

Project Dissertation Report on

**PAYING FOR HEALTHCARE IN INDIA:
FINANCING CHALLENGES AND LONG-
TERM PROJECTION OF HEALTHCARE
COSTS**

Submitted By:

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2K17/MBA/020

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CERTIFICATE FROM THE INSTITUTE

This is to certify that the project titled “**Paying For Healthcare In India: Financing Challenges and Long-Term Projection Of Healthcare Costs**” is a bona fide work carried out by **Ms. Bhawna Mehta** of **MBA 2017-19** and submitted to **Delhi School of Management, DTU, Bawana Road, Delhi-110042**, in partial fulfilment of the requirement for award of the degree of Master of Business Administration (MBA).

Signature of Guide

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Seal of Head (DSM)

DECLARATION

I hereby declare that the major project entitled “**Paying for Healthcare in India: Financing Challenges and Long-term projection of Healthcare Costs**” submitted to Delhi School of Management, Delhi Technological University, is a report of original and authentic work and analysis performed by me under the guidance of my Professor, Dr Archana Singh, Assistant Professor, Delhi School of Management, Delhi Technological University. This report is submitted in the completion of requirements for the Major Research Project MGT 44. The results furnished in this report were not submitted to any other University or academic authority.

Bhawna Mehta

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Thank you,

BHAWNA MEHTA

2K17/MBA/020

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EXECUTIVE SUMMARY

This paper is an attempt to present a detailed picture of the state of health financing and health expenditure in India. This is pursued first by way of identifying the challenges facing health financing in India, evidenced from primary research (administration of structured survey) and secondary research (Industry, Government and other organization reports). The investigation and further foray into alternatives of health payments stem from the fact that over 80% of Indians do not have any kind of health insurance. Out of pocket expenditure is the predominant source of financing when it comes to a chronic health condition or some accident leading to hospitalization. This expenditure carves a big hole in the budget of the entire household in many cases. The problem is aggravated due to a relatively greater number of ailments being treated at Private hospitals which charge more (data suggests).

Further the study intends to project the future scenario in the country by developing a model to project long term per capita healthcare costs due to the factors explaining the rise and fall in healthcare costs. Multiple Linear Regression technique has been used to create the model. Lastly, inspired by the adoption of value-based payments to healthcare providers in the West, further research for introducing alternative payment models in the Indian context is proposed as a way to reduce the effective cost to the patient.

Keywords: health financing, value-based payments, forecasting, healthcare, healthcare expenditure, out of pocket expenditure, private hospital, hospitalization, health insurance

I. INTRODUCTION

A. The Land of India at a Glance

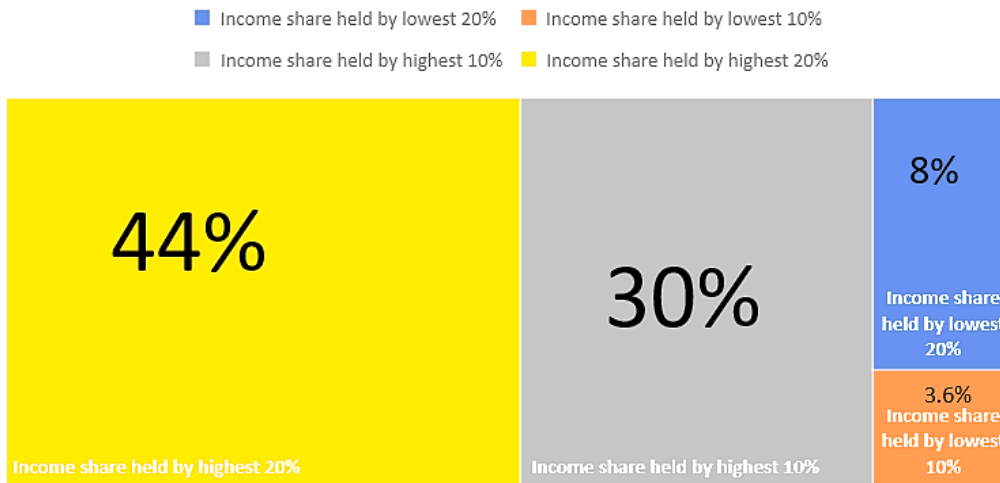
India, one of the world's most promising developing countries of the world and the largest democracy, is a nation of diversity and rich cultural heritage. It is a Lower Middle-income country in the South Asia region. (data.worldbank.org, Country Profile: India) The entire land of 3.3 million square km area experiences an overall tropical monsoon climate marked by relatively high temperatures and dry winters.

1) India: a macro-economic view:

India's current Gross Domestic Product is US\$2.601 trillion as of 2017. It is projected to grow at over 7% per year. (data.worldbank.org, Country Profile: India) World Bank's estimate of India's GINI index in the year 2011 was **35.1**. "Gini index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. A Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality." (World Bank)

As shown in fig. 1, the highest 20% of the quartile classes by expenditure have a 44% share of income while the lowest 20% hold 8% of the income providing enough evidence of a persistent income inequality and a stark difference between the rich and the poor. In a further section, the paper talks about the Mortality Gini Coefficient.

% Income Share held by various income groups India

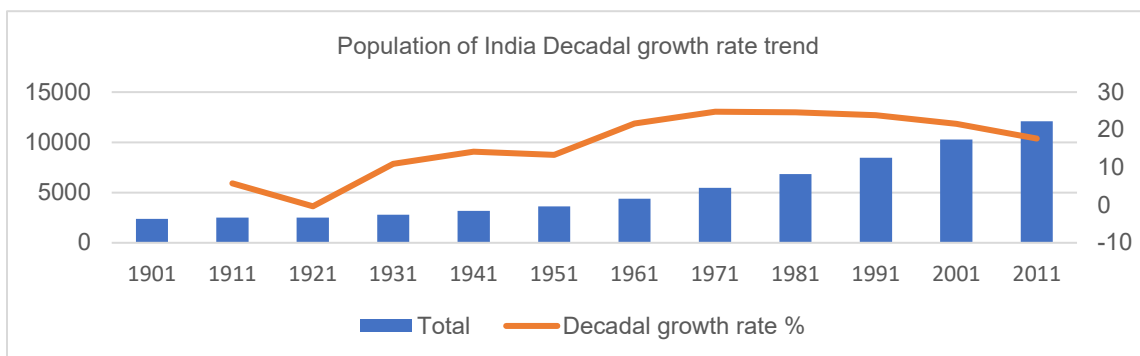


Data source: data.worldbank.org

Fig. 1. : % income share held by the different quartiles of the population based on income

2) Demographic characteristics:

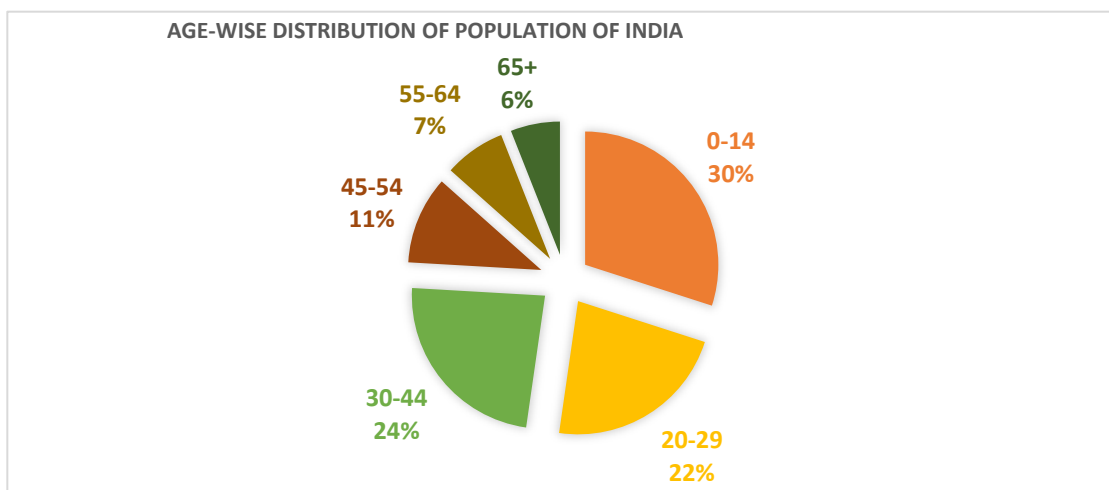
According to the National portal of India india.gov.in, India has a population of 1,210,193,422 (623.7 million-male and 586.4 million-female) as on the last census of 2011. This is equivalent to 17.8% of the world’s population. Fig. 2 below shows an increasing trend in the decadal growth rate which is kind of stabilizing around 2011. the population size of the country is enough to garner inequities in the kind of healthcare that all can receive rendering a fragmented healthcare industry providing services from the lowest to the highest level in strikingly different ways.



Data source: Registrar General of India

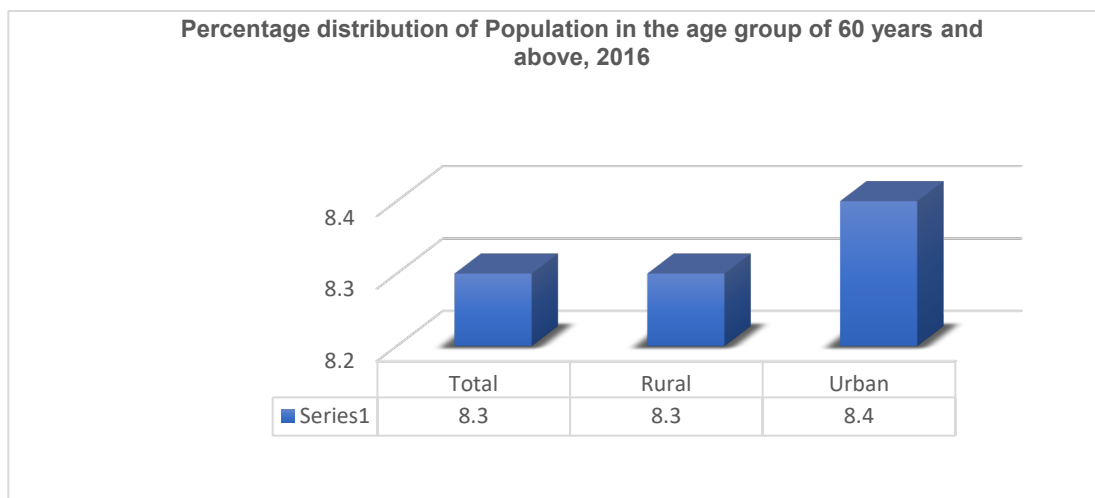
Fig. 2. : Decade-wise total population of India and trend in decadal growth

The individuals in the age groups 0-14 and 65 and above together make up 36% of the total population. This segment is a major contributing factor towards the potential ailments and healthcare service requirements and hence the trend in this composition might critically affect the trend in healthcare expenditure.



Data Source: SRS Statistical Report, 2016

Fig. 3. : Age-wise distribution of the population

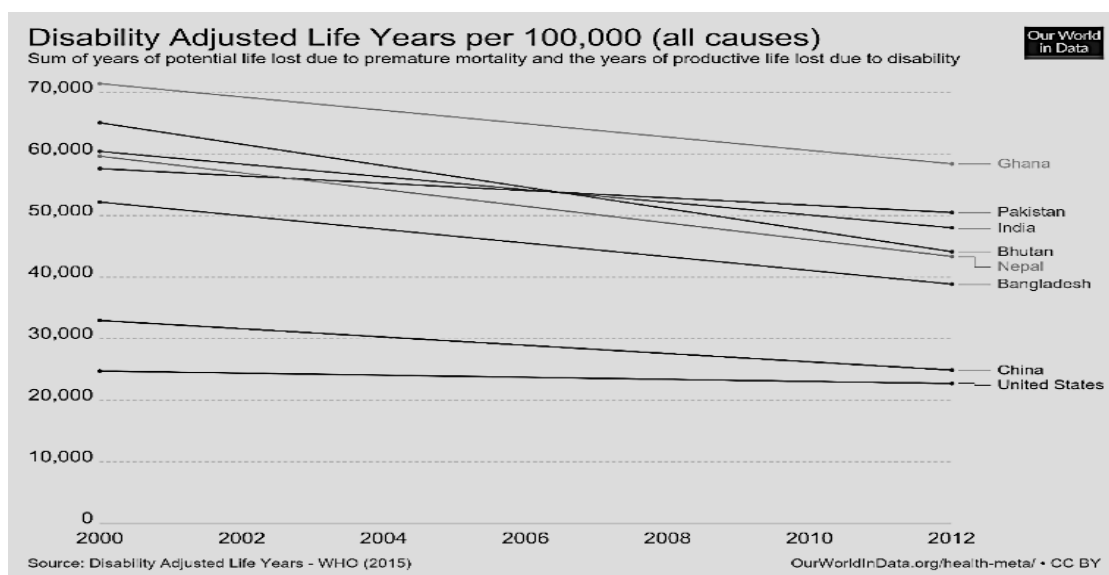


Data Source: Key Indicators of Social Consumption in India Health, NSS 71st Round, Jan-Jun 2014

Fig. 4. : Share and composition of population aged 60 and above in the total population

B. Healthcare financing: The India Story

India is one of the top countries in the world facing a large disease burden. As the chart below shows, India fares worse than the developed nations like US and its neighbour China and the gap is huge when it comes to the total number of years lost due to disease burden. While among the developing countries India fares better than Pakistan only. Bhutan, Nepal.



Source: ourworldindata.org/health-meta, Data: Global Burden of Disease Project

Fig. 5. : A comparison of few countries from different income groups for disease burden

and Bangladesh all managing a better position. Zimbabwe is one country amongst all which has been able to greatly reduce its disease burden in the 12 years in review.

Despite the high disease burden and poor access to healthcare services in the country, as is the case with low-and-middle income countries around the world, India also suffers from the same problem of very low public spending on healthcare and inadequate Government intervention. Though recent years have seen little but definite progress by the State to achieve Universal Healthcare Access through initiatives such as Rashtriya Swasthya Bima Yojana, NRHM, Aayushman Bharat etc., there is still a long way to go.

General barriers to Healthcare in India

- Poor transportation and road infrastructure
- Deficient coverage
- Unawareness of rights and facilities available
- No or poor access to healthcare in rural and suburban areas
- Quality services limited to high income groups
- Market imperfections in the healthcare value chain
- Huge gap in pricing of Public and Private sector

The value chain of healthcare in India spans all the way from patients with symptoms and disease to healthcare providers, doctors, nurses, medicine and medical equipment suppliers, manufacturers, Government and regulatory bodies. Highly evolved standards of medical care in private hospitals in India due to advancements in medical technology and practice and innovation in cost effective procedure continue to lure foreign patients who desire treatment and recovery at Indian private healthcare sector. On the other hand, the average domestic patient is still far from receiving high quality healthcare services at affordable prices and at the time of catastrophic illness or disease there ensues a struggle for financing medical fees. In scarcity of well-established prepayment methods like that in developed countries, catastrophic payments (Anamika Pandey et al., *Trends in catastrophic health expenditure in India: 1993 to 2014*) This struggle many a times culminates in financial catastrophe or untimely loss of life.

Broadly, the health financing models prevalent in India are (apart from the special schemes limited to some sections and critical diseases) “Central Government Health Scheme by the Government of India, Social Health Insurance by Public or Private facilities, Community based Health Insurance-Pooling, Voluntary Private Health Insurance and Out of Pocket payments.” (Pablo Gottret, 2005)

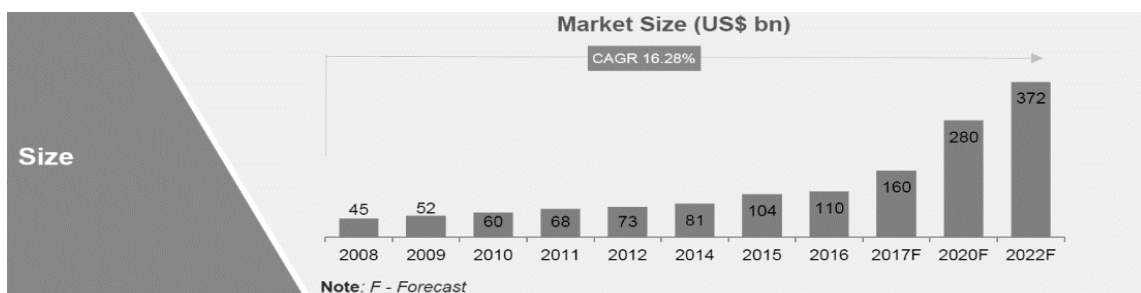
The mortality Gini coefficient measures the inequality in the distribution of years of life within country. The non-fatal dimensions of disease and injury require critical attention from health systems being the dominant source of burden of disease.



Fig. 6. : Mortality Gini Coefficient of India over 100 years shows a fall indicating improving equality of life

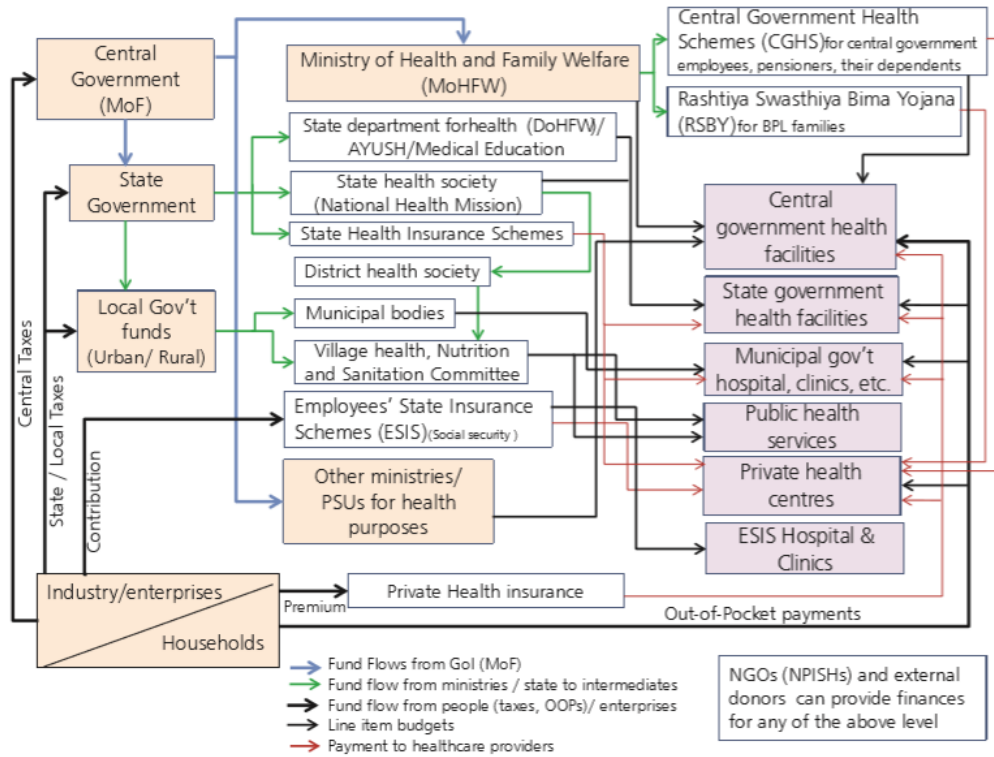
1) The Supply Side

According to data from ibef.org/industry/healthcare-India (Indian Brand Equity Foundation), Healthcare is quite a huge market in India with expected size of USD 372 billion by the end of 2022 wherein the hospital industry is to grow at an expected CAGR of 16-17%.



Source: www.ibef.org/industry/healthcare-india.aspx

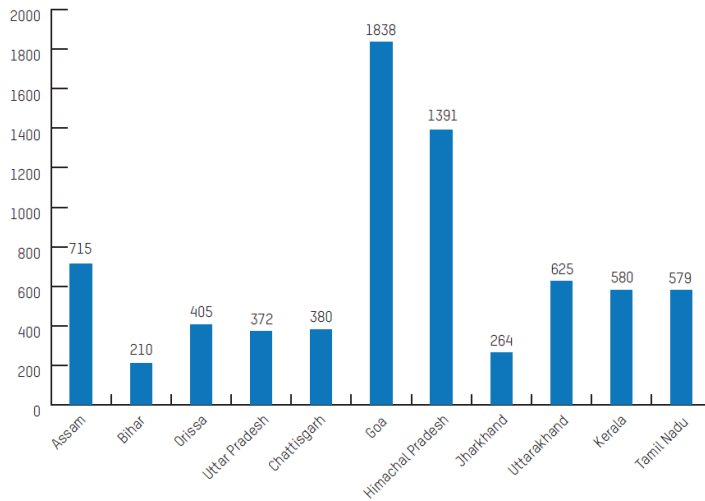
Fig. 7. : Market size of healthcare US\$ billion and growth in 10 years



Source: WHO SEARO (World Health Organisation South East Asia Regional Office)

Fig. 8. : Health Financing Flows in India

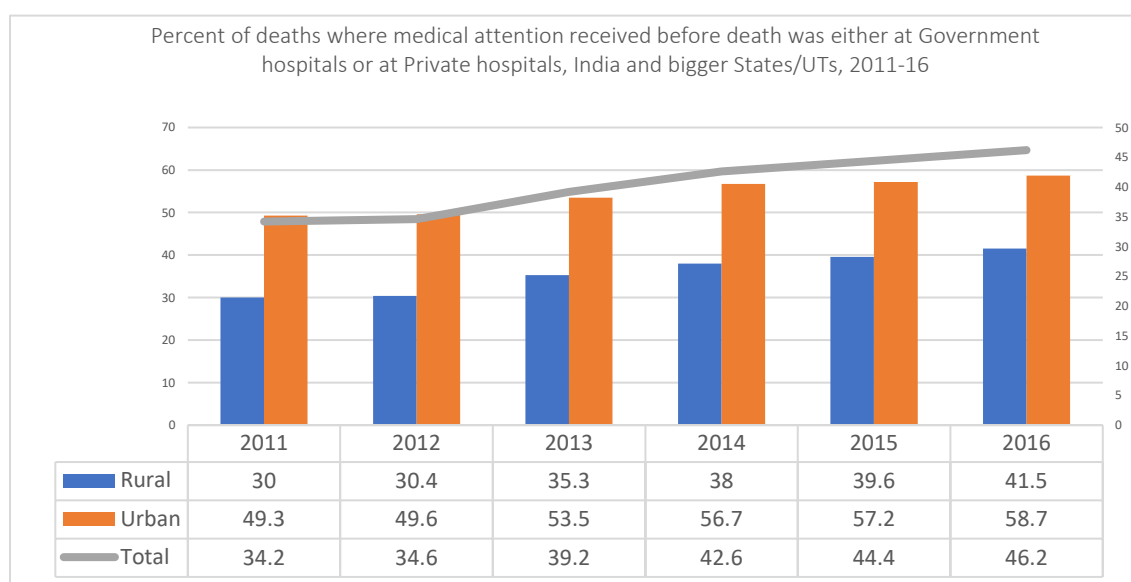
FIGURE 2.1: PER CAPITA TOTAL PUBLIC EXPENDITURE ON HEALTH IN INDIAN STATES 2009-10



Source: Mita Choudhury and H.K. Amar Nath (2012).

Fig. 9. : State-wise public health expenditure in India

The two major healthcare providers in the country are the Public and the Private sector. While there is a huge difference in the cost as well as quality of care in the two as evidenced in further pages. The public providers for health care include government hospitals, clinics, dispensaries, Primary Health Centres (PHCs) and the Community Health Centres (CHCs), Mobile Medical Unit (MMU) and the state and central government assisted ESI hospitals and dispensaries. The ‘private’ sources of healthcare providers include private doctors, nursing homes, private hospitals, charitable institutions. (NSSO Survey, 2014) Four alternatives are eventually available to a diverse population of



Data source: SRS Statistical Report 2016

Fig. 10. : Comparison of percentage of deaths after receiving medical attention at hospitals in Urban and rural areas

India: Big Private hospitals, small fragmented private clinics by independent doctors, Public hospitals, Private nursing homes and Medical quacks. (Esposito, M., Kapoor, A. and Goyal, S., 2012) Fig. 8 above shows the percentage of deaths after receiving medical attention at either Private or Government hospitals. Throughout the years the percentage is consistently higher in Urban areas.

There is a total of 346 CGHS wellness centres across the country which consist of about 2300 doctors hosting both ayurvedic and allopathic treatment.

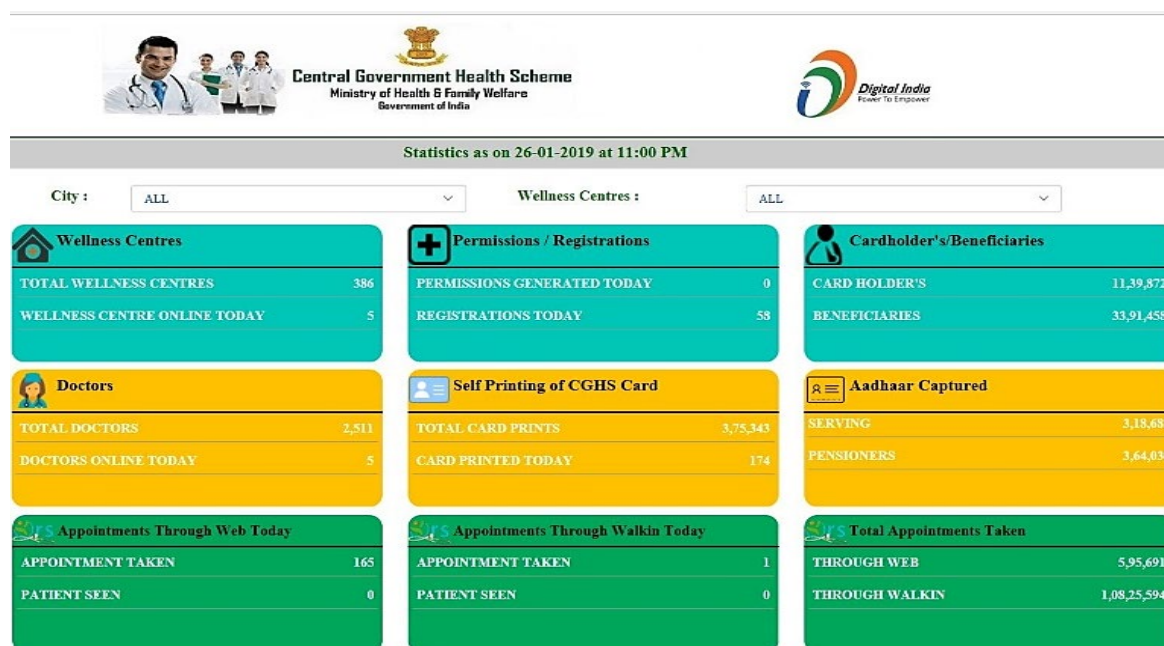
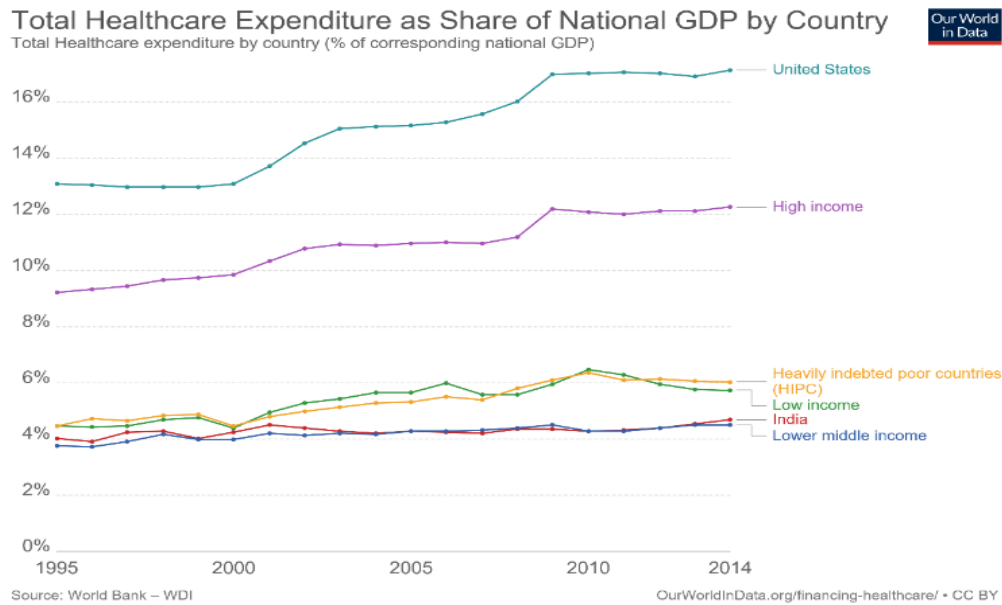


Fig. 11. : A view of the CGHS page showing the count of operating wellness centres, beneficiary statistics on a day. Source: data.gov.in

2) The Demand Side

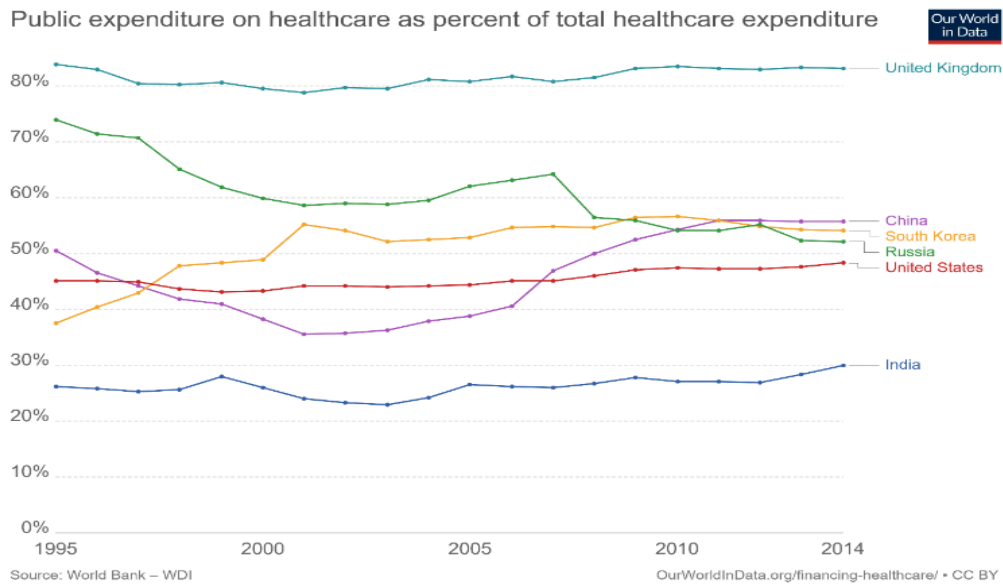
India spent 3.66% of its Gross Domestic Product on healthcare in 2016. The per capita expenditure on healthcare is growing at a rate of 10.8% (2016, World Bank data) When we take a panoramic view of the world, there is a stark difference in how different countries belonging to distinct Nation groups (with respect to national income) have changed the way of embracing healthcare expenditure.



Source: <https://ourworldindata.org/health-meta>, Data: World Development Indicators

Fig. 12. : Comparison of different countries for healthcare spending as a share of GDP

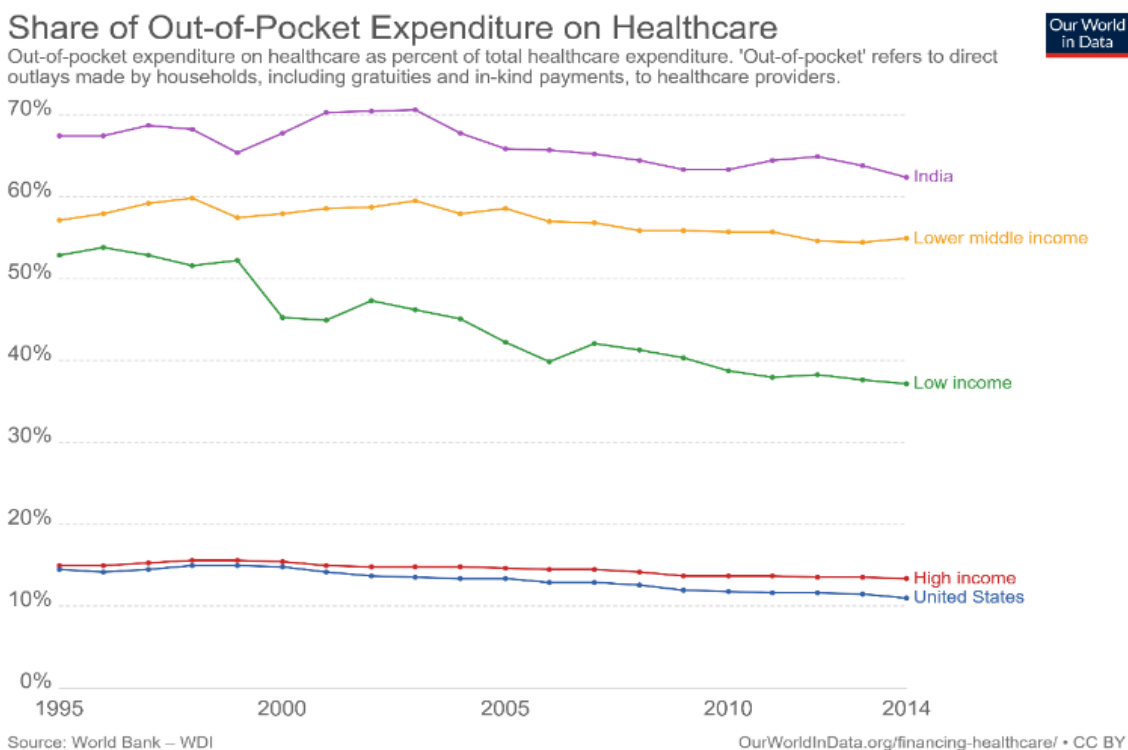
US in the west leads with a 13% share of GDP spent on healthcare. India lags behind even the Heavily indebted poor countries (HIPC) and most low-income countries.



Source: <https://ourworldindata.org/health-meta>, Data: World Development Indicators

Fig. 13. : Trend of public spending as a share of total healthcare expenditure; a comparison of countries across the worlds

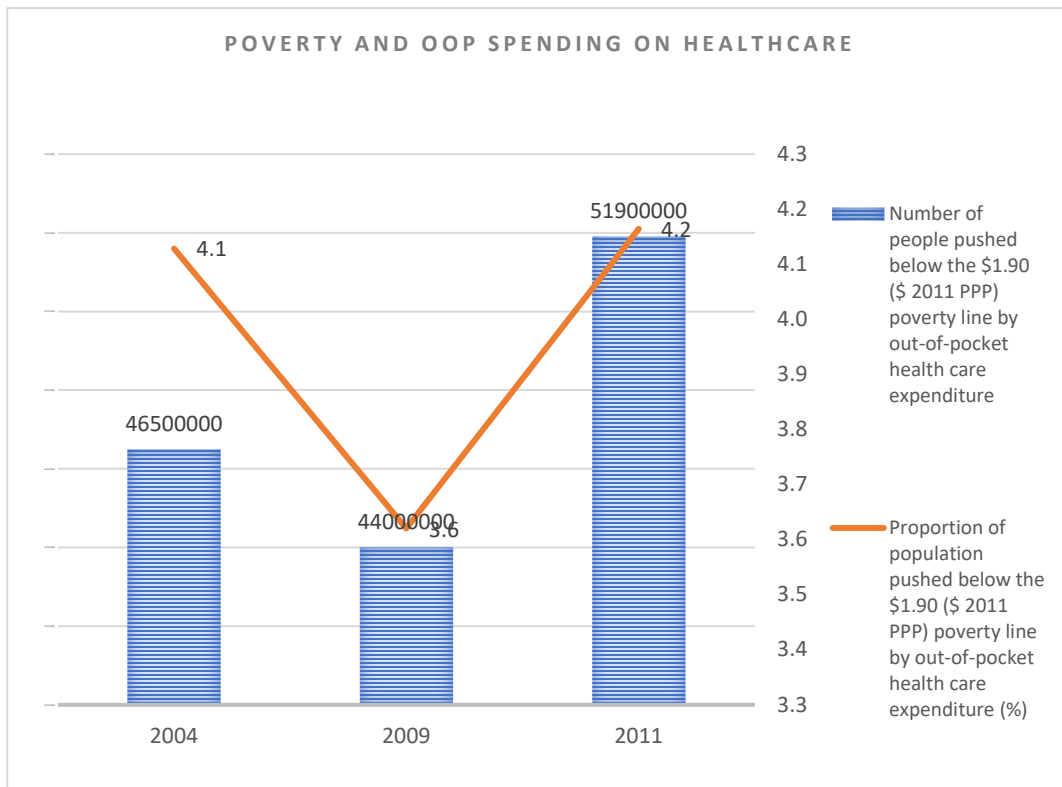
Compared to the developed countries like US, UK, Russia and emerging nations like China, South Korea, India has the lowest level of public spending on health aggravating the overall low level of health spending.



Source: <https://ourworldindata.org/health-meta>, Data: World Development Indicators

Fig. 14. : Comparison of countries on share of Out of Pocket expenditure in total health spending

Mean Out of Pocket Spending on healthcare per person in India was 26.27 USD (equivalent to INR 1865) between 2000 and 2016. A large section of the population is forced to forgo good quality healthcare owing to the infrastructure not being robust as to support prompt financing, payments, medical equipment, hospital beds, doctors and nurses. A distrust in the public sector facilities and services is also existent as is validated by a survey conducted as a part of this study.



Data source: Global Health Expenditure Database, World Health Organization

Fig. 15. : Share of population pushed into poverty due to Out of pocket spending

Owing to this scenario of health expenditure, insurance providers have been existing in India from a long time. The health insurance works on the mechanism of reimbursement of expenses incurred on health based on a fee-for-service model.

3) Is a Health insurance enough

The problem with the health insurance industry in India is that it is very much fragmented. A health insurance policy is a contract between the insurer and the insured. Owing to the private insurance providers there is a plethora of customized products available for persons seeking relief against unanticipated medical expenses at some future time.

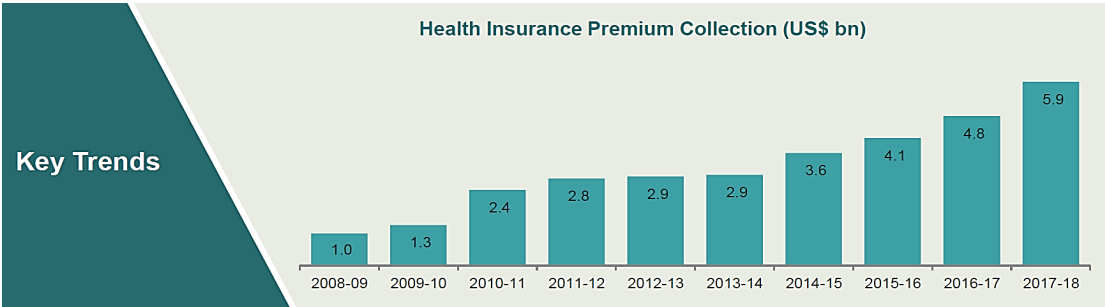
The major kinds of health insurance policies available in India

- Hospitalization Health Insurance Policy
- Critical Illness Health Insurance Policy
- Hospital Daily Cash Bonus Policy
- Personal Accidental Insurance Policy
- Tax Saving Health Insurance Policy
- Family Floater Health Insurance Policy
- Group Health Insurance Policy
- Disease specific Health Insurance Policy

Source: Various media articles

Fig. 16. : Types of Insurance policies in India

Despite that over 70% of people in the country are not covered by any type of health insurance as evidenced by primary and secondary research. Furthermore, the nature of these insurance products is so that the present infrastructure is not able to fully benefit those taking it. In most of the cases, the reimbursement covers only in-patient expenses and hospitalization expenses.



Source: www.ibef.org/industry/healthcare-india.aspx

Fig. 17. : Year-wise revenue collection of health insurance providers in US\$ billion

II. LITERATURE REVIEW

There exists a significant demand-supply gap in the healthcare sector. India has an infrastructure of around 16,000 hospitals, majority of which are based in urban areas as against majority population living in rural areas. The public-private contribution ratio is 20 percent:80 percent (which aggravates the expenditure problem as explained later). A segment of extreme harsh reality is the Bottom of Pyramid segment where the concern is not catastrophic spending that may be one time but a constant lack of basic healthcare. Enabling Healthcare Services for the Rural and Semi-Urban Segments in India: When Shared Value Meets The Bottom Of The Pyramid, (Mark Esposito et al, 2012) describes access to high quality, reliable and affordable basic healthcare service as a key challenge facing the rural and semi-urban population in India. Self-sustainable business models aimed at providing healthcare services to the bop segment in India. Healthcare delivery to such a population composition requires:

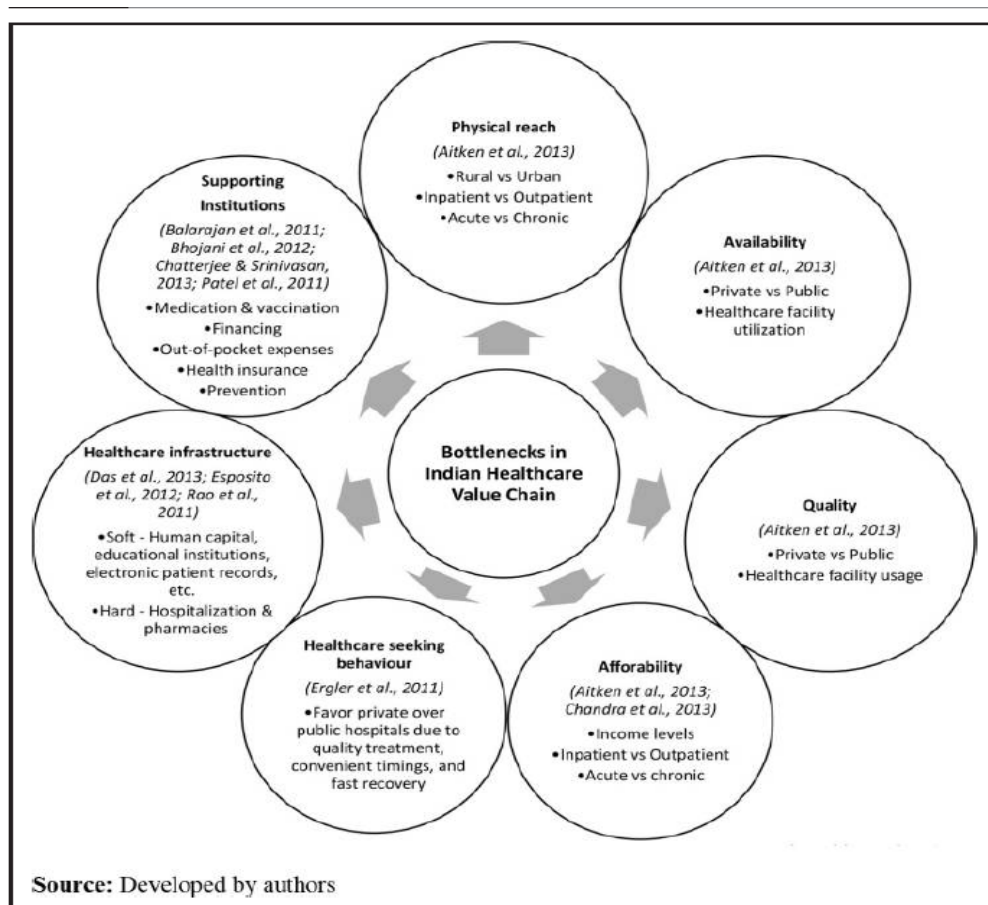
- To identify the pain point and decide upon value offering
- To understand the customer aspect
- To understand the value creation aspect
- To understand the value network
- To understand the socio-economic aspect

Aravind Eyecare, Narayana Hrudayalaya, Vaatsalya and lifespring Hospitals exemplify the above dimensions in moving ahead with the vision of the founders and focusing primarily on the BoP segment. In Health care finance - challenges and response, Syed Amin Tabish analyses existing issues in Indian health financing. Insufficiency of financial support to provide minimally adequate health care for everyone reflects a bleak outlook in 1993.

Moving to the lower-middle and middle-income class, a different set of conditions are the cause of the struggle. Govinda Rao and Mita Choudhary outline the issues surrounding the Public Healthcare System in India pertaining to low level public spending, poor quality healthcare and high out of pocket spending. Three features

are attributed to the Indian healthcare system: Low levels of Public spending; a poor preventive health infrastructure; OOP spending in the Private sector. State level factors like increase in own revenue of the state, increase in specific-purpose transfers for health sector and changes in prioritization contribute to the per capita health expenditure and thus high disparity amongst the states. Foreign aid and external expenditure are not significant in determining the fiscal space.

Indian healthcare value chain—status quo not a sustainable solution (Gopalakrishnan Narayanamurthy et al., 2017), The delivery side of healthcare Use of Delphi study and validation by expert panel review to inspect the problems facing the entire healthcare value chain especially the rural segment. A framework for bottlenecks In the Indian Healthcare Value Chain:



Source: *Indian healthcare value chain—status quo not a sustainable solution*, Gopalakrishnan Narayanamurthy et al., 2017

Fig. 18. : Bottlenecks in the Indian Healthcare Value Chain

Potential solutions recommended are Problem-based cost allocation and hub-and-spoke model.

Healthcare Costs

The costs of the care are especially influenced by decisions regarding hospital admission and surgery, and by decisions affecting the use of intensive care units, life sustaining treatments, and long-term care facilities. 5 Risk-adjustment models are reviewed in *Predicting future healthcare costs: how well does risk-adjustment work?* (Michael A. Cucciare et al., 2006) for their accuracy in predicting healthcare costs of individuals considering variables like **age, gender, prior healthcare and pharmaceutical costs, functional status** (e.g. Difficulties with activities of daily living) and diagnoses. Statistics like R-squared and Predictive ratio predict a strong relationship between health-related costs and factors like Age and prior healthcare data regarding individual patients or patient profiles.

A model for calculating costs of hospital-acquired infections: an Italian experience (M.M. Gianino et al., 2007), the paper measures the appropriate cost of Hospital Acquired Infections and disproves the assumed high correlation between extra Length of Stay and the HAI costs.

Modeling long term healthcare cost trends, prof Thomas E. Getzen, Using 5 input parameters: 1. Inflation (ordinary increase in prices); 2. Income (per capita rate of growth); 3. Multiplier (income effect on medical demand and labor cost); 4. Trend (extra increase due to Technology and other factors); 5. 2011 baseline Health SHARE of GDP, to project the long-term healthcare costs (National Health Expenditure) in US;

HEALTH FINANCING ALTERNATIVES IN LOW AND MIDDLE INCOME COUNTRIES, Pablo Gottret, Challenges in developing countries and the problems with existing solutions.

The Determinants of Health Expenditure: A Country-Level Panel Data Analysis, Xu Ke, Priyanka Saksenaa, Alberto Holly, (2011) also shows a strong link between GDP and health expenditure citing a number of studies in developed and developing countries

though non-stationarity of the data may have been overlooked. Also, double causation has also been detected in some cases. There is a significant bi-directional Granger-causality for 46 countries in Erdil and Yetkiner's study in 2009. Their analysis shows that one-way causality usually runs from GDP to health care expenditure in low and middle-income countries. Here, Granger causality test has been used to identify such bidirectional causality.

Population aged 65 years and above

The population structure can be a strong determinant of health expenditure especially children (0-14 years) and older population (65 years and above) due to their high disease vulnerability and more potential implications from injury since a significant proportion of Indian population falls in this segment, the effect of this variable is critical. Further in our analysis a more significant relationship was found between the growth rate of Population aged 65 years and above and health expenditure, hence the usage in the model.

Inflation

The other reason for the usage of this variable is that the level of Inflation affects the consumer purchasing power and spending capacity

Multiple Regression technique was used to model the relationship between the dependent variable, Current per capita health expenditure and the independent variables: GDP per capita, Inflation rate, Annual growth rate in population aged 65 years and above. Following tools and tests were used to verify the model assumptions and analyse the data.

III. SCOPE OF THE STUDY AND RESEARCH OBJECTIVES

NEED FOR THE STUDY

Over 80% of Indians do not have any kind of health insurance. Out of pocket expenditure is the predominant source of financing when it comes to a chronic health condition or some accident leading to hospitalization. This expenditure carves a big hole in the budget of the entire household in many cases. The problem is aggravated due to a relatively greater number of ailments being treated at Private hospitals which charge more.

SCOPE

The healthcare infrastructure which consists of the networks and linkages in the healthcare ecosystem is assumed to be consisting of healthcare delivery organizations; patients; supporting elements-pharmaceutical and the medical equipment suppliers and manufacturers is a broader aspect to be dealt with in a larger context. The paper is focussed on the financing aspect of health. This paper does not intend to comment on the India's entire healthcare infrastructure in detail but briefly touches on the delivery aspects to understand the impact on financing and increase in related costs.

OBJECTIVES

The research work seeks to fulfil two objectives:

- [1] To determine the most significant sources of financing healthcare by Indian households.

The first objective seeks to determine a few aspects of health financing from the demand side i.e. the general individual through objectively analysing their outlook towards treatment of ailments at healthcare providers and sources of financing the costs involved. The sensitivity of different age groups, gender, income classes, and rural/urban region dwellers is different to healthcare expenditure and choice of allocation of budget.

- [2] To predict the long-term healthcare expenditure and the trend in healthcare costs.

IV. RESEARCH METHODOLOGY

To achieve the objectives mentioned above, a survey was administered to a representative sample of the population. Relevant studies, research papers, industry reports and public databases were consulted for secondary data and prior work and insights on alternative solutions and existing scenario. A survey was administered to a sample of 117 individuals from various age groups, residential locations, income groups and occupations to analyze their outlook on healthcare services and health financing. Short interactions with professionals from healthcare as well as some segments of population whose participation is more significant.

For the purpose of computing the dependent variable CHEanngrowthpercent (annual growth rate in current health expenditure) as a function of the independent variables: GDPanngrowthpercent (percentage change in GDP); Inflation (the rate of inflation); the average of Life_expectancy(percentage change in life expectancy (years) year-on-year); Pop_aged_ann_growth (growth rate of Population 65 years and above) and Mortality_rate (Percentage change in mortality rate year-on-year) as med_tech, the requisite historical data was collected from Global Health Expenditure database and World Bank Data, Country Profile, India.

The data for the input variables and outcome Health expenditure is taken for the last 17 years from 2000 to 2016 i.e. from the start of the 21st century.

The choice of Input Variables

1. Inspired from model created by Thomas E. Getzen. He used the three variables: GDP, Inflation and medical trend proxy.
2. Evidence from theory and experiment for the current study

Gross Domestic Product

According to World Bank (ourworldindata.org/health-meta), GDP (national income) is the strongest predictor of healthcare spending at a cross-country level. *A Country-Level Panel Data Analysis*”, Results for Development Institute, WHO, Working Paper,

December 2011, also shows a strong link between GDP and health expenditure citing a number of studies in developed and developing countries though non-stationarity of the data may have been overlooked. Also, double causation has also been detected in some cases. There is a significant bi-directional Granger-causality for 46 countries in Erdil and Yetkiner's study in 2009. Their analysis shows that one-way causality usually runs from GDP to health care expenditure in low and middle-income countries. Here, Granger causality test has been used to identify such bidirectional causality.

Population aged 65 years and above

The population structure can be a strong determinant of health expenditure especially children (0-14 years) and older population (65 years and above) due to their high disease vulnerability and more potential implications from injury since a significant proportion of Indian population falls in this segment, the effect of this variable is critical. Further in our analysis a more significant relationship was found between the growth rate of Population aged 65 years and above and health expenditure, hence the usage in the model.

Inflation

The other reason for the usage of this variable is that the level of Inflation affects the consumer purchasing power and spending capacity

Multiple Regression technique was used to model the relationship between the dependent variable, Current per capita health expenditure and the independent variables: GDP per capita, Inflation rate, Annual growth rate in population aged 65 years and above. Following tools and tests were used to verify the model assumptions and analyse the data.

Coefficient of Determination, R-Squared in SPSS

Correlation Analysis, Test for multicollinearity in SPSS

Tests for checking stationarity of time series data-Unit Root Test and Granger's Causality Test in EViews

V. ANALYSIS AND DISCUSSION

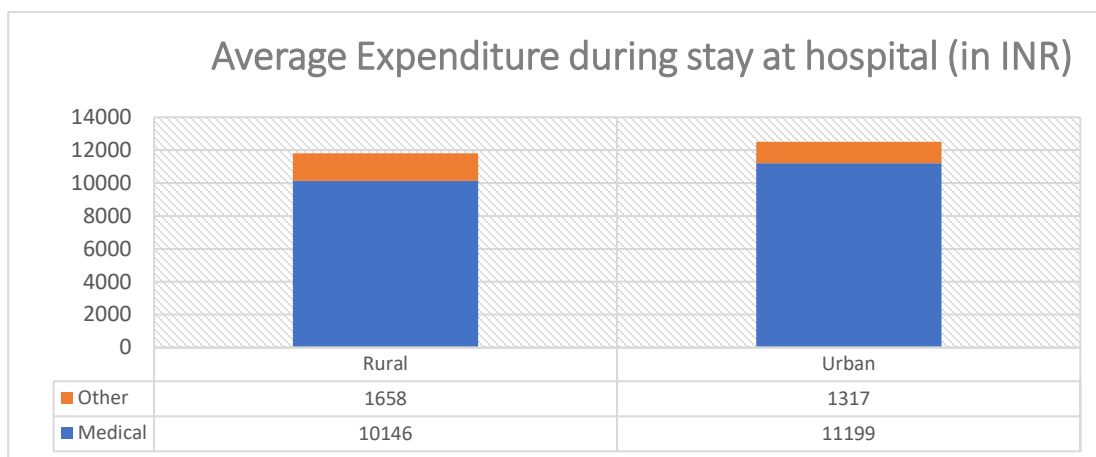
A. Health financing sources and impact on household expenditure

A survey of 117 respondents was conducted regarding the type of healthcare facilities they opted for in times of disease or injury or chronic illness. The survey was administered to all individuals in the age group of 18 to 65 years and above.

Survey insights

- Individuals whether employed, students or unemployed took part in the survey
- The maximum number of families had 4 members and 1 earning member
- There was an almost equal distribution of the various income groups
- Most of the results that emerged correlated with the findings in NSS Report
- The findings accentuated a relatively higher dependence on Private facilities for treatment and hence greater financial burden with some differences between various consumption groups

The survey attempts to answer the following questions: Whether health expenditure is a significant factor impacting an average household in India and if Out of Pocket spending is the prominent source of health payments as claimed in various research papers and reports.



Data source: Key Indicators of Social Consumption in India Health, NSS 71st Round, Jan-Jun 2014

Fig. 19. : Average expenditure during stay at hospital (medical and non-medical)

In 2014, average medical expenditure attributed to hospitalization was 63.6% more in Urban areas as compared to the rural areas while non-medical expenses during hospitalization were 1% lower in urban areas.

NSSO report, 2014 makes it clear that in the past 30 years, private hospitals have treated a greater number of in-patients than the public hospitals and there is no significant difference in the Rural and Urban region in this regard.

type of hospital	percentage of hospitalised cases in					
	rural			urban		
	1995-96	2004	2014	1995-96	2004	2014
(1)	(2)	(3)	(4)	(5)	(6)	(7)
public	44	42	42	43	38	32
private	56	58	58	57	62	68
all	100	100	100	100	100	100

Source: NSSO Survey 71st Round Report, 2014

Fig. 20. : Hospitalised cases treated at public and private hospitals in urban and rural areas

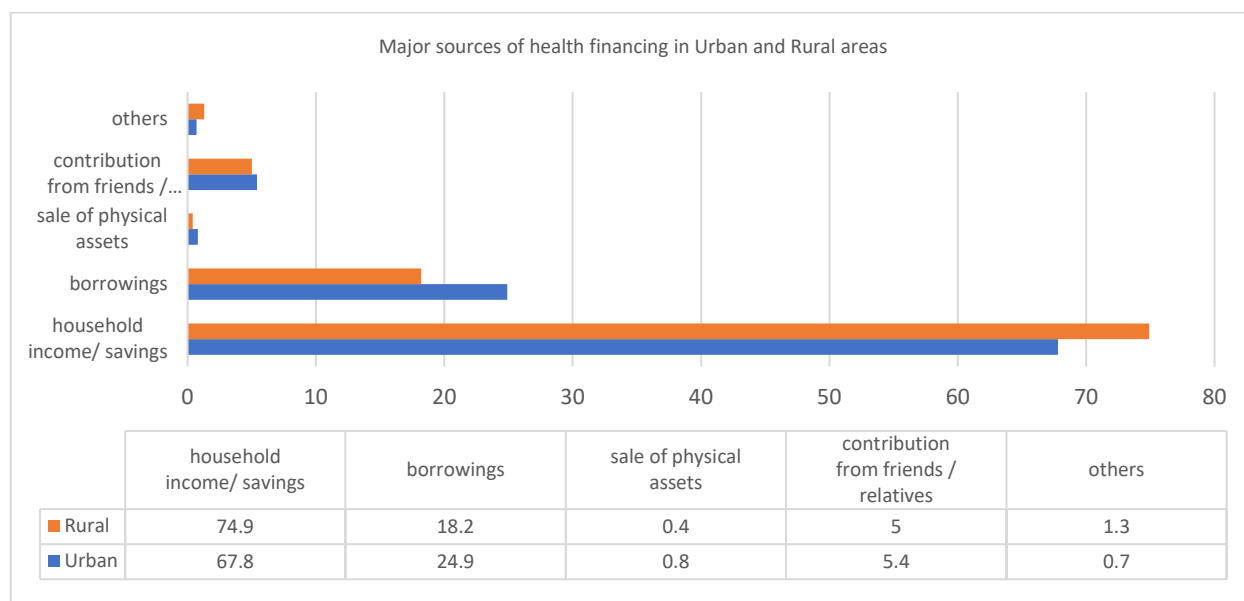
Statement 3.9: Average medical expenditure (₹) per hospitalisation case for each broad ailment category in different types of hospital			
broad ailment category	average medical expenditure (₹) per hospitalisation case		
	public	private	all
(1)	(2)	(3)	(4)
infections	3007	11810	8134
cancers	24526	78050	56712
blood diseases (including anaemia)	4752	17607	13313
endocrine, metabolic & nutrition	4625	19206	14117
psychiatric & neurological	7482	34561	23984
eye	1778	13374	9307
ear	6626	19158	15285
cardio-vascular	11549	43262	31647
respiratory	4811	18705	12820
gastro-intestinal	5281	23933	17687
skin	3142	14664	10438
musculo-skeletal	8165	28396	21862
genito-urinary	9295	29608	24525
obstetric and neonatal	2651	21626	11707
injuries	6729	36255	23491
other	14030	35572	28003
all	6120	25850	18268

Source: NSSO Survey 71st Round Report, 2014

Fig. 21. : Disease specific average medical expenditure per hospitalization case

Leading disease conditions in terms of Average expenditure per hospitalised case is Cancer followed by Cardio-vascular diseases. On an average, a much higher amount was spent for treatment per hospitalized case in the private sector (INR 25850) than in the public sector (INR 6120). The highest expenditure was recorded for Cancer (INR 56712) followed by Cardio-vascular diseases (INR 31647).

How India pays for healthcare



Data source: Key Indicators of Social Consumption in India Health, NSS 71st Round, Jan-Jun 2014

Fig. 22. : Sources of health financing in urban and rural areas

Row Labels	Count of Are you covered by any type of health plan?
<input type="checkbox"/> No	53
Rural	22
Urban	31
<input type="checkbox"/> Yes	64
Rural	11
Urban	53
Grand Total	117

Fig. 23. : Coverage of health plans in Rural and Urban areas as per survey conducted

Our survey says 66.66% of respondents in rural areas are not covered under any health insurance scheme while the corresponding percentage is 37% in the Urban region out of a total of 117 respondents. The reason for a high percentage of covered individuals is the sample selection, the sample may be biased with more of the respondents in the covered category.

quintile class of UMPCE	percentage of persons having coverage of health expenditure support					
	not covered	Govt. funded insurance scheme	empl. (not Govt.) supported health protection	arranged by hh with insurance company	others	all
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	rural					
01	89.1	10.1	0.7	0.0	0.0	100
02	88.8	10.7	0.4	0.1	0.0	100
03	87.4	11.9	0.6	0.1	0.0	100
04	83.3	15.9	0.5	0.1	0.1	100
05	81.1	17.0	0.8	0.9	0.2	100
all	85.9	13.1	0.6	0.3	0.1	100
	urban					
01	91.4	7.7	0.6	0.0	0.2	100
02	87.5	10.6	1.3	0.5	0.2	100
03	84.7	12.9	1.3	1.0	0.1	100
04	79.7	13.5	3.3	3.4	0.1	100
05	66.6	15.1	5.6	12.4	0.3	100
all	82.0	12.0	2.4	3.5	0.2	100

Ref: KI of Social Consumption in India: Health

Source: National Sample Survey, 2014

Fig. 24. : Percentage distribution of persons by coverage of health expenditure support for each quintile class of UMPCE

Data from NSS, 2014 reveals a much bleaker outlook, as high as 86% of the rural and 82% of the urban population do not fall under the coverage of health expenditure support. “Government, however, was able to bring about 12% urban and 13% rural

population under health protection coverage through Rastriya Swasthya Bima Yojana (RSBY) for unorganized workers and those below poverty line, ESI for organized workers, CGHS for government employees and other state levels insurance plans that cover the below poverty line population.

The survey also tried to gauge if there was a significant impact of health expenditure on the budget of households.

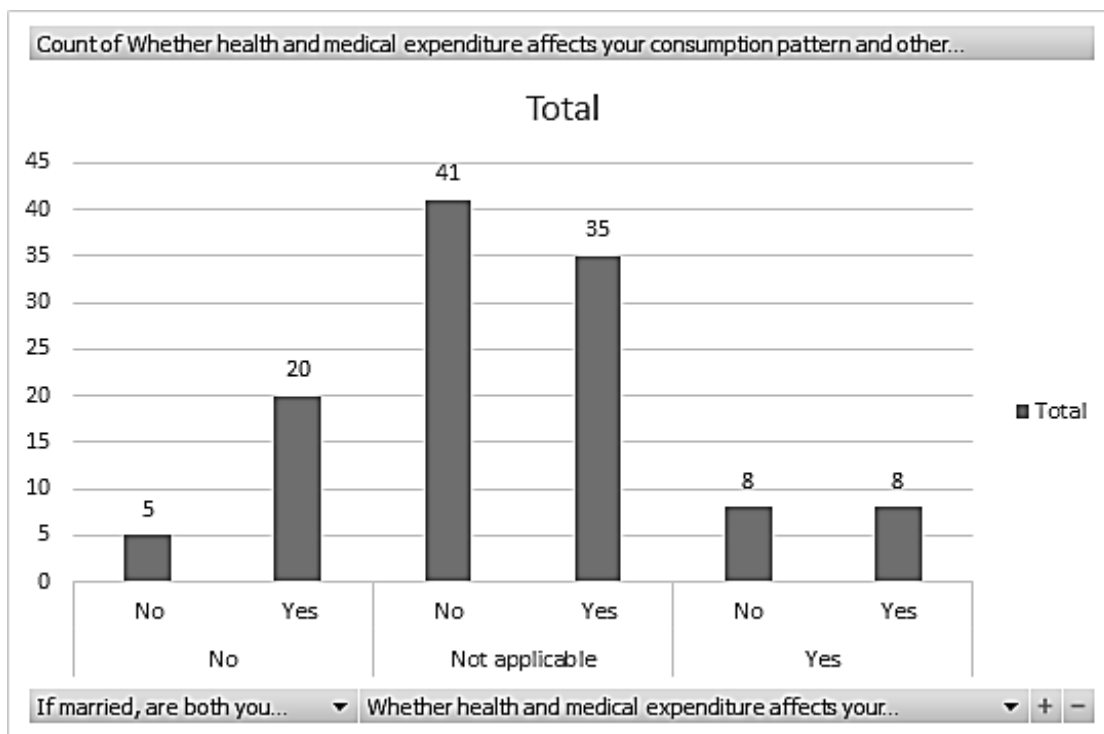


Fig. 25. : Whether medical expenditure is significant: Both spouses earn, one of the spouses earns, Unmarried

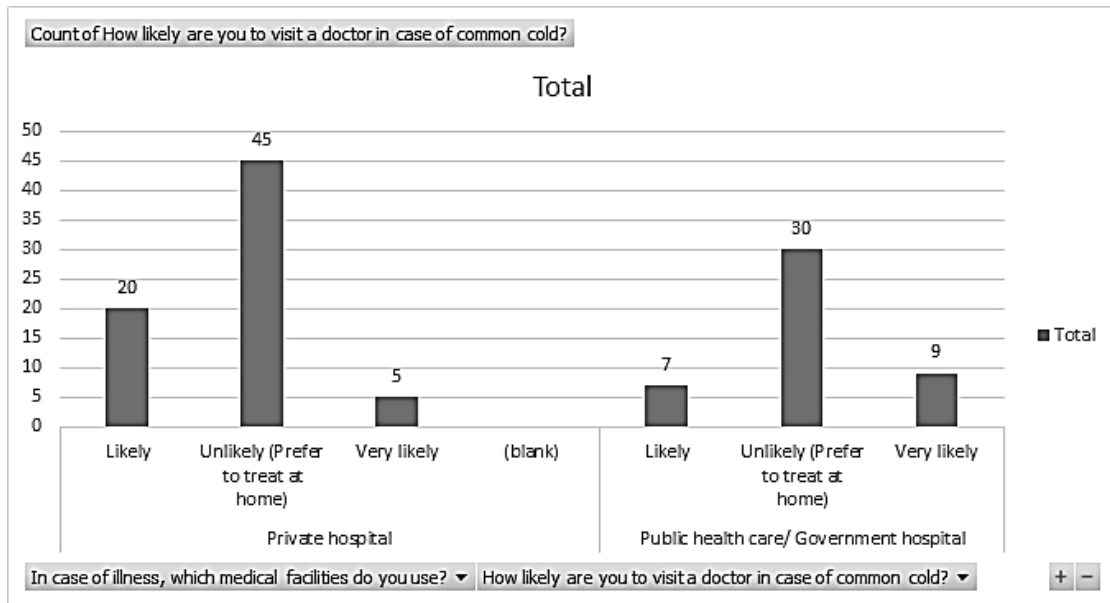


Fig. 26. : Frequency of hospital visits compared for respondents using Private and Public facilities

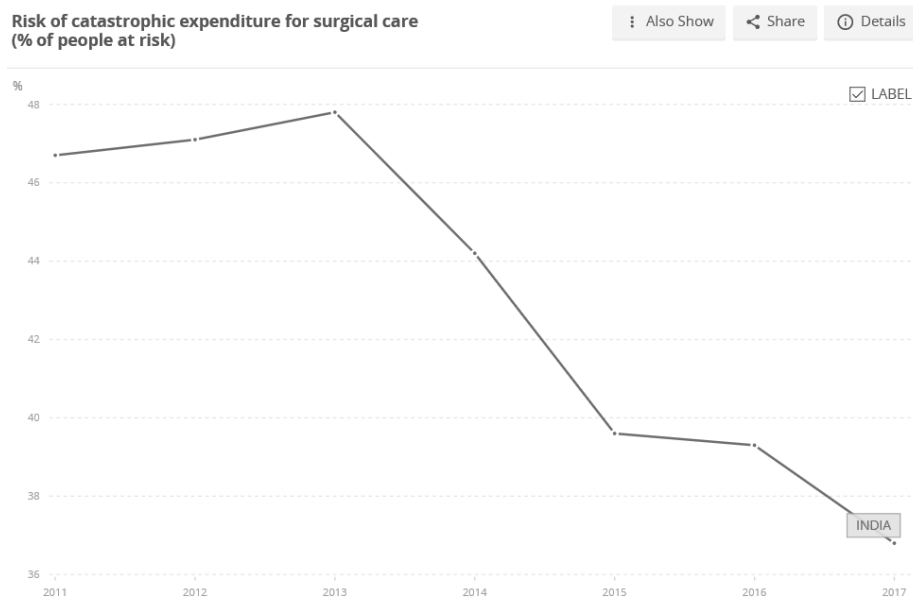


Fig. 27. : Percentage of people at risk of catastrophic expenditure for surgical care

Niger, a country in West Africa and Yemen, in West Asia top the list with 93.1% and 97.2% people at risk in 2017 respectively.

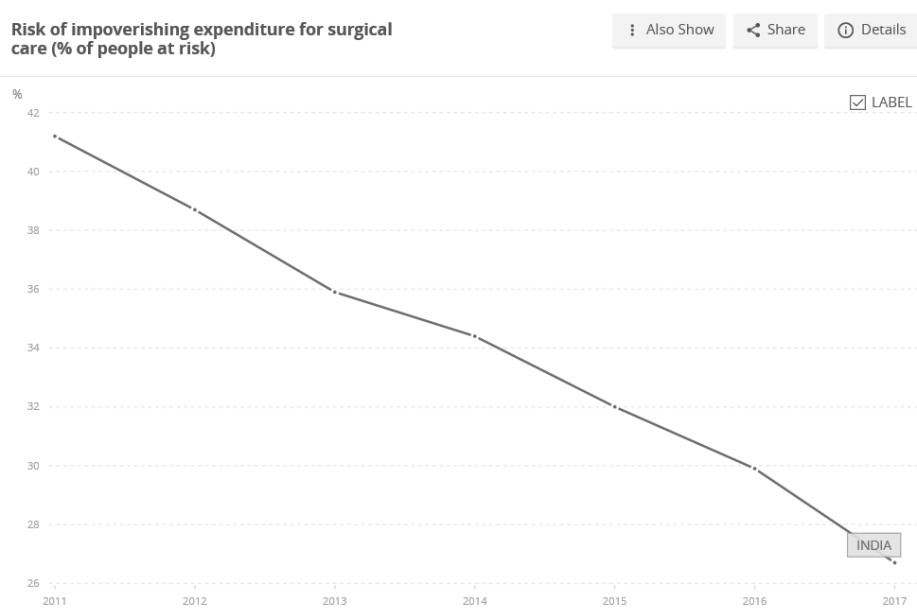


Fig. 28. : Percentage of people at risk of impoverishing expenditure for surgical care

Fig. 28 shows a gradual decline in the percentage of people at risk of impoverishing expenditure for surgical care in the last 6 years. In 2017, 26.7% people were at risk compared to 41.2% in 2011.

B. Modeling future healthcare costs

Motivation and assumptions

Deriving from the model developed by Thomas E. Getzen (2007) to predict long-term healthcare costs in US, we attempt to predict the Current per capita health expenditure in India using the historical longitudinal data for health expenditure, macro-economic and demographic factors.

Here, the Current Health Expenditure per capita is the sum total of domestic public and private health expenditure including “others”. Professor Thomas E. Getzen in his model used the variables: growth in real income (GDP); Inflation rate (Consumer price index) and the baseline value of share of GDP equivalent to Healthcare.

For the purpose of estimating the dependent variable CHE_US\$ (current health expenditure per capita) as a function of the independent variables: GDP annual growth rate; Inflation (the rate of inflation in the economy); annual growth rate of population aged 65 years and above, above variables adjusted for medical costs growth due to

changes in technology and innovation using the average of Life_expectancy(percentage change in life expectancy (years) year-on-year) and Mortality_rate (Percentage change in mortality rate year-on-year) as proxy for med_tech, the requisite historical data was collected from Global health Expenditure database and World Bank Data, Country Profile, India.

Following assumptions were made and (and few are verified statistically) in continuation with and in addition to the Thomas Getzen model:

- i. Basic structure of medical practice in India will not suddenly undergo radical change.
- ii. Current and historical figures are sound basis for projecting future expectations in healthcare expenditure rates.
- iii. Life expectancy and mortality rate are together sufficiently able to predict trend due medical technology and innovation.
- iv. Though there is a significant relationship between GDP per capita growth rate and Per capita health expenditure, bi-directional causality does not exist as proved by Granger's causality test.

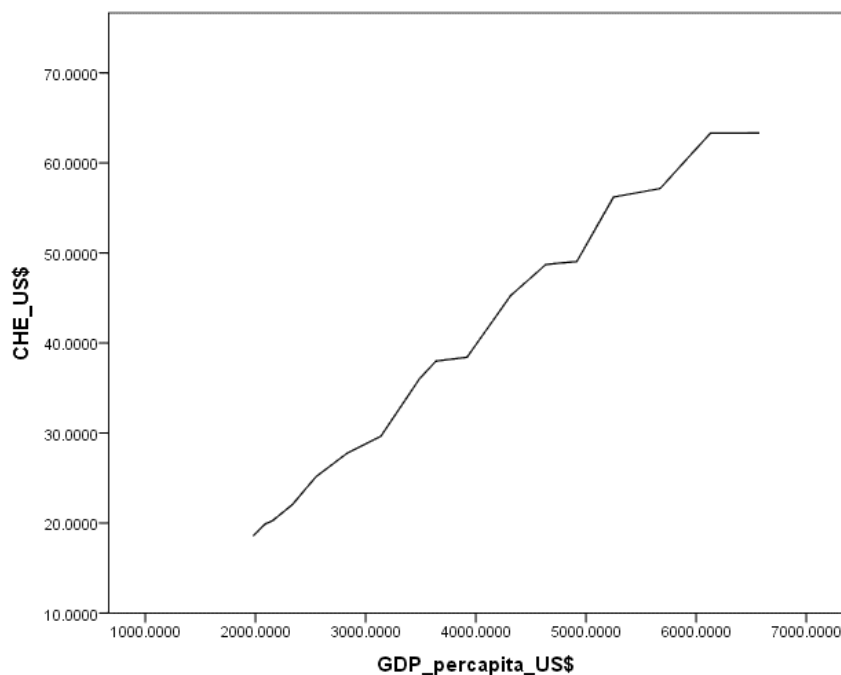


Fig. 29. : Relationship between total health expenditure and GDP per capita

Granger Causality Test is performed to check the direction of causality between the two variables in the case of India. The results obtained are as below:

Pairwise Granger Causality Tests			
Date: 05/26/19 Time: 20:28			
Sample: 1 18			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
GDP_PER_CAPITA_GROWTH__ANNUAL__ does not Granger Cause CURRENT_HEALTH_EXPENDITURE_CHE_PER_CAPITA_IN_US\$	15	3.00995	0.0948
CURRENT_HEALTH_EXPENDITURE_CHE_PER_CAPITA_IN_US\$ does not Granger Cause GDP_PER_CAPITA_GROWTH__ANNUAL__		1.17123	0.3491

Fig. 30. : Pairwise Granger Causality test in EViews

At 90% significance level, f statistic of 300095 with a p-value of 0.0948<0.1, we reject the Null hypothesis that GDP per capita growth does not Granger cause Current per capita health expenditure. Therefore, it is a strong determinant of CHE. Further, at 90% significance level, with a p-value of 0.3491>0.1, we fail to reject the null hypothesis that CHE_PER_CAPITA does not Granger Cause GDP per capita growth.

Testing the assumptions of linear regression

According to Basic Econometrics, Damodar N. Gujarati, “If multicollinearity is perfect, the regression coefficients of the X variables are indeterminate and their standard errors are infinite.”

To check multicollinearity, Variance Inflation Factor for all independent variables was computed in SPSS. While there is no multicollinearity in GDP_percapita_US\$ and Inflation, Pop_aged_ann_growth is slightly multi-collinear with CHE_US\$.

The data had no multicollinearity.

Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	Inflation	Pop_aged_ann_growth	med_tech	GDPanngrowthpercent
1	1	4.740	1.000	.00	.00	.00	.00	.00
	2	.151	5.606	.00	.26	.05	.00	.00
	3	.093	7.124	.00	.04	.03	.00	.74
	4	.011	20.617	.58	.45	.57	.01	.20
	5	.005	32.023	.41	.25	.35	.98	.06

a. Dependent Variable: CHE_US\$

Fig. 31. : SPSS output showing collinearity diagnostics

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-92.837	7.130		-13.021	.000					
	Inflation	.193	.516	.028	.373	.716	.036	.112	.019	.461	2.169
	Pop_aged_ann_growth	9.036	2.689	.277	3.361	.006	.575	.712	.171	.378	2.644
	med_tech	46.424	3.949	.822	11.755	.000	.957	.962	.597	.528	1.895
	GDPanngrowthpercent	.928	.410	.123	2.262	.045	.202	.563	.115	.872	1.147

a. Dependent Variable: CHE_US\$

Fig. 32. : Variance Inflation Factor with tolerance values for the four Independent variables (regressors) in the model

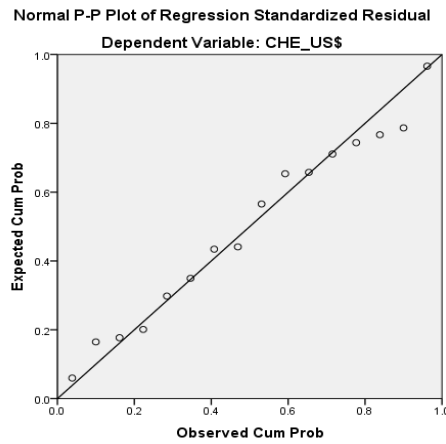
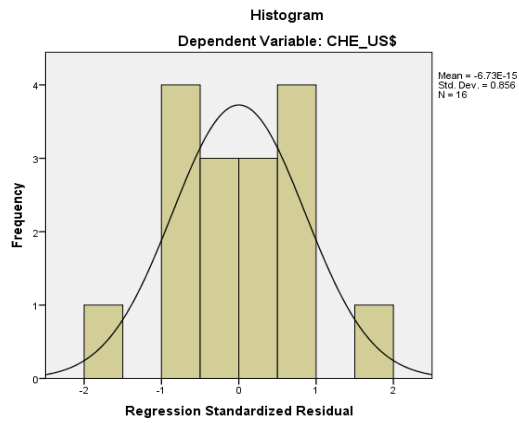
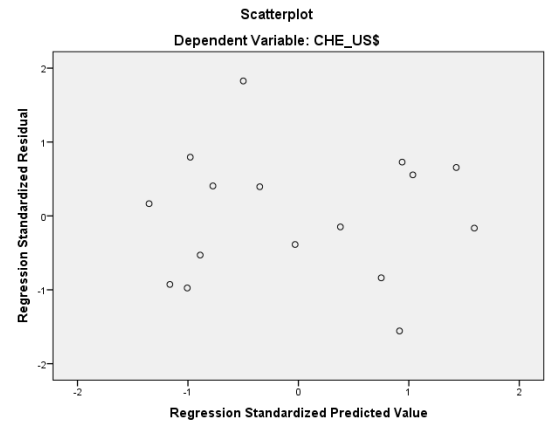


Fig. 33.: Plot of residuals reflecting a normal distribution



The scatter plot visualisation shows that there is no homoscedasticity.

To test for autocorrelation, the Durbin-Watson statistic was computed in SPSS. The Durbin-Watson statistic was found to be 1.731 (very close to 2). Therefore, no significant autocorrelation was found in the data.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.986 ^a	.972	.961	2.9801606	1.731

a. Predictors: (Constant), GDPanngrowthpercent, Inflation, med_tech, Pop_aged_ann_growth

b. Dependent Variable: CHE_US\$

Fig. 34. : Model Summary in SPSS Output

A coefficient of determination of 97.2% indicates a large amount of variation in healthcare expenditure being explained by the regressors in the model. When adjusted for the number of independent variables included in the model i.e. 4, the Adjusted R-Square comes out to be 96.1%.

VI. FINDINGS AND RECOMMENDATIONS

A. Health financing sources and impact on household expenditure

Nature of health insurance scheme/plan

116 responses

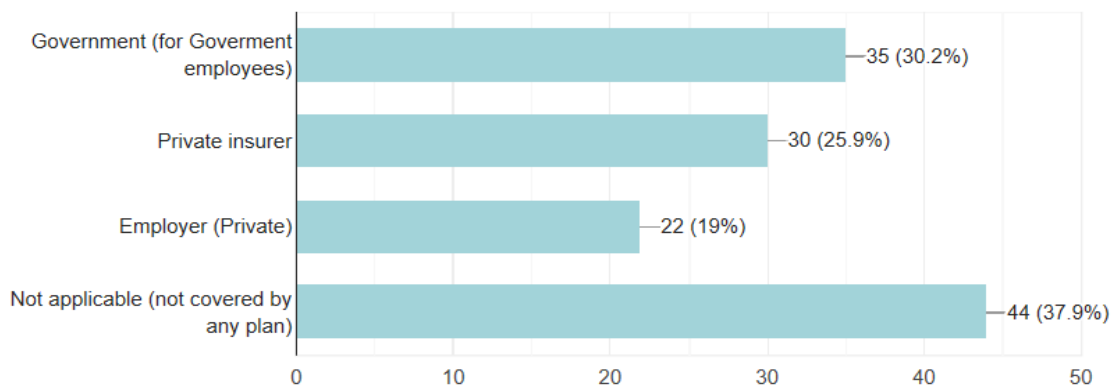


Fig. 35. : Bar chart depicting coverage of the sample individuals (respondents) under different health plans (Both Urban and Rural areas)

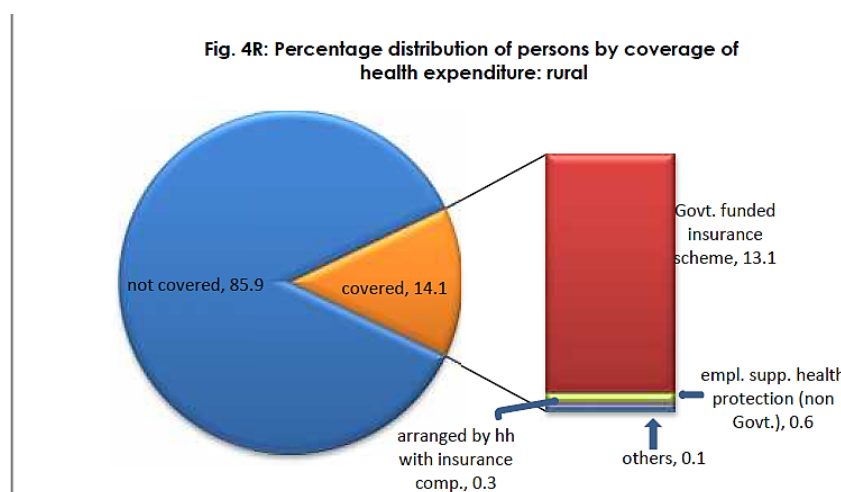
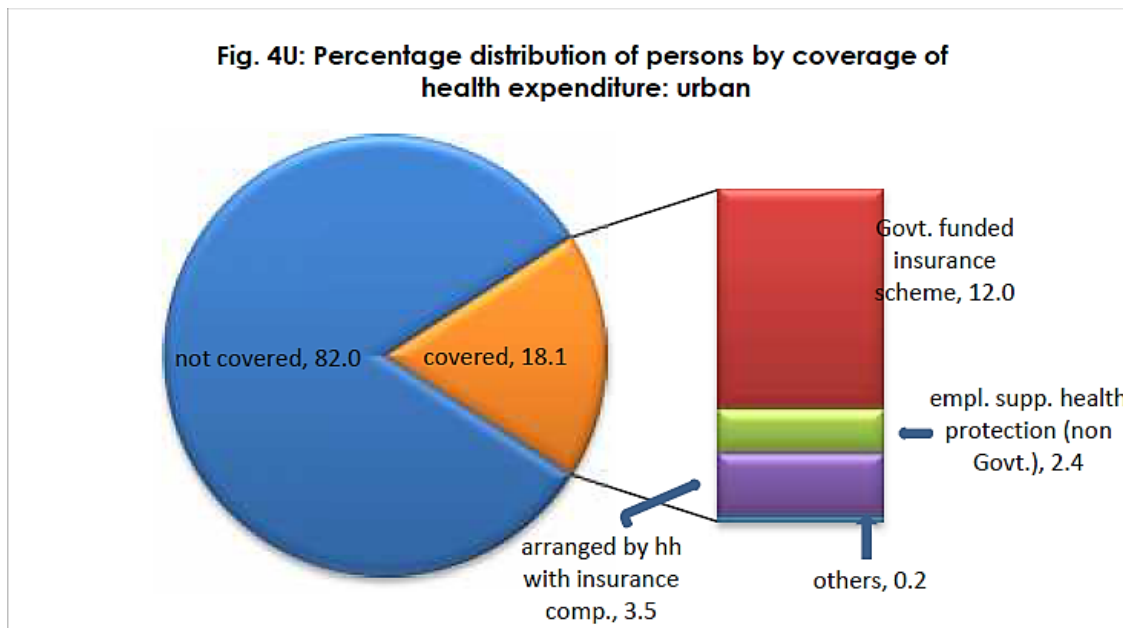


Fig. 36. : Percentage distribution of persons by coverage of health expenditure in rural areas, NSSO report



Source: NSSO Survey 71st Round Report, 2014

Fig. 37. : Percentage distribution of persons by coverage of health expenditure in urban areas, NSSO report

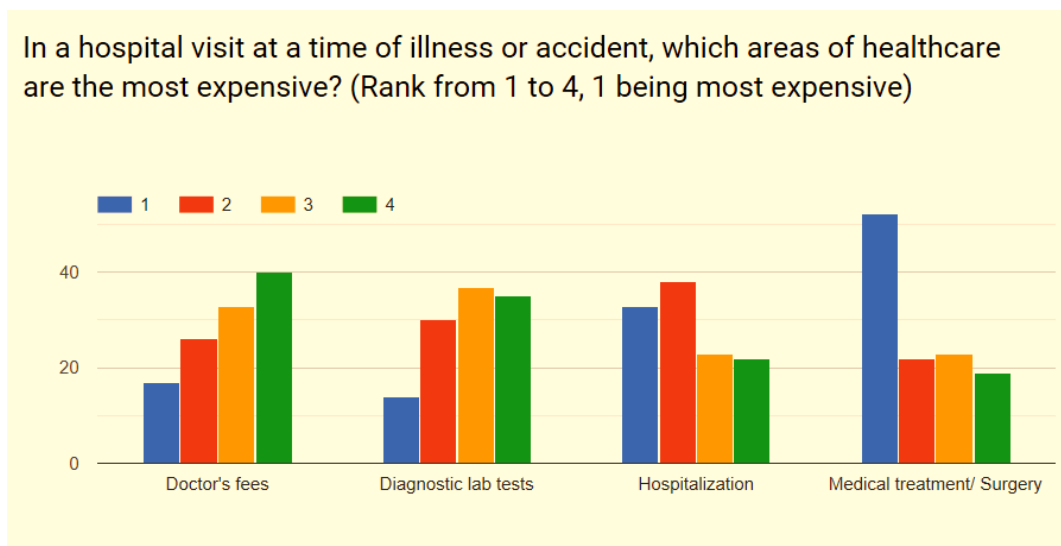
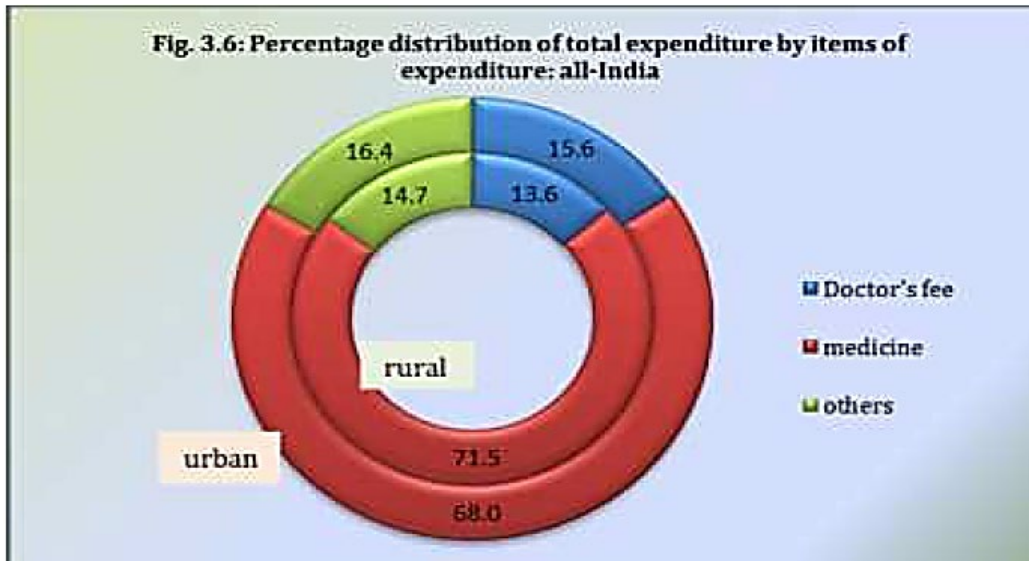


Fig. 38. : Survey results showing outlook of sample towards most expensive areas of healthcare administration

The respondents indicated Medical treatment as the most expensive followed by Hospitalisation, while diagnostic lab tests were ranked the lowest.



Source: NSSO Survey 71st Round Report, 2014

Fig. 39. : Actual percentage distribution of total expenditure by items of expenditure

At all-India level around 72% in rural sector and 68% in urban sector of the total medical expenditure was done for purchasing 'medicine'. Second in this list for both for rural (15%) and urban sector (16%) was 'Diagnostic test and other expenditure', followed by 'doctor's fee'.

What is your relied source of funds if long term care is required at a later point in time for you or some member of your household?

116 responses

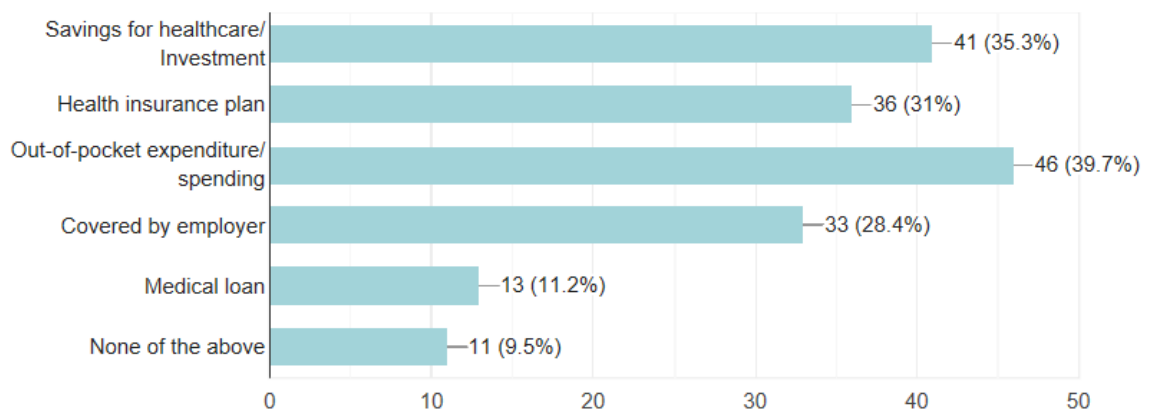
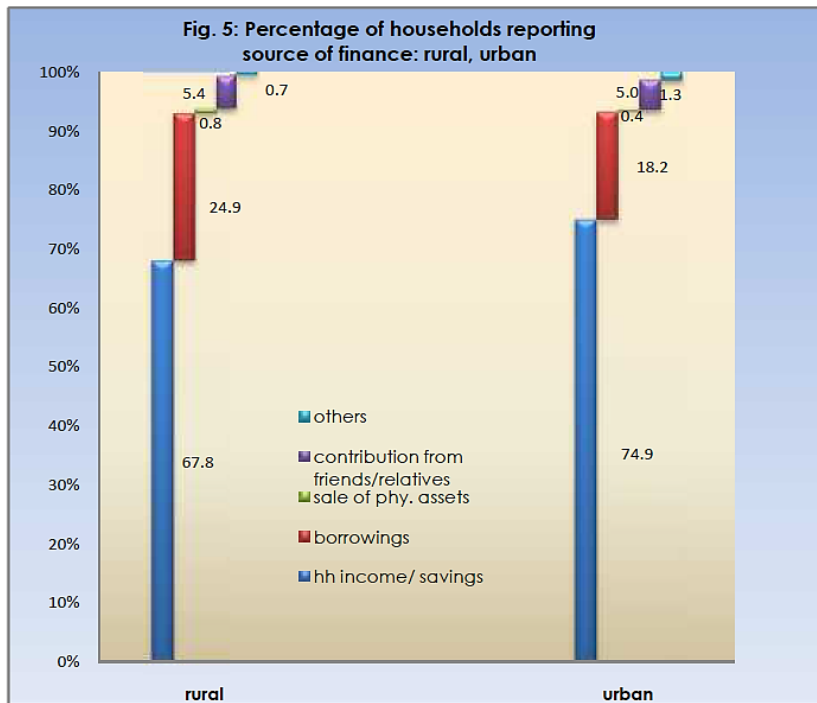


Fig. 40. : Perception of individuals about most reliable sources of health financing



Source: NSSO Survey 71st Round Report, 2014

Fig. 41. : Actual percentage of households reporting sources of health financing

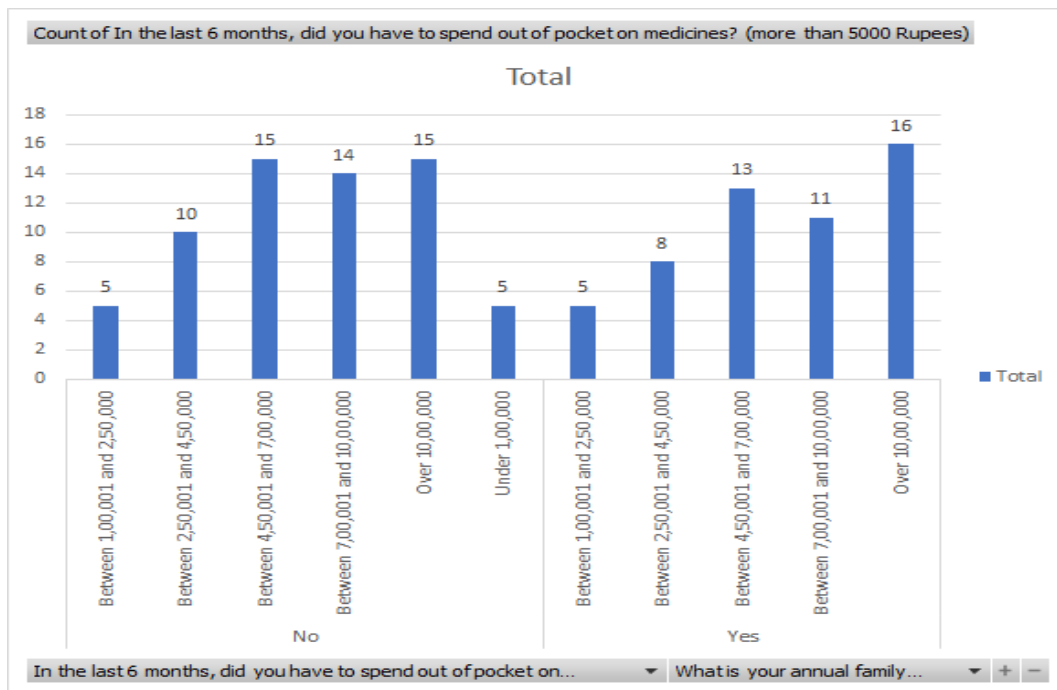


Fig. 42. : Income group wise out of pocket expenditure on medicine (in the 6 months before the survey)

B. Modeling future healthcare costs

The data produced the following insights about the different variables and relationships.

The 22-year average growth rate of GDP is 1.69%. (tradingeconomics.com/India/gdp-growth).

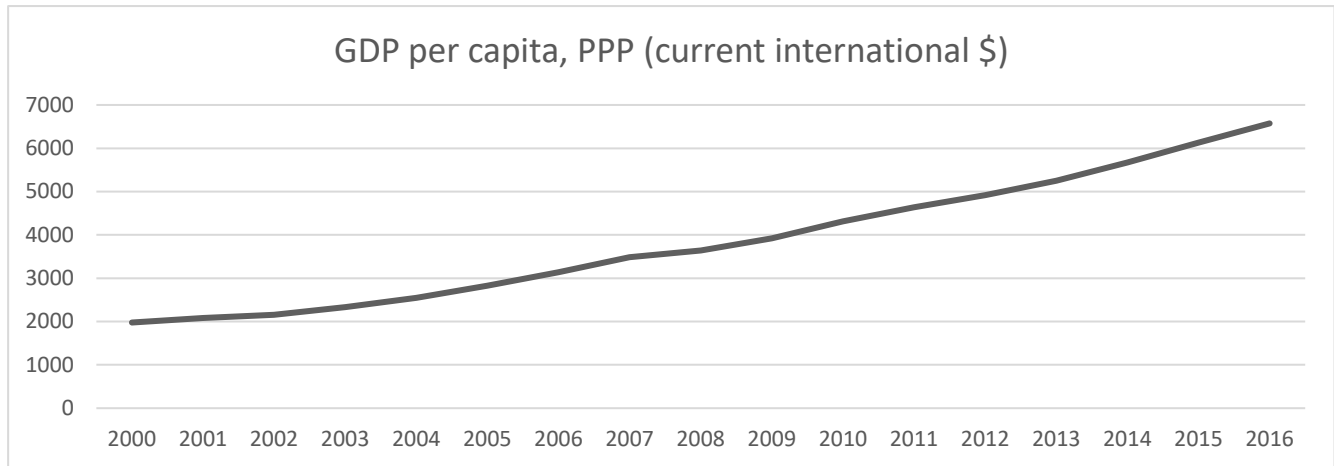


Fig. 43. : Trend in per capita GDP 2000-2016

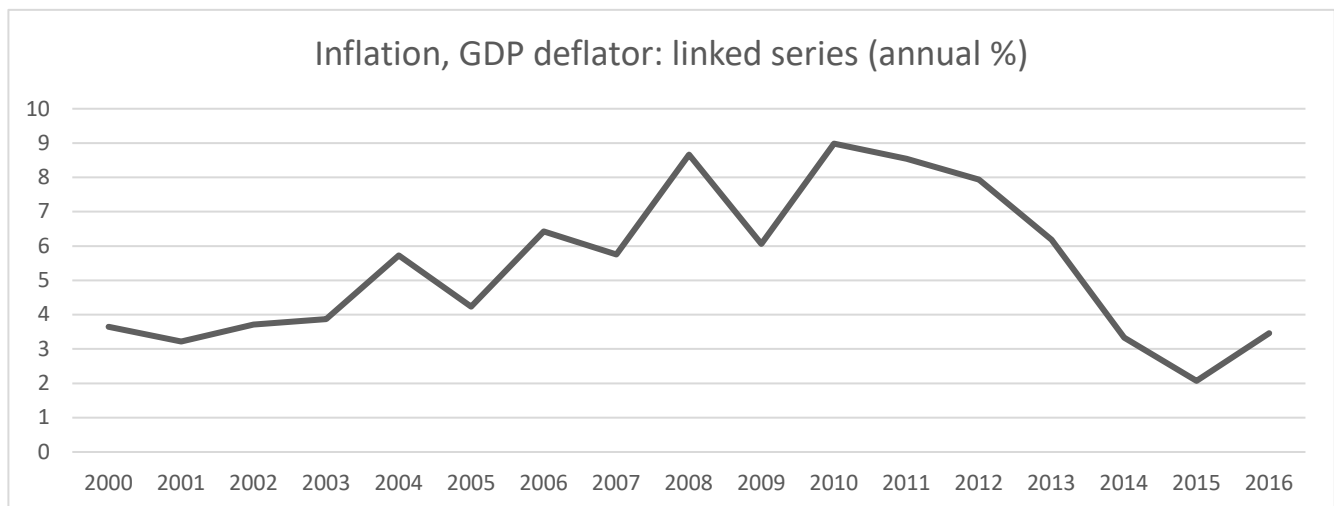


Fig. 44. : An increasing short-term trend is observed in inflation after 2015

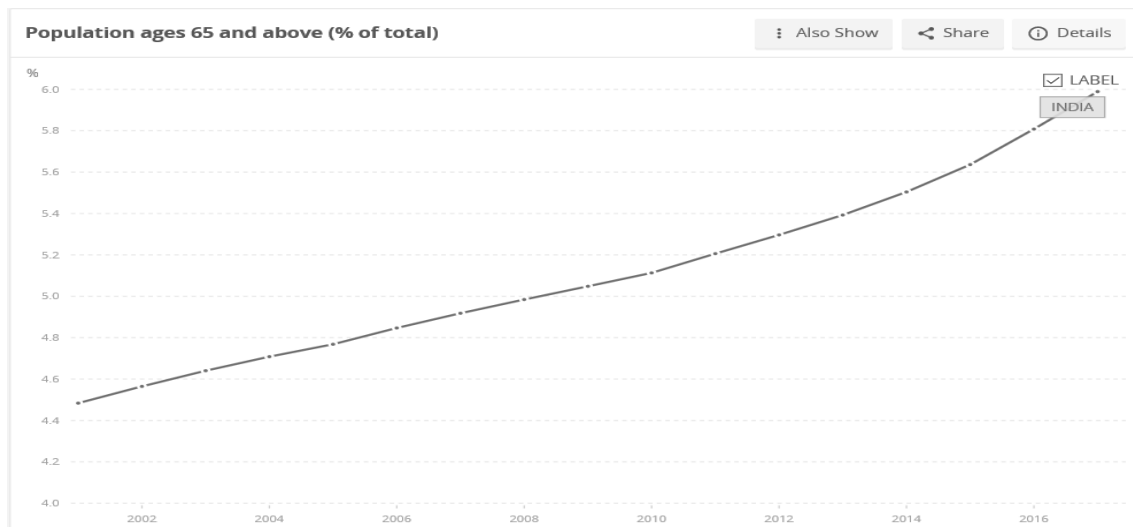


Fig. 45. : Trend in share of population aged 65 years and above in total population

After testing for the assumptions and analysing the data for developing the model, the following regression equation was arrived at for estimating the Health expenditure value in future.

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.986 ^a	.972	.961	2.9801606	1.731

a. Predictors: (Constant), GDPanngrowthpercent, Inflation, med_tech, Pop_aged_ann_growth

b. Dependent Variable: CHE_US\$

Fig. 46. : Coefficient of determination and Durbin-Watson statistic for the model

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics				
	B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF			
	1	(Constant)	-92.837			7.130							
	Inflation	.193	.516	.028	.373	.716	.036	.112	.019	.461	2.169		
	Pop_aged_ann_growth	9.036	2.689	.277	3.361	.006	.575	.712	.171	.378	2.644		
	med_tech	46.424	3.949	.822	11.755	.000	.957	.962	.597	.528	1.895		
	GDPanngrowthpercent	.928	.410	.123	2.262	.045	.202	.563	.115	.872	1.147		

a. Dependent Variable: CHE_US\$

Fig. 47. : Coefficients of the independent variables and their t values at significance level computed in spss

$$\text{CHE_US\$} = -92.837 + (0.193) * \text{Inflation} + (9.036) * \text{Pop_aged_ann_growth} + (0.928) * \text{GDPanngrowthpercent} + (46.424) * \text{med_tech}$$

Short-term values were calculated using the values of factors as inputs. These values were taken from the figures reported and forecasted by reputed organisations.

	CHE_US\$	Inflation	Pop_aged_ann_growth	med_tech	GDPanngrowthpercent
		%	%	%	
	Y	x1	x2	x3	x4
2017	39.66620289	3.6	1.763692	2.362413	6.68
2018	41.17836049	4.74	1.753009	2.381339	7.23
2019	41.93094632	4.89	1.743208	2.401434	7.1
2020	42.97490188	4.57	1.739564	2.423959	7.2

Fig. 48. : Per capita Health Expenditure values till 2020, Test data

	CHE_US\$	Inflation	Pop_aged_ann_growth	med_tech	GDPannngrowthpercent
	Y	x1	x2	x3	x4
2017	39.66620289	3.6	1.763692	2.362413	6.68
2018	41.17836049	4.74	1.753009	2.381339	7.23
2019	41.93094632	4.89	1.743208	2.401434	7.1
2020	42.97490188	4.57	1.739564	2.423959	7.2
2021	43.3909634	4.57457	1.75	2.429835	7.25184
2022	43.71474497	4.579145	1.75	2.435739	7.304429
2023	44.04057147	4.583724	1.75	2.441672	7.357784
2024	44.36846825	4.588307	1.75	2.447634	7.411921
2025	44.69846119	4.592896	1.75	2.453625	7.466857
2026	45.03057676	4.597489	1.75	2.459645	7.522611
2027	45.36484202	4.602086	1.75	2.465695	7.579201
2028	45.70128462	4.606688	1.75	2.471774	7.636645
2029	46.03993286	4.611295	1.75	2.477884	7.694964
2030	46.38081568	4.615906	1.75	2.484024	7.754176
2031	46.72396272	4.620522	1.75	2.490194	7.814303
2032	47.06940429	4.625143	1.75	2.496395	7.875367
2033	47.41717143	4.629768	1.75	2.502627	7.937388
2034	47.76729593	4.634398	1.75	2.508891	8.00039
2035	48.11981037	4.639032	1.75	2.515185	8.064397
2036	48.4747481	4.643671	1.75	2.521511	8.129431
2037	48.83214334	4.648315	1.75	2.527869	8.195519
2038	49.19203115	4.652963	1.75	2.534259	8.262685
2039	49.55444748	4.657616	1.75	2.540682	8.330957
2040	50.05779325	4.662274	1.765313	2.547137	8.400362
2041	50.56617424	4.666936	1.780894	2.553625	8.470928
2042	51.07969383	4.671603	1.796752	2.560146	8.542685
2043	51.59845867	4.676274	1.812894	2.5667	8.615662
2044	52.12257895	4.680951	1.829327	2.573288	8.689892
2045	52.65216846	4.685632	1.846059	2.57991	8.765406
2046	53.18734477	4.690317	1.863098	2.586566	8.842238
2047	53.72822943	4.695008	1.880454	2.593256	8.920424
2048	54.27494812	4.699703	1.898135	2.599981	8.999998
2049	54.82763084	4.704402	1.916149	2.606741	9.080997

2050	55.3864121	4.709107	1.934507	2.613536	9.163462
2051	55.95143115	4.713816	1.953219	2.620367	9.247431
2052	56.52283219	4.71853	1.972294	2.627233	9.332946
2053	57.10076457	4.723248	1.991744	2.634135	9.42005
2054	57.68538311	4.727971	2.011579	2.641074	9.508787
2055	58.27684829	4.732699	2.031811	2.648049	9.599204
2056	58.87532656	4.737432	2.052453	2.655062	9.691349
2057	59.48099062	4.742169	2.073516	2.662111	9.785271
2058	60.09401973	4.746912	2.095013	2.669198	9.881023
2059	60.71460006	4.751659	2.116958	2.676322	9.978657
2060	61.34292502	4.75641	2.139366	2.683485	10.07823
2061	61.97919561	4.761167	2.16225	2.690686	10.1798
2062	62.62362086	4.765928	2.185627	2.697926	10.28343
2063	63.27641822	4.770694	2.209512	2.705205	10.38918
2064	63.93781399	4.775464	2.233921	2.712523	10.49711
2065	64.60804385	4.78024	2.258873	2.719881	10.6073
2066	65.28735329	4.78502	2.284386	2.727278	10.71982
2067	65.97599822	4.789805	2.310478	2.734716	10.83473
2068	66.6742455	4.794595	2.33717	2.742195	10.95212
2069	67.38237355	4.799389	2.364481	2.749715	11.07207
2070	68.10067305	4.804189	2.392435	2.757276	11.19466
2071	68.8294476	4.808993	2.421054	2.764878	11.31998

Fig. 49. : Long term forecast of Health expenditure till 2071

If the input variables in the model follow the assumed trend the per capita health expenditure is set to rise by over 74% from its current value in 55 years (half a century). It will be offset partially by a corresponding increase in incomes and Gross Domestic Product but sufficient enough to adversely impact the household budget.

VII. CONCLUSION

The challenges outlined almost 25 years ago and still in continuum include inequity in resource allocation in the healthcare sector, an extremely high disease burden, fee-for-service reimbursement to medical providers and utilization of Information Technology at a nascent stage among all others mentioned throughout this study. India has come a long way having increased the Government expenditure on healthcare almost 3 times in absolute value terms but a meagre 1.26% growth in share of Government share in Total health expenditure. (still a very long way to go!)

Government interventions are not able to achieve a sufficient level of coverage aggravating the menace of Average medical expenditure per hospitalisation in a private hospital being as high as 4 times that in Public hospitals. Rising non-communicable disease burden, high cost structure of availing healthcare services from private providers are aggravating healthcare expenditure in the country. Preponderance of OOP expenditure is evident in primary research as well as industry reports.

Further, in the Indian context like other developing countries, on predicting healthcare expenditure as a function of Inflation rate, Growth rate of population aged above 65 years and trend due to advancement in medical technology, we estimate over 80% rise in medical expenditure in 50 years. The situation calls for serious efforts by Government and innovators to search for alternative ways of reducing the cost burden on the patients in India.



RECOMMENDATIONS

There is a need to stabilize costs in the secondary and tertiary healthcare to ultimately lessen the cost burden on the patient in catastrophic and chronic illness. Value based care is an alternative payment model conceptualised in the western nations. Further research is based on identifying parameters for measuring the value of healthcare to justify the costs in terms of quality. Introduction of such model in public healthcare providers and then incentivised introduction in the private sector is recommended.

This way the payment model rewards better patient health outcomes, provider performance, and quality of care. Value based payment can be a source of arrangements that incentivize quality and performance improvements that support efficient, cost-effective care.

RESEARCH IMPLICATIONS

This research holds an implication both for the research community and the practitioner community. It serves as a platform for understanding the current scenario of healthcare expenditure and financing in the country and the challenges entwined. A sounder targeting of healthcare delivery can address the pain points of a large proportion of population. Catastrophic expenditure on health can have adverse long-term implications for those involved. For the research community it fuels the need to look into alternative approaches to financing and payment models to reduce the ultimate cost-burden on the patients and the household.

VIII. LIMITATIONS OF THE STUDY

Sample for the survey could not be chosen to be fully representative of the population. Sample size was small. Life expectancy and mortality rate have been used as proxies for growth in medical technology and innovation trends. The chosen variables might not be sufficiently enough correlated with medical technology growth trends. The variables chosen are not exhaustive, though multiple regression accounts for the error due to incorrect inclusion of variable bias, a strong exogenous influencer with significant impact on health expenditure might be left-out. Due to unavailability and other issues unstructured interview with industry professionals could not be conducted. These interactions can be vital in understanding the intricacies to objectively arrive at the conclusion and recommendations.

IX. SOME IMPORTANT DEFINITIONS

This study uses some terms related to macroeconomic and demographic characteristics of healthcare and healthcare expenditure. The definitions of the same are as given by the World Bank are provided below:

- 1) *Domestic per capita private health expenditure (current US\$)*: “Current private expenditures on health per capita expressed in current US dollars. Domestic private sources include funds from households, corporations and non-profit organizations. Such expenditures can be either prepaid to voluntary health insurance or paid directly to healthcare providers.”
- 2) *Domestic private health expenditure (% of current health expenditure)*: “Share of current health expenditures funded from domestic private sources. Domestic private sources include funds from households, corporations and non-profit”
- 3) *Out-of-pocket expenditure per capita (current US\$)*: “Health expenditure through out-of-pocket payments per capita in USD. Out of pocket payments are spending on health directly out of pocket by households in each country”.
- 4) *Out-of-pocket expenditure (% of current health expenditure)*: “Share of out-of-pocket payments of total current health expenditures. Out-of-pocket payments are spending on health directly out-of-pocket by households.”
- 5) *Domestic general government health expenditure per capita (current US\$)*: “Public expenditure on health from domestic sources per capita expressed in current US dollars”
- 6) *Domestic general government health expenditure (% of current health expenditure)*: “Share of current health expenditures funded from domestic public sources for health. Domestic public sources include domestic revenue as internal transfers and grants, transfers, subsidies to voluntary health insurance beneficiaries, non-profit institutions serving households (NPISH) or enterprise financing schemes as well as compulsory prepayment and social health insurance contributions.”
- 7) *External health expenditure per capita (current US\$)*: “Current external expenditures on health per capita expressed in current US dollars. External sources are composed of direct foreign transfers and foreign transfers

distributed by government encompassing all financial inflows into the national health system from outside the country.”

- 8) *External health expenditure (% of current health expenditure)*: “Share of current health expenditures funded from external sources. External sources compose of direct foreign transfers and foreign transfers distributed by government encompassing all financial inflows into the national health system from outside the country. External sources either flow through the government scheme or are channelled through non-governmental organizations or other schemes.”
- 9) *Current health expenditure per capita (current US\$)*: “Current expenditures on health per capita in current US dollars. Estimates of current health expenditures include healthcare goods and services consumed during each year.”
- 10) *Current health expenditure (% of GDP)*: “Level of current health expenditure expressed as a percentage of GDP. Estimates of current health expenditures include healthcare goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT and stocks of vaccines for emergency or outbreaks.”
- 11) *Life expectancy at birth, total (years)*: “Life expectancy at birth indicates the number of years a new born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.”
- 12) *Mortality rate, infant (per 1,000 live births)*: “Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year.”
- 13) *GDP per capita (current US\$)*: “GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.”
- 14) *GDP per capita growth (annual %)*: “Annual percentage growth rate of GDP per capita based on constant local currency. Aggregates are based on constant

2010 U.S. dollars. GDP per capita is gross domestic product divided by midyear population. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.”

- 15) *Inflation, GDP deflator (annual %)*: “Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency

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