smaller cities, catering to the semi-urban and rural areas in 1998.

3.1.2 Business Model

Given Apollo’s vast experience in running hospitals across India and other countries in Asia, the Middle East and Africa since the early 1980’s, the hospital was able to identify the Indian cities that needed healthcare facilities and the kinds of services required. The Apollo Reach hospitals had key features that were central to its successful business model. Accessibility was core to the model given the urban-rural disparity access to healthcare in India. Apollo Reach hospitals were located in the less developed areas in India, known as Tier II cities.

In order to serve the patients living in these Tier II areas, who are mostly poor, Apollo Reach had to ensure that their services were affordable to this population. The cost of treatment was 20-30% less than other Apollo hospitals and other major hospitals (International Finance Corporation, 2012). The facilities were smaller, basic and offering a limited number of services in comparison to the other Apollo Hospitals serving the urban areas. The limited number of tertiary services provided at Apollo Reach includes cardiac, oncology, neurosurgery, radiology and other specializations.

In order to incentivize good physicians to the Apollo Reach hospitals in the rural and semi-urban areas, which is usually a challenge, Apollo offers a fast-track career which gives doctors more responsibility and offers quicker promotions if they work at any of the Apollo Reach hospitals. Due to Apollo’s network across India, employees know there are opportunities at other hospitals once they’ve completed a rotation at the Reach hospitals.
To make healthcare affordable to low-income patients, Apollo Reach hospitals treat both low and high income patients. The higher fees paid by the wealthier patients help make the hospitals profitable for the Apollo Hospitals Group. The cross-subsidization between high and low-income consumers provides affordable health services to the poor.

Also, the founder of Apollo, saw that if patients and healthcare workers in one region could consult experts in another region without having to travel physically, there would not only be better utilization of resources, but also a better proliferation of awareness to prevent the increasing disparity in access to healthcare for Indians. The rationale was that, if low skilled health workers could be trained to undertake more complex jobs without the expert doctor or health professional residing or physically travelling to the site for training, there would be an increase of human resources available to cater to the skills gap in the demand and supply of healthcare in the remote areas. With telemedicine available at all Apollo Reach hospitals, patients no longer have to travel long distances for a second opinion or wait for weeks before they can meet a specialist doctor. Apollo decided to bridge this gap through the use and adoption of Information and Communication Technology (ICT) to deliver health services far and wide. Today, Apollo runs the oldest and largest multi-specialty telemedicine network in South Asia.

3.1.3 Innovation and Technology that Enhanced Healthcare Access to the Poor

In 1999, the Apollo Hospital Group set up the Apollo Telemedicine Networking Foundation (ATNF), a not-for-profit, for the purpose of implementing the telemedicine project as a cost-effective method for healthcare delivery for those in areas with little to none medical expertise available. ATNF focuses on giving remote consultations and second opinions to both patients and doctors, for whom due to distance and spiralling costs, access to quality healthcare is difficult. Tele-camps are set up to enable a specialist to see several patients back to back.

Apollo Telemedicine Networking Foundation saw the adoption of Information and Communication Technologies (ICT) as the most effective way to accelerate the bridging of the demand supply gap in India, without physically shifting the resources. It is able to electronically connect the citizen to the care provider residing in different localities and also accelerate generation of additional resources with various levels of competency.

3.1.4 ICT Overview in India:

India had a teledensity of 36% in 2009 and a four-fold increase in the use of mobile phones over land lines and by 2012 there were over 200 million telephones in rural India. The availability of telecommunication infrastructure in rural India was increasing, with a 13% teledensity achieved by 2008, which was much higher than the availability of doctors and nurses in the rural areas (International Finance Corporation, 2012). Recognizing this, both the public and the private sector providers realized that telemedicine could possibly be the solution to bridge the gap in health services between the wealthy who have access to healthcare and the poor who cannot afford the services (Ganapathy, 2004).

3.1.5 Telemedicine

ATNF since its inception in 1999, has set up telemedicine centers across India conducting well over 57,000 consultations in the first ten years. ATNF utilizes telemedicine using appropriate hardware, software, and peripheral medical devices, to examine, investigate, monitor, and treat, with the patient and the doctor physically located in different places. Using Broadband Internet, Integrated Service Digital Network (ISDN) lines or Very Small Aperture Terminal (VSAT), audio files, text data, images, and video can be transmitted (Ganapathy and Ravindra, 2009). Through ATNF’s custom made, web based software, Medintegra, used by the peripheral centres in the network, the Apollo Reach hospitals were able to transmit electrocardiograms (ECGs), X-ray, MRI, ultrasound and CT scan images. The videoconferencing camera is placed directly on the images and the consultant views the images at the tertiary center.
The operational process at an Apollo Telemedicine center is as follows:

The office assistant ensures computers and video conferencing equipment are in working condition by 8:00 am. Scheduled tele-consultations are checked and noted on a white board in the order of the appointments. Most consultations take place between 1:00pm-5:00pm. Facilities are set-up such that three simultaneous tele-consultations can take place. For review tele-consultations, medical case records are obtained from the Medical Records Department and prior consent of all those involved in the tele-consultation process is taken. All tele-consultations are recorded manually in the medical records but Apollo is working towards using Electronic Medical Records (EMR) in all tele-consultations. If the ATNF’s web-based software cannot be used, prescriptions are sent as an e-mail or faxed to the remote end, where a printout is handed over to the patient. To ensure privacy, only the tele-consultant is present at the telemedicine centre but at the remote end, relatives or the telemedicine administrator need to be present sometimes to facilitate language translation. All tele-consultations are recorded and stored in a secure computer.

The cost for a tele-consultation ranges between £13-19 and the cost covers the cost of transmission, costs incurred at the peripheral services while rendering the tele-service, costs at the specialist end and the consultant’s professional fees. This cost is significantly cheaper relative to minimum of £64 -160 the amount the patient would have to pay if they physically visited a hospital and incurred travel and accommodation costs (Ganapathy and Ravindra, 2009). However, it is important to note that a lot of the IT backbone infrastructure were made available through partnerships. Apollo on some of their telemedicine projects partnered with the Department of Space, Government of India and the Indian Space Research Organization (ISRO) to use VSAT to provide quality healthcare to Indian villages. The VSAT and the videoconferencing system were provided by ISRO while Apollo provided the tele-consultations, either for free for those who were unable to afford the services or at the cost of US £13-19 for those who could afford. The long term sustainability of Apollo’s telemedicine project without subsidies or contributions from the government, particularly with the backbone infrastructure to ensure necessary connectivity remains unanswered as the current platform runs as a not-for-profit.

3.2 Aravind Eye Care Centre

Aravind Eye Care Centre (Aravind) is the largest eye care and most productive eye care provider in the world. It comprises a network of five tertiary care hospitals, five surgical centers, six community eye clinics, 42 primary eye centers, two managed hospitals, a training institute, an eye bank, a research lab, drug and eye care equipment manufacturing company (Aurolab), and an international training facility (Lions Aravind Institute of Community Ophthalmology) which consults and trains eye hospitals in other developing countries.

Aravind was established in 1976 by Dr. G. Venkataswamy (popularly known as Dr. V) as a not-for-profit with a mission “to eradicate needless blindness by providing appropriate, compassionate and high quality eye care for all.” Aravind has pioneered many process innovations that have reduced the cost of eye treatment substantially and has enabled their organization to profitably deliver world-class eye care to both poor and rich alike. Despite, being a not-for-profit organization, sustainability was at the core of Aravind’s concept from the onset, whereby the hospital would provide services to paying and non-paying patients, yet be financially self-sustaining.

3.2.1 Critical Demand

India is home to 12 million blind, a quarter of the world’s blind population of which 75% of the cases resulted from cataracts which can be corrected with simple a surgery that many Indians cannot afford (Forbes, 2010). Though cataracts are the leading cause of blindness in India, glaucoma and diabetic retinopathy are also prevalent (Northeastern University, Social Enterprise Institute, 2010).
3.2.2 Business Model

Approximately 70% of eye surgeries at Aravind are conducted for free or below cost, while 30% are performed above cost without compromising on the quality of eye care delivered on either side of the price range. The cost for the poor, which typically includes a two-night stay at the hospital and medication for a month, is 750 rupees (£10) mainly to cover the cost of the lens implanted in the eye. The same or similar procedure in the other section of the hospital that caters to wealthier individuals could be as high as £636 (Porter and Thomas, 2013). The price differential is largely to do with the type of lens inserted in the eye and categories of admission rooms. Patients who are unable to pay for their surgery are given basic hard lens and stay in a general ward with other patients with a mat on the floor while paying patients have the option to choose from a menu of soft lenses and other categories of rooms.

Aravind is not dependent on donors, its highly efficient operations coupled with its pricing structure allow the hospitals to maintain significant profit margins primarily through their revenue. In 2010, Aravind had a net profit of £8.3 million on revenues of £18.5 million (Forbes, 2010).

Despite increased interest from donor organizations, Aravind does not plan on compromising the current model, which has proven sustainable. Aravind also makes investments into educational and training programs especially designed to teach people with minimal skills from a wide range of backgrounds.

3.2.3 Innovation and Technology that Enhanced Healthcare Access to the Poor

Several factors have been attributed to Aravind’s success in serving poor rich and poor health consumers. Some of Aravind’s innovations and use of technology that has facilitated their delivery of care to the poor include:

3.2.4 Process Engineering and Standardization

According to Dr V, the fast food chain, McDonald’s, core competency is efficiency and mass production, leading to a business that is both highly scalable and replicable. Aravind attained operational efficiency by setting up two surgical stations side by side, with the surgeon positions between both tables, assisted by a swiveling microscope and two sets of paramedics. For each patient, there is a nursing paramedic who hands over the sterilized instruments and implants to the doctor, focuses the microscope and bandages the patient. There is a second nurse, referred to as the running nurse, which replaces all the used surgical instruments with sterilized ones and wheels the patient in and out of the operating theatre. With the aid of these two assistants, the Aravind doctors are able to briskly perform operations within ten to twelve minutes of each other, completing about five surgeries in one hour, compared to the average eye surgeon who would perform one or two within the same hour with an assistant nurse (Govindarajan and Ramamurti, 2013).

While the process innovations here does not directly increase access to eye care for the poor, it indirectly does so, as the high operational and efficiency levels attained, allows Aravind Hospitals to cater to high volumes of patients, which ultimately allows their cross-subsidy model to work as two-thirds of the patients are non-paying. In the absence of such engineered processes, Aravind would struggle to attain such high productivity levels and as a result serve the poor.
3.2.5 Telemedicine

In an effort to reach 70% of India’s population that lives in rural areas, Aravind’s administrators came up with the concept of establishing village vision centers where patients could receive basic eye care backed up by online videoconferencing with doctors at the hospitals. The concept of telemedicine was not as successful as it could have been at inception as there were no Internet service providers in some areas, and in areas where there were providers, service was not only very expensive, but it was too slow for effective videoconferencing, with typical dial-up speeds of 35 kbps (University of California, Berkley, 2006).

Subsequently, Aravind partnered with researchers at the University of California, Berkeley, and an Intel Corporation in 2006 to develop a new technology for low-cost rural connectivity. This telemedicine project was based on “Wi-Fi” wireless networks in order to allow eye specialists at Aravind interview and examine patients in five remote clinics, also known as vision centers across the state via high-quality video conference. Regular wi-fi has a connectivity range of about 200 feet, which makes it ill-suited for long distance networking, which led to the development of the UC Berkeley team to develop the software to overcome the limitations.

*"Historically, though, most projects have been either too expensive or too technologically complex to be used in poor, rural areas. What we’ve done here is develop a simple, inexpensive software and hardware system that can provide villages with a high-bandwidth connection to computer networks in cities as far as 50 miles away.”*  

Eric Brewer - UC Berkeley Professor of Computer Science and Director of the Intel Research Berkeley lab

The speed of this technology is about 100 times faster than dial-up speeds and carry 100 times as far as regular Wi-Fi. The technology allows anyone with about £510 for a pair of small computers with directional antennas to network with another location within 50 miles and in line of sight. If there happens to be a hill in the way, a couple more antennas at the high spot can relay the signal between stations. Once the main hospital facility within 50 miles has high-speed networking and the initial system installed, there’s a little ongoing cost of operation which requires little power and can also run off solar.

Each rural vision center is staffed by a single nurse trained in eye care who uses the UC Berkeley designed computer network and attends to the patients first, then spends about five minutes on a web camera consulting with an Aravind doctor. Upon examination via teleconference, if the Aravind doctor determines that a closer examination or surgery is required, the patient is given a hospital appointment. This was first set up at the Aravind Hospital in Theni, in the state of Tamil Nadu, with high speed links to three vision centers (rural clinics), who see/screen an average of 1,500 patients each month.

At the vision centers, patients are able to receive glasses, medicine or remote diagnosis for serious problems that would have otherwise required hospital appointments. Approximately 5-10% of the patients, which is an estimated 100 people monthly, experience significant improvement in their sight (ibid).

The UC Berkley team installed the first long-distance Wi-Fi system in a vision center in the village of Ambasamudram, about seven miles from the Aravind hospital in Theni. The following two vision centers where the system was installed was done jointly by the Berkley team, Aravind and local vendors while subsequent installations have been done solely by Aravind staff and vendors with no assistance from Berkeley (ibid).
3.2.6 Other factors Enhancing Delivery of Healthcare to the Poor

3.2.6.1.1 Task-shifting/ Training Lower-Skilled Personnel

Aravind transfers routine tasks to lower-skilled personnel who have been properly trained to undertake preoperative tasks and serve as assistants to the surgeons and doctors, who as a result are able to focus solely on their areas of technical expertise. Aravind has trained village girls (some of whom only have high school diplomas), to become ophthalmic paramedics; they constitute 64% of Aravind’s workforce and perform tasks such as admitting patients, maintaining medical records, and assisting doctors. Strict division of labour and development of new specialized roles have contributed to reduced costs for providing quality eye care at Aravind.

3.3 Narayana Hrudayalaya (NH) Hospitals

Narayana Hrudayalaya (NH) was founded in 2001 in Bangalore, India by Dr. Devi Shetty, a renowned cardiac surgeon to provide quality cardiac healthcare to the masses and has since become Asia’s largest cardiac center and attracts patients from almost eighty countries. The Bangalore hospital has grown to a 1,000 bed facility with advanced technology and doctors performing an average of 30 surgeries a day and a maximum of 60 surgeries a day in its 24 operating theatres — the highest number of cardiac surgeries performed by any hospital in India (Cawston, 2011; University of Pennsylvania, 2010). NH is a multi-specialty hospital, currently running 5,500 beds across 14 hospitals in 11 cities offering, not only cardiac care and surgery, but other specialized care such as paediatric surgery, oncology, neurosurgery, nephrology, haematology and transplant services among others. Dr. Shetty and his management team came up with the ‘Health City’ concept, a 2,000-5,000 bed cluster of multi-specialty hospitals on a single campus (Sociovigil, 2013).

In India, around 2.5 million people require heart surgeries every year but all of the country’s doctors put together perform only 80,000 to 90,000 surgeries a year (University of Pennsylvania, 2010). There was an obvious un-met demand for cardiac care which Dr. Shetty decided to fill through his vision to deliver very high quality cardiac care at a relatively low cost through economies of scale and specialization. Typically, heart surgery in India cost between £3,180 and £4,450. The cost could go much higher depending on the complexity of the surgery and hospital stay after the procedure. At NH however, cardiac surgeries cost approximately £1,900, regardless of the complexity of the procedure or hospitalization length (ibid).

3.3.1 Critical Demand

Cardiac diseases in India is higher than most countries as Indians are at a higher genetic risk (IPIHD, 2007). Indians are generally three times more susceptible to heart attacks than Caucasians and India accounts for 45% of the world’s incidence of coronary heart diseases (Cawston, 2011). Despite this need for cardiac services, prior to NH, there were no options for the majority of Indians who are poor to access cardiac care as the government hospitals did not have enough capacity to provide care for the large volume of patients and private hospitals were often too expensive for the majority of Indians to afford.

3.3.2 Business Model

45% of NH’s patients pay less than £1,900, of which about 30% are covered under a micro-insurance plan for healthcare called Yeshasvini, a state wide insurance scheme in the state of Karnataka for rural farmers that reimburses NH with an estimated £765 per surgery (University of Pennsylvania, 2010). For those who have no medical insurance coverage and can’t afford to pay the regular hospital charges, NH offers concessional rates. The discounted rates are dependent on the patient’s financial capability and are either funded by NH’s charitable trust, individual donors or the hospital itself. An estimated 15% of NH’s patients are said to benefit from these concessions.

NH also has a hybrid pricing system model in place similar to that of Aravind’s cross subsidy, where the cost paid by wealthier patients who use the upgraded hospital services such as the semi-private and private hospital wards, pay up to £2,550/£3,180, which is used to offset the losses incurred by the lower or non-paying poor patients (ibid). Approximately, 20% of the hospital wards are built to serve this non-paying group, however the quality of medical care received by both the wealthy and poor patients remains the same.

Financial management is a core component of NH’s business model whereby clinical administrators and doctors are held accountable for the costs and quality of care. Every day, at noon, every doctor and
3.3.3 Process Innovation versus Product Innovation

NH is convinced that the healthcare industry requires process innovation over product innovation, improvements to lower the cost of medical attention and make it more widely available has been of prime importance. NH has been focused on bringing unit costs of healthcare delivery to the lowest possible point without compromising on quality. The leadership team is determined to further reduce the cost of cardiac surgery which ranges between £955 (average cost for open heart surgery) and £1,900 to £510 from point of admission to point of discharge by 2020, a goal which NH believes is possible through continuous process re-engineering to improve efficiency, productivity and economies of scale (Business Today, 2014; Govindarajan and Ramamurti, 2013; Forbes, 2013).

NH has focused on delivering low cost, high productivity healthcare through different methods:

Workforce Productivity: One of the ways NH has achieved its successful low cost healthcare delivery, has been by maximizing work force productivity, for both the surgeons/ consultants and the lower skilled staff. Surgeons undertake 70-100 consultations a day and an average of 4 operations daily, six days a week, tallying 24 procedures weekly (Cawston, 2011; Business Today, 2014). Key to the high level of outcomes at NH is harnessing the competitive nature of doctors. The hospital administrator monitors the transparency of outputs and outcomes for each surgeon and is open for all colleagues to see. Also, the waiting times and outcomes for operations are measured for each surgeon which creates some form of peer pressure and drives the staff towards constant improvement.

Compensation Structure: Typically, cardiac surgeons are paid per procedure and their costs substitute a significant portion of the hospital’s expenses but at NH, the doctors are paid fixed salaries amounting to the Indian average, though they work to a much higher level of productivity. And because the surgeons work on a fixed salary instead of per operation, the cost to the hospital drops per procedure as the number of procedures increases.

Work Teams: Also, to complement the compensation structure at NH, the management leveraged how best to use the hierarchy of medical talent to optimize surgical procedures. Doctors operate with a team, comprising of a specialist, junior doctors, trainees, nurses and paramedic staff. A cardiac bypass surgery typically takes five hours but the specialist only partakes in the critical part which is grafting the bypass. Other aspects of the surgery such as suturing, harvesting of arteries/veins, opening and closing the chest - is done by junior doctors, while the preparation of the patient is done by the nurses and paramedic staff. This frees up the specialist doctor to do more surgeries per day, thus bringing down the cost per surgery and also improves the doctor’s skill as well as reduces errors as they perform these surgical procedures repeatedly (ibid). The NH group conducts 150 major surgeries daily and approximately 12% of all cardiac surgeries in India are performed at NH hospitals, with almost 50% of its patients being from economically disadvantaged groups (ibid).
3.3.4 Equipment and IT Infrastructure

While NH has top of the line hospital equipment and machines, their model is to ensure frugality by adopting an ‘asset light’ strategy. NH does not buy all its equipment but leases some on a pay-per-use basis, thus keeping capital costs low.

Given NH’s volumes and track record, its management have been able to convince equipment vendors not to sell their equipment but yet recoup their costs and make their profits through different ways. For example, the management was able to get the vendor for a blood gas analysis machine to simply park the equipment at the hospital and make their money by selling the chemical reagents required for the test. The hospital saves on the cost of the machines while the vendor profits from the sheer volume of chemical volume sales. Another vendor parked their catheterization laboratory equipment at the hospital free of charge because the vendor wanted to use NH as a referral, with the idea that if he can show that the equipment can cope with the patient volumes at NH, it can work anywhere. Thus, confirming how the increasing volumes have helped lower costs in many ways (ibid).

NH hospitals moved to the usage of digital X-ray technology in order to save on the recurring cost of film for conventional X-ray machines. Also, while most hospitals use their expensive equipment such as CT or MRI scanners for only eight hours daily, NH uses them for 14 hours and offers these tests to patients at lower rates at night. As volumes increase, per unit cost naturally come down, further expanding their reach to those in low-income groups which constitute the majority of India’s population (ibid).

**IT Infrastructure:** As part of a cost reducing strategy, NH tries to adopt technology to smoothen information flow and hence decision-making. NH is one of the few hospitals globally that produces a balance sheet on a daily basis using an Enterprise Resource Planning (ERP) software, which stores all the Group’s financial details. Both senior doctors and administrators get an SMS on their mobile with the previous day’s revenue, expenses, and profit/loss margin to serve as a diagnostic tool to inform remedial measures as concerns their productivity. Information such as how many days the patient stayed at the hospital before the operation, how many days in the ICU, how many days post-op, and what the cost of material used for the operation is easily accessible to the aforementioned using their IT infrastructure (Kaleebullah, 2013). Though heavy investment was made into NH’s IT infrastructure, it was worth the investment as it has enabled them reduce the cost of their healthcare delivery by improving productivity and efficiency of their operations.

NH also has a complaint management system (CMS) that keeps track of all the problems each of the 17 hospitals spread across India faces on a daily basis. The CMS system registers complaints daily and patients are encouraged to give feedback on the service received. Initially, when the system was set up, NH received an average of 200-300 complaints daily, this number has since reduced to 60-80 complaints (ibid). The accessibility to this information gives management an indication of how operations are going at each hospital and informs them where to focus their attention.

3.3.5 Telemedicine

NH used IT-infrastructure to scale up access to healthcare especially in the rural areas as rural healthcare is a challenge everywhere primarily due to cost of setting up and paying for healthcare.

The NH hospital in Bangalore, the Indian Space Research Organization (ISRO) and the state Government of Karnataka partnered to kick off a telemedicine project, whereby medical experts in urban areas reach out and provide support to other medical practitioners on daily and severe illnesses in both rural and semi-rural areas. The objective of the project was to alleviate and eventually eradicate the cost and burden of travelling on the poor during heart and related illnesses. It also helped to overcome inefficient health delivery in the rural places. By creating a forum to establish or enhance a doctor’s exchange program where less experienced practitioners in the rural areas have links to learning opportunities, the patients have more relevant referrals while improved exposure and synergy amongst professionals is easily achievable.
Dr Devi Prasad Shetty set up nine Coronary Care Unit (CCU) whose main thrust is to offer cardiac care to the rural poor. With the use of telemedicine, each CCU has beds, medications, computers, electrocardiogram (ECG) machines, video-conferencing devices and technical staff trained to operate them. A standard process flow would go as follows: a patient visits a CCU, the GP takes the ECG scan which is immediately transmitted to a specialist at the hub NH hospital. The patient and the GP are both presented to the specialist who diagnoses and treats the patient alongside the observation of the medical staff at the CCU.

There are two categories of beneficiaries at NH hospitals, free patients and paying patients. The first categories are those who are below the poverty line and are entitled to free diagnosis, free medicine and free treatment. The other larger category, pay for their services some of which are insured and others pay from their pocket (IDPAD Case Study). The process for admitting a cardiac patient to a CCU linked to a telemedical centre is a series of referrals. First the patient visits the health sub-centre and is then:

- Referred to PHC
- Referred to the District Hospital
- Patient is admitted into CCU
- General Physician investigates
- Consultation with experts through telemedicine through connectivity

NH partnered with the state government of Karnataka on a specific telemedicine project to increase healthcare access to poor people using technological advances at affordable rates. The project linked NH’s hospital in Bangalore, Karnataka’s state capital, to a public local hospital in the state’s peripheral town of Chamarajanagar, 300km from Bangalore. This Chamarajanagar District Hospital project was one of several coronary care units (CCU) across India that were linked to the NH multispecialty hospital through the internet and telephone lines.

### 3.3.6 Case Study of Chamarajanagar District Hospital’s Coronary Care Unit

Chamarajanagar, is one of the most underdeveloped districts in the state of Karnataka. Before the introduction of telemedicine, the Chamarajanagar district hospital had no facility to deal with emergency cardiac situations. The Hospital had 70 beds, 15 doctors and the capacity to treat over 250 out patients a day. The hospital had facilities for general medical and surgical treatments, yet patients with any emergency cardiac condition had to travel at least 60 kilometres to Mysore for treatment, thereby losing the 6 crucial hours after a heart attack when a blood clot can be broken down and the life saved. Through the telemedicine project, NH through its support by ISRO was able to extend its tele-cardiology consultations to patients at the Chamarajanagar district hospital and also established a network of physicians.

NH provides specialist doctors such as cardiologists, pulmonologists, paediatricians and radiologists among other specialists for tele-consultations. Before the introduction of tele-medicine in Chamarajanagar, the district hospital had no facility to deal with cardiac emergencies.
Chamarajanagar’s CCU has two medical officers (each with at least MBBS qualifications) who trained at NH’s Bangalore hospital for three months in cardiac care, then were selected by NH. Two staff nurses are appointed by the state government’s health department, four graduates of science and commerce who have trained as tele-medicine assistants and re the backbone of the telemedicine facility. Three housekeeping staff area also trained to care for all the supportive needs that are non-technical and the facility also has one ambulance driver. This staffing is similar to what exists at other CCU’s across India (ibid).

The Chamarajanagar district hospital had a wide range of facilities such as out-patient departments, in-patient wards, intensive care units, general medicine, paediatrics, obstetrics, gynaecologist, orthopaedics, ENT and eye, surgical theatre, ultra-sound, x-rays and radiologists, microbiology, a pharmacy and an ambulance. The 250 bed hospital has well maintained infrastructure and its 60 staff including 15 medical doctors provide secondary care services to rural people (ibid). As a result of the tele-medicine project, this district hospital is now able to do daily cardiac checks and provide treatment. Using telephone lines, the physician network in the Chamarajanagar district are networked with NH for early diagnosis of heart attacks. The patient is referred by the medical officer to the CCU with preliminary investigations. The investigation report and patient’s details are sent electronically to the doctors at NH for review, followed by tele-conferencing. If possible, the patient can be treated at the CCU and for cases needing surgery, the patient is referred to NH at Bangalore.

3.3.7 Business Model: Public-Private Partnership

Chamarajanagar CCU was constructed within the district hospital and staffed by NH with the exception of two nurses. The government supplies water, electricity, telephones. The telecommunication (VSAT equipment) was set up also by the Indian Space Research Organization at no cost. It would otherwise have cost around INR 15 lakh (£15,480) for a 385kbs line. Computers and tele-conferencing unit were given by NH in association with ISRO free of charge. The bulk of the cost for technology oriented services goes on software. NH has developed its own software which is given to the general practitioners, hospitals or charitable organisations free of charge. Capital expenditures to establish the facilities and satellite links were borne by the state government.

Sustainability

The whole contexts of telemedicine-based medical care in rural and distant areas are highly cost effective once equipment has been installed. Sustainability therefore is largely dependent on the maintenance of equipment and upkeep of the CCU facility which includes consumables, medicines and staff salaries (if not government employees). Chamarajanagar CCU levies user charges for telemedicine services which exclude consultation and the doctor’s fee. While, compensation for the medical staff was not covered, ensuring the medical staff at both the district hospital and specialty hospital are compensated for their service and time were examined. This was done in order to establish a sustainable revenue earning model is imperative to work out what fee charged these poor patients is affordable.

3.3.8 Other factors Enhancing Delivery of Healthcare to the Poor

3.3.8.1 Partnerships

NH hospital has major partnerships with the private and public sector organizations. NH has a partnership with Biocon Foundation where they set up a generic drug shop where it sells drugs twenty to thirty percent cheaper to its members. There are microinsurance schemes between NH and the Government of Karnataka (Yeshasvini) and Tamil Nadu etc., which work on flexible payments and have helped thousands of low-income Indians procure quality healthcare services at NH hospitals. Apart from these partnerships, the hospital thrives on innovation-based partnerships, such as the one with Texas Instruments. NH and Texas Instruments teamed up to drive down the cost of equipment’s such as X-Ray plates (the cost was brought down from £5,200 to £190) (Next Billion, 2011).
3.3.9 **Investment towards Training and Development**

NH invests in training, skilling and providing their staff with education to increase efficiency and productivity, thus ensuring quality care delivery. NH has post-graduate programs for doctors which are approved by the National Board. There is also training available for technicians and paramedics which are conducted year-round. And for nurses, there are regular skills training programs, held in conjunction with the Nursing Council and a local university (Narayana Health, 2014).

3.3.10 **Low Cost Building Model/Design**

NH's Mysore Hospital was designed and built at a cost of Rs 18 lakh per bed (approximately £18,450), when the thumb rule cost of a similar hospital is Rs 40-50 lakh (£41,000 – 51,300). Some of the features of NH's construction model is the building on pre-fabricated structure, limited to a ground floor structure to minimize costs and architectural design that allows for maximum use of daylight to reduce cost electricity consumption (ibid).

3.4 **CARE Hospitals**

CARE Hospitals (CARE) is one of India’s largest hospital chains engaged in providing both primary and tertiary healthcare services. CARE started as a 100 bed facility offering cardiac care in Hyderabad, but has since grown to over 2,000 beds across 15 hospitals in 6 states (CARE Hospitals, 2014). This multi-specialty healthcare provider was established in 1997 by a group of doctors who worked at public health facilities and were disgruntled by the bureaucracy. As a result, they decided to improve healthcare accessibility by providing world class quality healthcare at an affordable price for India’s middle and lower income groups. Though CARE began with cardiology and it remains a focus area, the hospital also provides other specialties such as neurosurgery, urology, orthopaedics and neurology.

Similar to NH Hospitals, CARE Hospitals illustrate how Indian healthcare providers have focused on a particular high-demand service, built a large capacity to provide that service at an affordable cost, and developed a variety of organizational innovations to support its business model. Their operational model revolves around strategic cost control and all care has been developed to meet a specific price-point (Kumar, 2011).

3.4.1 **Business Model**

Similar to Aravind Eye Centre model, CARE has deployed what it calls a “multi-tariff system” for the provision of healthcare services where the hospital charges patients in higher income groups, higher fees. This system enables the hospital to cater to multiple segments of the Indian population. The tiered pricing model allows the organization to provide services with minimal margins or below the full cost to almost 75% of its patients. The price variance occurs mainly on capital costs and also on services/amenities whilst limiting fixed costs. Therefore, patients can pay more to enjoy additional amenities and comforts such as private wards but the technologies and skill utilized for procedures are the same for all patients as all patients receive the same quality of healthcare (ibid).

One of CARE’s major success factors has been in its ability to keep capital expenses to the barest minimum. This model is largely based on their decision to lease space and property, instead of outright acquisition. CARE typically undertakes under-utilized facilities (e.g. lease under existing hotels and hospitals) and makes incremental investments into these buildings by modular expansion of the facilities rather than construction from scratch (ibid). CARE’s strategy includes locating their facilities on the periphery of urban areas in cheaper real estate markets thus making positioning them closer to its targeted lower and middle income group.

Most hospitals in India achieve profitability in the first three to five years, but CARE’s capital efficiency model has consistently helped it attain profitability at each facility within the first year of operations. CARE’s financial sustainability is largely dependent on its high volume and the multi-tariff system. 25% of care is provided below the full costs but above the variable costs, 50% of care is provided close to the full costs and 25% of care is provided with margin (Krishna, 2008). The overall patient mix consist of 25% low income patients, 50% middle income and 25% higher income earners (Kumar, 2011).
The price variation enables the hospital to serve large volumes at lower costs and as a result attracts a large number of people with limited incomes whilst maintaining the quality of service.

3.4.2 Innovation and Technology that Enhanced Healthcare Access to the Poor

3.4.2.1 Reverse Engineering

CARE works within a fixed pricing scheme, whereby once a target market price has been set for a service, the hospital ensures they derive an appropriate cost structure to provide the same service at a lower price without compromising on quality. The low cost strategy is sustained by continuous evaluation of the cost drivers for services which inadvertently puts pressure on the market to develop new and improved approaches to delivery of the service.

Another major strategy CARE uses to achieve its objective of lower costs is “de-skilling”, where the functions of highly trained personnel are repackaged and assigned to lower skilled personnel. Similar to the task shifting models adopted by other Indian healthcare providers like Aravind Eye Centre and Narayana Hospitals, CARE optimizes the skills of their highly trained staff by allowing them to focus on higher-skill functions while more routine tasks are carried out by those with less formal education or training. Cheaper labour substitution enables CARE to further cut costs when possible which also addresses the problems associated with shortage of skilled staff. CARE has also found that less skilled personnel are easier to retain, especially when they have additional responsibilities to their conventional tasks.

3.4.3 Continuous Efficiency Improvement: Use of Equipment and Supply Chains

CARE Hospital attempts to reduce the cost per unit of healthcare delivery by increasing efficiency of their clinical and administrative operations. Similar to other Indian hospitals focused on improving efficiency, optimizing the use of capital equipment has been a strategy commonly adopted. At CARE, the equipment in the radiology department is used continuously in order to limit any down time of the expensive equipment. During the day, outpatient appointments are conducted while in the evenings radiology for inpatients are conducted.

There is also a lot of emphasis on achieving efficiency along the supply chain. CARE ensures it gets the best value for money when procuring materials and equipment without compromising on quality. For non-critical equipment e.g. computer monitors, CARE conducts cost comparisons with lower priced equipment from cheaper sources such as China, with more expensive global brands. Once the equipment meet CARE’s internal quality standards, these lower costing equipment are deployed across all its hospitals.

In the same vein to increase efficiency and lower costs, CARE Group which includes CARE Hospital and CARE Foundation, established Relisys, a manufacturing subsidiary focused on commercializing indigenous technologies and machinery. The ability to self-manufacture its own medical equipment has been cited as one of its critical enablers in achieving significant cost reductions for both the organization and its patients. Relisys started by manufacturing routine equipment (e.g. intravenous lines, catheterization guide wires) and over time after extensive research progressed into manufacturing more technologically advanced equipment such as coronary stents. The ability of CARE to self-manufacture medical equipment has played a key role in facilitating innovation and cost reduction.

3.4.4 Information Technology Solutions and Telemedicine

As previously established, a major challenge in rural India is the availability of trained doctors, especially specialists. CARE adopts an integrated healthcare delivery model, in its bid to extend its reach to patients across urban as well as rural areas in India. CARE runs primary health centers in rural areas and urban clinics.

CARE Foundation started the Care Arogya Kendra program in 2008. Under its Rural Health Mission (RHM), they deliver healthcare to 50 villages using a community-based, technology-leveraged outreach model where grassroots community workers are trained as “Village Health Champions” (VHCs) and equipped with hand held devices, enabling doctors at district-level hubs to remotely attend to the patient in the village. These trained workers gather primary data and relay the patient’s information to the appropriate medical personnel who may be several miles away. Technology platforms are used to provide the VHC’s with health information, guidance on medical evaluation, remote interpretation of echocardiographs and scans, as well as direct access to healthcare personnel to offer further consultative services in real time. The technology
platform averts the need for travel to a clinic and indirectly helps reduce the patient’s expenditure. When a patient requires greater medical attention, they are referred to the CARE Arogya Clinic located at Yavatmal for further consultations and treatment or to CARE hospitals at Nagpur and Hyderabad, for specialty and super specialty care, respectively (Center for Health Market Innovations, 2014). Currently, more than 65% of primary care treatments are addressed at village level by health workers through remote doctor support and 35% are treated at referral primary health centers.

CARE Telemedicine Model
The programme is run through a rural, hub-and-spoke model, with a central primary care clinic and telemedicine-based decision support system (DSS) at the back end supporting a network of CHWs (who also sell insurance). The CHWs are connected to the doctor at the primary clinic through two possible channels, a mobile phone or a hand-held-device (HHD), which support telemedicine-based consultation and medicine provision. The CHWs also sell preventative health-care products, such as mosquito nets, soap and water-purifying tablets, in their village.

CARE’s telemedicine system is also used for daily video conference among all facilities, allowing the hospitals to share data and analyze deviations from internal benchmarks.

3.4.5 Other factors Enhancing Delivery of Healthcare to the Poor

3.4.5.1 Management Structure: Physician Leadership

At CARE, just as is the case in many of India’s innovative healthcare institutions, management is made up of physician-executives. Most of the hospitals initiatives are physician led which empowers physicians to be a part of the management decisions. The management actively seeks input from doctors in matters of strategic management and administrative issues such as policies and plans in order to boost commitment and ownership. This is similar to NH Hospitals where doctors receive daily profit and loss statements, so they have a better understanding of how their actions ultimately affect the final cost of care delivered.

3.4.6 Service Management

CARE employs engineers to drive data management systems across the different facilities to enable real-time monitoring of data for the purpose of tracking and benchmarking costs of care per patient, per service or by another parameter. Variations in expected costs are collected as data, evaluated and continuously refined to ensure lower costs are maintained (Barak, Krishna et al, 2008).
4 Comparative Analysis of the Case Studies

All the four hospitals presented in the case studies above, Apollo Hospitals, Aravind Eye Care Centre, Narayana Hrudayalaya and CARE Hospitals are all for-profits healthcare providers with not-for-profit organizations that conduct specific activities, such as research and the implementation of their telemedicine operations, which is the case in all four hospitals. One of the hospitals, Aravind, focuses on a single specialty, while the other three are multispecialty institutions. These institutions also operate as academic centers integrating clinical research with delivery of their healthcare services. In order for these four hospitals to deliver on their dual commitment to high quality and ultra-low cost care, they have mainly focused on innovations around organizational processes through their use of technology.

Each of the four cited Indian hospitals in this paper are able to deliver quality care comparable to western countries like the UK and the US, even though in some cases they charge as much as 95% cheaper than their US counterparts (Govindarajan and Ramamurti, 2013). NH has a mortality rate of approximately 2%, 1.4% mortality rate within 30 days of coronary artery bypass graft surgery, compared with 1.9% in the US (Anand, 2009). According to the European Association for Cardio Thoracic Surgery the mortality rate for England was 1.8%, while the European average is 2.4% (European Association for Cardio Thoracic Surgery, 2010). Apollo Hospitals have recorded better outcomes than international standards for complications associated with orthopedics, coronary and prostate surgery (Govindarajan and Ramamurti, 2013). Aravind has performed better than most Western hospitals with infection rates of 4/10,000 cases, while the UK published rate was 6/10,000 (Cawston, 2005). Organizational advantages common through all four hospitals include:

4.1.1 Hub and Spoke Model

All four hospitals in the study started by establishing urban hubs where specialist doctors, high quality talent and sophisticated C place. In these Indian hospitals, the spokes are mainly used for diagnosis, routine treatment, follow-up care, while more complex procedures and surgeries would take place at the hub. The hospitals are able to keep costs low by not duplicating the equipment, specialist doctors and range of services at the spoke.

The hub and spoke approach is further fostered by the use of technology, telemedicine specifically, as it allows remote delivery of healthcare by computers, cameras and telephones. Therefore allowing doctors in the hub to serve and treat patients at the spoke clinics. The exceptions are in cases that are too complex for the spoke to handle and need to be transferred to the hub. Either way, the cost of healthcare is lowered, as there is no wage lost during time away from work and transportation costs are minimized or removed completely.

The hub and spoke organizational process helps creates large volumes by reducing barriers to treatment. Narayana Hospitals and Aravind Eye Centers conduct more open-heart surgeries and eye surgeries respectively than any other hospital worldwide. At NH, surgeons perform an average of 400-600 procedures annually compared to 100-200 in the US, while Aravind doctors perform 1000-1,400, compared to an average of 400 in the US (Govindarajan and Ramamurti, 2013). Repetition of procedures by the surgeons improve the quality of the care offered. Also, as the volumes increase, doctors, equipment and infrastructure are used more efficiently which ultimately reduce costs as the facilities benefit from economies of scale in purchasing equipment, medicines and supplies. At CARE hospitals, the radiology for inpatients are done at night, while services for outpatients are done during the day to ensure optimal efficiency of the expensive equipment.

The hub and spoke model is also an enabler for high quality treatment by developing protocols that reduce errors in medical procedures even for complicated surgeries. CARE hospitals developed risk classes on the basis of age, weight, medical history and lifestyle. A different protocol is followed for each patient and particular attention is paid to high-risk patients. In the US, one in 200 angioplasty patients will require surgery
and half of the patients will die while only two of the 40,000 angioplasty patients at CARE have required surgery and only one has died on the operating table since the hospital was established in 1997 (ibid). The model also allows for doctors at the hub to become specialists on specific medical problems as their skill is mastered based on the high volumes they treat. This is evident in Apollo, where the high volumes of patients has emerged them as a leader in organ transplant surgeries.

Indian hospitals have often come up with innovations to address needs. For example, CARE hospitals perform angioplasties by going through the wrist and not the groin, which is the more common approach yet requires a longer healing period; with the wrist procedure, patients can be discharged quicker thus reducing the costs (ibid).

4.1.2 Task Shifting

The Indian hospital exemplars have been efficient in matching skill levels to the requirement of the task. They have created new categories of low-cost healthcare workers, highly skilled workers and focused specialists. Aravind has trained village girls with secondary education or less to become ophthalmic paramedics and they make up 64% of Aravind’s (Cawston, 2005) workforce performing more routine tasks and assisting the specialist doctors. For the higher skilled professionals, Narayana Hospitals encourages general physicians to become specialists and specialists to become super specialists in rare sub specialties. Nurses are also trained to enter higher skilled positions of nurse intensivist, which is similar to a nurse practitioner in the US (Govindarajan and Ramamurti, 2013).

At both Aravind and NH, specialists work in teams and are supported by a number of nurses, paramedics and resident doctors. The surgeon/specialist only performs critical parts of the procedure, which further enhances efficiency. The support staffs conduct all the pre and post-operative tasks. The lower skilled paramedic staff are also able to go to the spoke clinics in the rural areas; check vitals, screen patients, provide follow up care etc.

Self-service is an extreme form of task shifting whereby patient’s family members take over tasks in providing non-ICU post-operative care originally performed by hospital staff. NH hospitals in conjunction with Stanford University developed a comprehensive four hour audio and video training that shows how to provide care for patients in the days following their heart surgery. This ensures further cost reduction, allows for personalized and continued care at home, thus reducing post-surgery complications (ibid).

4.1.3 Cost-effectiveness

Ensuring maximum value for minimal amount is the aim of most Indian hospitals. The goal is to maximize the number of patients treated rather than procedures conducted. One of the ways through which this can be achieved is to prolong the work life of their expensive equipment through maintenance and repair. Striking deals with maintenance companies to double their equipment life has become increasingly common in Indian hospitals that attract high volumes of patients. These hospitals have also adopted asset-light strategies whereby they would rather lease than buy land and buildings, as these are usually very expensive. Some hospitals will not purchase expensive equipment but establish a pay-per-use model with the equipment provider, which NH has done with General Electric (GE) and Philips. The companies that provide the equipment are able to agree to such negotiations because the volumes of these hospitals are large and significant enough.

Some healthcare providers have come up with cheaper substitutes for medical supplies and equipment for example CARE hospitals, under Relysis, its manufacturing subsidiary, developed stents priced between £155 -£230 per unit, in comparison to imports which cost ten times as much (ibid). Aravind signed a technology transfer agreement with a US company called Aurolab to manufacture intraocular lenses for eye surgeries. The lenses produced by Aurolab and sold in the US cost £128 each but after the agreement with Aravind, they were able to produce them at £3.20 per unit and this eventually dropped to £1.28.

These innovative Indian hospitals are also able to deliver low cost, high quality care because they pay their doctors fixed salaries as opposed to pricing for individual procedures or tests. Although they receive the average salaries they would get at other hospitals, the fixed price model serves to discourage doctors from prescribing unnecessary procedures, while the treatment protocols in place ensure all procedures are followed. Lastly, these hospitals encourage doctors and clinical teams to be thorough and prudent by being transparent with their doctors on how their decisions about treatments, tests, medicines prescribed directly
affect the total cost of treating the patients as well as hospital revenues. At NH, doctors receive daily profit and loss statements, in order to know in real time the balance that they need to achieve, which guide and shape the decisions they make as concerns providing care. Doctors get comparative performance data across hospitals in their Group, to further motivate them and encourage information sharing.
5 Demand Side Healthcare Financing (DSF)

Financing in healthcare continues to be an area that attracts attention. Demand Side Financing (DSF) in healthcare has been used in developing and emerging economies as a tool to improve access to care and utilization of resources, especially among the poor. Due to the ineffective public health service interventions, often characterized by poor efficiency and quality concerns of the health systems, access and utilization of services has remained poor among low income groups. As a result, DSF was seen as a way to improve the utilization of under-used services among poor and under-serviced populations by placing purchasing power, as well as the choice of provider (where possible), directly in the hands of the recipients (World Health Report, 2010). DSF can be consumer-led (vouchers, cash transfers, tax rebates) or provider-led (capitation payment, referral vouchers), and can be provided before or after service utilization. This system of output-based remuneration for services rendered in principle can improve efficiency in service delivery through competition (Ensor, 2004). While not often stated explicitly, the main argument in favour of DSF is that beneficiaries face mainly financial barriers, which prevent them from using particular healthcare services. The combination of targeting and earmarking grants (in the form of voucher or health card or membership roll number) is the core of DSF in India (World Health Report, 2010) and two examples of such schemes are given below:

5.1 CARE Arogya Card

CARE Foundation is a not-for-profit under the CARE Hospitals Group which started in 1996, before the establishment of CARE hospitals with the aim of making advanced comprehensive healthcare affordable and accessible to all. The foundation is focused on innovations in medical education and training, healthcare research, expanding access to poor patients, and adopting technology to reach to people in communities – both rural and urban (Center for Health Market Innovations, 2014).

To provide affordable primary healthcare in rural areas, CARE Foundation partnered with the Centre for Insurance and Risk Management (CIRM) to create an outpatient microinsurance product marketed as the CARE Arogya Card and sold by the VHCs in the form of pre-paid health cards. The programme was set up to address access to affordable healthcare by low-income households and high out of pocket expenses in India. The individuals who purchase the cards receive services on a fee-for-services basis at nominal prices from the VHC network. The initiative was funded and supported by the Micro insurance Innovation Facility at the International Labour Organization (ILO) (Rupalee and Sharma, 2014). Though it only covers outpatient care, it provides assistance to obtain hospitalization wherever required (Center for Health Market Innovations, 2014).

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The CARE Microinsurance product
The insurance product provides outpatient insurance to a family of four (two adults and two children) at a premium of 300 Indian rupees (INR) (equivalent to £3) for 1 year, with unlimited visits to the community health worker (CHW) and clinic up to a sum assured of INR2, 500 (£27). As is common in pilots, the product features were modified following field testing. In the second year, the sum assured was reduced to INR1, 500 (£16) and the product allowed the enrolment of any four members of the family, instead of two adults and two children. The insurance covers consultations and medicines, but diagnostic services are excluded.

5.1.1 Yeshaswini

The founder of Narayana Hrudayalaya, Dr. Devi Shetty launched a micro insurance scheme under the ageis of the Karnataka state government. The scheme covers over 3 million farmers, who are members of the farmers cooperatives and their dependents. This is a contributory plan where the beneficiaries pay a premium of 18 rupees (£0.20) monthly and 5 INR (£0.05) at inception, upon which a Yeshaswini membership card is issued (Narayana Health, 2014). Through these minimal contributions, beneficiaries receive cashless treatment for outpatient care and surgical procedures at the Narayana network of hospitals spread across the state. The state government provided infrastructure for NH like making available post offices within the
state to collect monthly premiums, track payment and issue health insurance cards. Yeshaswini is a demand side financing scheme, which is primarily a private initiative with the support of private providers and with limited financial contribution by the state government (Rupalee and Sharma, 2014). It is an example of how private led initiatives are able to develop a market based solution to reduce the financial burden of the poor when pursuing medical care. The huge success of Yeshaswini scheme in Karnataka has led other state governments in India to adopt a similar scheme. Some steps have also been taken by the State of Karnataka to develop similar schemes for teachers and other groups as this particular scheme was only for farmers. Experience with micro insurance has shown that poor families are now more likely to seek low cost treatments which they had previously forsaken because of ability and reluctance to pay for conditions that did not appear life threatening (Narayana Health, 2014).

5.1.2 Shortcomings of Demand Side Financing

Based on some studies done to review Indian case studies on the effect of DSF, the basic premise of significant improvement in utilization of the service by the target population and reduced out-of-pocket expense were established. However, DSF financing has its shortcomings and raises several concerns:

Inadequate Supply of Skilled Manpower: DSF schemes do not address the shortage of trained doctors and health workers which remain a key challenge in many areas in India particularly the rural areas.

Narrowly Focused: DSF schemes with a narrow focus may have limited impact on final health outcomes e.g if the aim is to reduce maternal mortality, it may be critical to have both ante and post natal care for mothers including nutrition as opposed to having one over the other.

Adverse Incentives: The scheme may be such that healthcare provider is incentivized when they recommend a particular service e.g over prescription of services such as caesarean-sections. There have been cases where higher prescriptions of caesarean operations were observed and linked to the provision of certain incentives (Donaldson and Sharma, 2008).

Low Uptake of Services: Other non-financial barriers like socio-cultural norms, attitudes and practices can limit the uptake of certain services. For areas where these factors are significant, DSF on its own may not achieve the desired goals e.g. specific cultural norms like delivery in the mother's home may act as a constraint in follow-up visits.

Sustainability: DSF schemes require sound planning, administrative and management structure and skills, with continuous monitoring and evaluation. This indicates that significant financial and non-financial resources need to be committed on a continuous basis. As a result, the source and continuity of funding is crucial, and schemes will fare differently on the cost criterion (ibid).

While DSF does not provide a solution to the panacea of healthcare financing issues in developing countries, it presents an opportunity for private investors and entrepreneurs in Kenya to develop viable market based solution just as seen in the case of Yeshaswini and Arogya. Only 20% of Kenyans are said to have some form of medical insurance cover (The Economist- Intelligence Unit, 2014). The government’s National Hospital Insurance Fund (NHIF) coverage is low as it’s mostly civil servants and some of those in formal employment that are under the cover. The low insurance penetration presents an opportunity for private insurance companies to develop micro insurance products to cater to Kenya’s working poor (half of Kenya’s population), who are largely uninsured, particularly for outpatient services.
6 Comparison between India and Kenya

Both Kenya and India share some socio-economic similarities, which provide useful context within which healthcare is being delivered in both countries. Currently, of Kenya’s forty-four million, an overwhelming 45.2% are said to be living below the poverty line (World Bank Databank, 2013). Though not as high as Kenya, approximately 22% of India’s 1.2 billion people live below the national poverty line (ibid). The working poor in Kenya have monthly consumption expenditure of between KES 1,562 to 2,200 (£11 to £15.50) (rural) and KES 2,913 to 4,000 (£21 to £28) (urban). Quite similarly, India’s average monthly expenditure in the rural areas is £12 and £27 in the urban areas (Government of NCT of Delhi, 2012; National Sample Survey, 2013).

Current world development indicators show that 61.9% of healthcare expenditure in Kenya is private and even higher at 66.9% in India (World Bank Databank, 2013). This indicates that healthcare in both countries are largely driven by private spending; Coupled with low health insurance coverage in both countries, there is a significantly high out of pocket expenditure for health consumers in India and Kenya. Approximately 80% out of pocket expenditure (OOP) in India and 47.6% in Kenya, which is significantly lower, though still on the high side. In both countries, this mostly falls on the largely uninsured working poor. This only shows that the working poor are active healthcare consumers (Accenture, 2014; World Bank Databank, 2013; PSP4H Policy Brief, 2014).

According to the World Bank indicators, health expenditure per capita in Kenya is £29 (approximately 4,000 KSH) and the average household size is 5, meaning annual household healthcare expenditure would be 20,000KSH (Kenya National Bureau of Statistics, 2008). Similarly, India’s per capita expenditure for health is £39 (approximately 5,800 KSH) and the average household size is between 5 and 4, meaning annual household healthcare expenditure would be approximately 26,000KSH (Times of India, 2012).

Both India and Kenya have low physician per patient ratio as Kenya has 0.2 physicians per 1,000 people, while India has 0.7 per 1,000 (World Bank Databank, 2013).

PSP4H identified liquidity or cash flows as the major problem facing Kenya’s working poor as opposed to an absolute inability to afford services within the “can pay less” segment. This needs to be seriously considered by any healthcare provider looking to serve this 22million market segment in order to ensure footfalls at the clinics/centres are enough to sustain operations and ensure profitability. Delivery of healthcare services at affordable low costs and in large volumes is necessary given the thin profit margins often realized when serving “the can pay less” segment.

6.1 Health Seeking Behaviour of Kenya’s Poor

It is imperative that any healthcare provider looking to deliver services understands that health-seeking behaviour plays an instrumental role in determining a consumer’s access and use of health services and products. Health seeking behaviour also informs the types of services the consumer perceives as being acceptable. PSP4H’s primary research show the factors that influence the way consumers in Kenya access healthcare can be broadly categorized into the following four groups- geographical, socio-cultural, economic and organizational.

Geographical: There is a greater burden of illness on the poor because of the distance to a health facility as access is a barrier for Kenyan’s poor, especially in the rural areas.

Socio-cultural: Factors such as traditional beliefs, women status, cultural norms all influence when and what kind of healthcare people receive.
Economic: Most developing countries, Kenya inclusive, highlight healthcare costs as a barrier to the utilization of health services in both the public and private sectors.

Organizational: The manner, in which health services are organized, managed and delivered influence health seeking behaviour generally.
Conclusion

Maximizing value at the lowest cost possible is the aim of healthcare providers, especially in emerging economies like Kenya where a significant percentage of the population fall into the low-income group. Some innovative Indian for-profit healthcare providers have successfully proven that the delivery of high quality, low cost medical care is not a myth. Kenyan private sector healthcare providers looking to profitably serve the working poor can adopt and contextualize learning's from India’s established healthcare providers. These learnings include:

**Identifying the Unmet Demand:** It is critical that any provider looking to serve Kenya’s working poor, locates their clinics/hospitals in areas where there is a significant unmet demand for healthcare. Prior to setting up the hospital/centers, a project team needs to conduct analysis of potential locations to understand the quantity and quality of demand that exists in that region. With the poverty incidence in Kenya and the income disparities found in the urban and rural areas, Kenyan healthcare providers should focus on the areas that have been identified as serving these twenty million in the “can pay less” market segment in different parts of Kenya. PSP4H’s primary research on *The Kenyan Poor and Their Use of the Private Health Sector* has used the Kenya Poverty Incidence/Headcount Index to identify Kenya’s working poor, using the household consumption expenditure required to purchase a food basket to fulfil nutritional requirements and to meet basic non-food items such as transportation, rent and schooling. Also important to note is that India’s demography, having relatively large and concentrated poor populations have fostered the success of its innovative for-profit health providers in delivering low cost, high quality health services to these populations.

**Economic Profiling of the Working Poor Regionally:** Kenya’s poverty line was drawn at 1,562 KSH (£11) and 2,913 KSH (£20.63) as disposable income in rural and urban households respectively. The primary research also indicated that half of the people in rural areas and third of those in rural areas live below the poverty line. Understanding the economic and financial profile of the target market and how much disposable income they have would be critical to develop a suitable pricing model that can profitably sustain the business yet remain affordable to the working poor.

Regionally within Kenya, the percentage of the population living below the poverty line were identified, providing an indication of the pockets of low-income groups around Kenya, in order to inform potential low-cost healthcare providers. It is imperative for the healthcare provider looking to serve the working poor, understand how pertinent this information is in locating their low-cost facilities around Kenya.

**Figure 7-1 Percentage of Population below the Poverty Line by Region**

![Percentage of Population below the Poverty Line by Region](image)

**Source:** SID and KNBS, 2013

**High Volumes and Low Margins:** All four Indian hospital cited as case studies, revealed that low-price, low-margin, high-volume model is one that works as the healthcare provider leverages on existing infrastructure that serves wealthier customers to also serve poor health consumers who often times cannot afford to pay for the medical services in full. Cross-subsidization from wealthier patients to poorer patients took place at Aravind, CARE, Apollo and NH. However, it is also critical to note that providers that practiced cross-subsidization on a large scale like NH and CARE attracted patients with India’s state subsidized insurance...
under its National Health Insurance Program, Rashtriya Swasthya Bima Yojana (RSBY). Thus, providing NH and CARE with a base of poor clients who can still pay.

Healthcare Financing: Both India and Kenya have high OOP expenditure rates and the ability to pay is among the most common obstacles to access to healthcare for the working poor. The Indian for-profit hospitals cited in section 3, have shown a leaning towards different forms of community-based health insurance (CBHI) schemes. Health providers like NH, have gone a step further beyond the state subsidized insurance program and forged an insurance product, called Yeshasviniv, in partnership with the state government to provide coverage to farmers belonging to a cooperative for at least one year. Also, CARE developed its own micro-insurance product called CARE Arogya in conjunction with the ILO. In the NH case, the government partnership was critical to its success, while for CARE, there was donor support from the ILO which raises questions of sustainability. In Kenya, perhaps the CBHI schemes can leverage local cooperatives that organize informal sector workers as this could present a viable option for low income populations in mobilizing resources and providing financial protection. CBHI could serve as complementary to other traditional health financing schemes.

Bundle Payments: PSP4H found that most working poor have issues with cash flows as opposed to absolute inability to pay for medical services and as a result bundled payments for care cycles over fee-for-service would be a suitable payment form that is aligned with value. With fee-for-service, providers are rewarded with volume, though it does not necessarily increase the value the working poor patient receives. Employers in different countries are beginning to embrace bundled payments as a mode of healthcare service delivery for their staff. In 2012, Walmart introduced a program to its employees where those who need cardiac, spine and other selected surgery can obtain care at one of the six providers they selected, which all have great track records and health outcomes. The hospitals are reimbursed for the care provided the employees with a single bundled payment covering both inpatient and outpatient pre and post-operative care (Govindarajan and Ramamurti, 2013). Private Kenyan for-profit health providers looking to serve employees of corporations can explore the provision of bundled payments over the traditional individual pricing for healthcare services and commodities commonly required by that population given the high OOP and low insurance penetration.

Organizational Processes and Process Engineering: Enhancing the healthcare provider's internal production processes for goods and services is imperative in serving Kenya's working poor market as costs need to be brought to the barest minimum and high volume of patients need to be treated to attain economies of scale, ensure profitability and a sustainable business model.

The effectiveness of workers is largely determined by the system within which they work in addition to their skill. Processes undoubtedly play a significant role in performance, hence creating new ones and redesigning existing processes will be necessary for Kenyan healthcare providers looking to serve the working poor. The provider's defined processes will shape productivity and most efficient and cost effective use of labour; financial management of the healthcare delivery (costs versus value) and most efficient use of technology and organizational structure to expand healthcare access in order to cater to the unmet needs of the twenty two million working poor in Kenya. The organizational processes will be formed and established with an understanding of the skilled manpower in Kenya and the appropriate technology (cost effective and suitable for the local conditions) available to facilitate delivery of healthcare to different parts of the country.

Task Shifting: To varying degrees at the four Indian hospitals studied, the healthcare provider optimizes the skills of their highly trained staff by allowing them to focus on higher-skill functions while more routine tasks are carried out by lesser skilled workers. Similar to India, Kenya’s doctor to patient ratio is extremely low and lower level clinical personnel need to be used maximally. Strict division of labour and development of new specialized roles have contributed to reduced costs for providing quality healthcare in India. Given the dearth of doctors, Kenyan healthcare providers looking to deliver low cost yet quality healthcare need to leverage more on its use of lower cadre medical staff, clinical officers in this case, as well as other workers such as pharmaceutical, dental and laboratory technologists. The successful innovative Indian hospitals serving the
lower segment markets have all invested in training of these lower cadre medical personnel and assigning more responsibilities to them under appropriate supervision to ensure quality is not compromised.

Data Collection and Continuous Improvement: After the organizational structures and processes have been put in place by the provider, the need for continuous and rapid improvement through data collection cannot be overemphasized. Kenyan healthcare providers would need to take a queue from their Indian counterparts in tracking progress of their facility over time and comparing performance to their peers within and outside the organization. Tracking outcomes and costs is imperative as seen from the Indian case studies. Measuring the cost of care is usually a problem for healthcare providers and only few clinicians know what each component of care costs and how these costs relate to the health outcomes achieved. For the value of the care to be determined, the cost of treating the condition must be tracked and measured through the treatment period/care cycle.

The goal of the healthcare provider has to be to improve value whereby pertinent health options services are made available to patients a relatively low cost. The dual commitment to attain value and lowering costs without compromising on quality would be the aim of any low cost healthcare provider. While there is no “silver bullet” to delivering low cost healthcare, it is crucial for any low cost healthcare provider in Kenya to structure their business to organize around the working poor, their needs and their disposable income especially going by the regional differences economically.
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