Quality of Service (QoS) in Indian Healthcare and its Impact on the Consumer's Choice of the Level of Care (LoC)

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Abstract

This study analyzed consumers' choice of hospitals or Level of Care (LoC) as it is called by the National Sample Survey Office (NSSO). The Government of India has been conducting Health surveys and the 75th survey is the recent data on the usage of healthcare across India. The data comprises of all the states and Union Territories. The hospitalization data of the survey contains the consumer inputs on why they do not choose Government or Public Hospitals (GH). It also contains the prior and first subsequent hospitalization inputs. Using this, a Pareto analysis was conducted to know the reasons consumers state for not using GH. Also, the previous experience of the consumers and the subsequent choice have been arrived using a Decision Tree. This study has consolidated the reasons for the choice of LoC and this has subsequently helped to arrive at a tentative model that can be analyzed in further research. The objective of this study is to understand the challenges and consumer perceptions to assist in evolving healthcare in India. This is conducted at a time when India is transforming its healthcare mission amid a very intense combat of the COVID-19. The Prime Minister of India has also announced in the 74th Independence Day speech on the 15th of August 2020 about the National Digital Health Mission (NDHM) making it very apt to look at the past, present and future of Indian Healthcare.

Keywords
Health Insurance, Healthcare, Level of care, Quality of service, Hospitals

1. Introduction
Nearly 63 million people of India are in debt due to health care expenses and a third of the population is driven below poverty line due to the same (Source: https://www.governancenow.com/news/regular-story/63-million-indians-are-in-debt-due-healthcare-expenditure-report). It is a very ambitious goal to think of finding a solution to this issue in one research paper. However, this paper serves to give a good introduction to the literature review, existing landscape, the stakeholders, and the status. There is a wide and deep research that has happened in various geographies across various segments of insurance. Section 1 reviews the literature from the prior research and narrows down the scheme and impacting factor that will be focused on. Section 2 explains the healthcare and health insurance in India. Section 3 elaborates on the NSSO data and focuses on an analysis on the reasons consumers do not choose Government or Public hospitals. Section 3 plunges into a Decision Tree with the voluminous data to suggest how the choice of the LoC is calculated. Section 4 proposes a model how these come together, and a final section suggests the possibilities for further research.

1.1 Objectives
Good health leads to happiness for individuals (Angner et al, 2010) and economic growth for a nation (Smith, 2012). Many times, good health is not available or affordable to everyone. While nations strive to make universal healthcare possible, there are still wide gaps to make it accessible for everyone. This situation is very similar in developed economies as well of developing economies. While there are pockets of success in certain South Asian nations, India is still way behind in its journey (Sen and Lamont, 2015). India ranks almost in the last quartile among sovereign countries in terms of quality and accessibility of healthcare (145th among 195 countries). Affordability is the key to accessibility. Affordability is not simple to implement; it requires creative, out-of-the-box thinking. To deliver affordability, we require innovation—innovation in discovering drugs, developing therapeutics and delivering healthcare (Mazumdar-Shaw, 2018). To make healthcare available for everyone, it is very important to get the public, private and Charitable / Trust / NGO led hospitals (CT) to be on par with the healthcare delivery. Many people in

India shun the Government and Public hospitals and this study explores the concerns and subsequent decisions in a systematic way using the tools of Operations Management research.

2. Literature Review

Insurance is an age-old industry. Healthcare is a need for everyone. Research has happened far and wide in this industry across different dimensions. Financial burden on households due to healthcare is high in India but only small segments of the population are covered with health insurance (Vellakkal, 2013). Protecting households from high out-of-pocket (OOP) payments for health care is an important health system goal. High OOP payments can push households into poverty and make them vulnerable to catastrophic health expenditures. In countries like India where the health system is highly privatized and insurance coverage low, it is critical that people, particularly the poor, are protected from high OOP payments for health care (Shahrawat and Rao, 2012). Despite this high spending on OOP expenditure by individuals, the provision of health care, that is adequate in terms of quality and access, is becoming more and more problematic (Ellis et al, 2000). UHC brings great equity and an overall health achievement for the nation, since the remedying of many of the most easily curable diseases and the prevention of readily avoidable ailments get left out under the out-of-pocket system, because of the inability of the poor to afford even very elementary healthcare and medical attention (Sen and Lamont, 2015). Political commitment and intellectual leadership are required for Universal Health Care (Sen and Lamont, 2015). Given this background, understanding the various health insurance schemes in India, their target segments, impact, extent and quality of coverage, financing options and limitations is of paramount importance to steer the direction of the research in an area that is of immediate focus. (Ellis et al, 2000) have conducted an extensive study almost two decades back which is still very relevant in many areas. The various health insurance schemes as they stand today can be broadly classified as Private Health Insurers, Social Health Insurance, Government Sponsored Schemes, Community Based Schemes. Social Health Insurance comprises of Central Government Health Scheme (CGHS), Employee State Insurance Scheme (ESIS). Social Health Insurance and Employer offered Health Insurance Schemes could be considered under Group insurance for the purposes of this paper. Government-sponsored health insurance schemes (GSHISs) can serve as change agents for achieving universal coverage (La Forgia and Nagpal, 2012). Two approaches namely Government Health Scheme Rashtriya Swasthya Bima Yojana (RSBY) and Rajiv Aarogyasri Community Health Insurance (Aarogyasri) have been critically evaluated and factors that impact the accessibility of universal health care are summarized (Sriram, 2018). Some critical findings from the paper that are detrimental to the adoption of health insurance are lack of enrolment, unavailability of eligible participants, higher cost for enrolment and high migration rates (Bradley-Springer, 2012) (Shukla and Singh, 2018) (Wilkinson and Marmot, 2003). There had been multiple instances of denial of treatment due to unresolved disputes between the hospital and the insurer. All these summarize the factors as price control, effective governance, adequate quality control, patient protection and information transparency (Sriram, 2018) . There is an immediate need for greater information for assessing the prices, quality and access of providers and their patterns of operation (Ellis et al, 2000) in addition to the beneficiaries information. Blockchain technology has the potential to address the interoperability challenges currently present in health IT systems and to be the technical standard that enables individuals, health care providers, health care entities and medical researchers to securely share (Liang et al, 2012) electronic health data (Datta et al, 2015) (de Vries and Huijsman, 2011). The theories that are relevant from a decision-making perspective in health insurance are already researched and summarized (Schneider, 2004). During and after the pandemic, there have been research on the quality of service in healthcare that focused on certain aspects of healthcare. The impact on essential healthcare due to COVID-19 on endemic infectious diseases in South East Asia (Gadsden et al, 2022), transforming health service delivery in India addressing the human resource needs in public health (Zodpey et al, 2021), the causes and determinants for utilization of healthcare services in private and public facilities (Rout et al). In addition to these, the use of technology such as telehealth during COVID-19 to accelerate the provision of quality healthcare in India (Bhatia, 2021) discusses about healthcare in general. In this paper, we consider the level of service historically and how it impacts the choice of the level of care the subsequent time.

3. Methods

This study uses quantitative research methods and Quality control tools to analyze the data from NSSO. The data from NSSO consists of 13 blocks of information. Among these blocks, Block 6 contains the hospitalization information and is structured in Table 1.

Table 1. Hospitalization information and is structured

	Sch. 25.0 : LEVEL - 05 (Block 6)						
srl. no.	**Item**	**Schedule reference**			**Length**	**Byte position**	**Remarks**
		Block	**Item**	**Col.**			
1	Common-ID				34	1	Auto-duplicated
2	Level				2	35	"05" Generated
3	Filler				1	37	"0" Generated
4	Srl. no. of hospitalisation case	6	1	All	2	38	
5	Srl. no. of member hospitalised (as in col. 1, bl. 4A & 4B/ 5)	6	2	All	2	40	
6	Age (as in col. 5, bl. 4A & 4B/ col. 4, bl.5)	6	3	All	3	42	
7	Nature of ailment	6	4	All	2	45	
8	Nature of treatment	6	5	All	1	47	
9	Type of medical institution	6	6	All	1	48	
10	Reason for not availing govt./public hospital	6	7	All	1	49	
11	Type of ward	6	8	All	1	50	
12	When admitted	6	9	All	1	51	
13	When discharged	6	10	All	1	52	
14	Duration of stay in hospital (days)	6	11	All	3	53	
15	Surgery	6	12	All	1	56	
16	Medicine	6	13	All	1	57	
17	X-ray/ ECG/ EEG/ Scan	6	14	All	1	58	
18	Other diagnostic tests	6	15	All	1	59	
19	Treated before hospitalisation	6	16	All	1	60	
20	If 1 in item 15, nature of treatment	6	17	All	1	61	
21	If 1 in item 15, level of care	6	18	All	1	62	
22	If 1 in item 15, duration of treatment (days)	6	19	All	5	63	
23	Treatment continued after discharge?	6	20	All	1	68	
24	If 1 in item 19, nature of treatment	6	21	All	1	69	
25	If 1 in item 19, level of care	6	22	All	1	70	
26	If 1 in item 19, duration of treatment (days)	6	23	All	3	71	
27	Blank				53	74	
28	NSS				3	127	
29	NSC				3	130	
30	MULT				10	133	

4. Data Collection

There is a total of 93,925 hospitalization records in this data. In these 40,427 hospitalization cases have provided reasons for not choosing a Govt Hospital. These are all the people who have not availed Govt Hospital. They have either chosen Charitable/Trust/NGO run hospital or private hospital. 17,444 people went to Govt Hospital the first time out of the 32,176 hospitalizations. (i.e.) 54.21% of the hospitalizations first time.

With these inputs, a Pareto analysis was done on the data (Table 2) and shown in Figure 1.

Table 2 Input data for Pareto analysis

Reason Detail	Total	Reason %	Cumulative %
Quality not satisfactory / Doctor not available	16440	36%	36%
Preference for trusted doctor / hospital	11669	26%	62%
Specific service not available	6351	14%	76%
Long waiting	6157	14%	90%
Others	2295	5%	95%
Facility too far	2156	5%	100%
Financial constraint	98	0%	100%
Total	**45166**	**100%**	

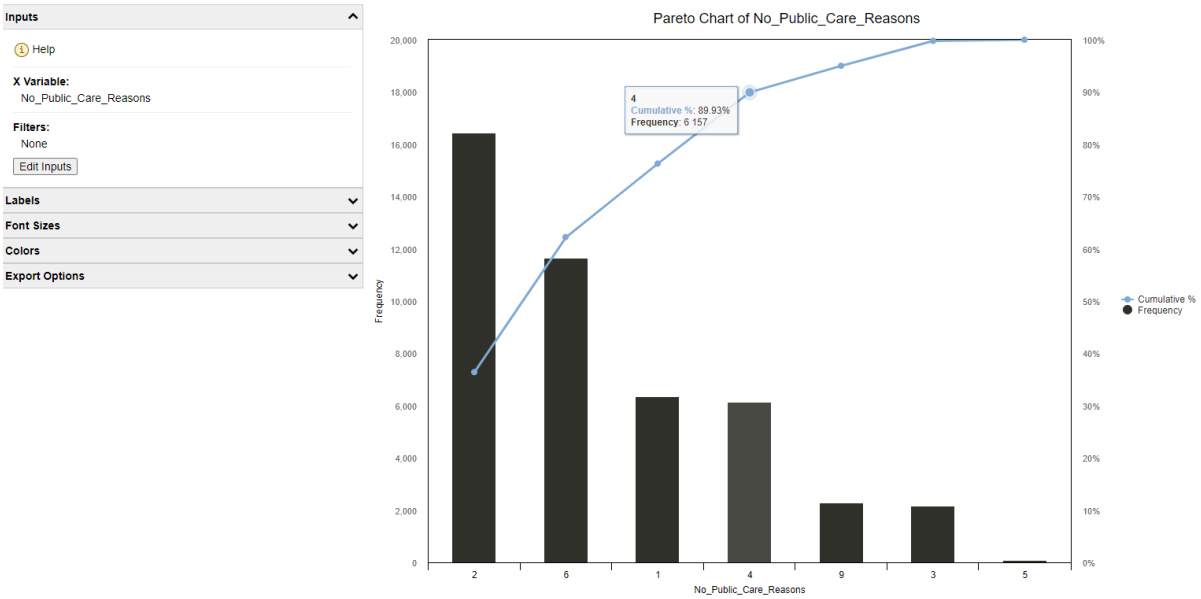

Figure 1. Pareto analysis

At an overall perspective, 90% of the concerns are in the top 4 reasons such as quality not satisfactory or doctor not available, preference for a trusted doctor / hospital, specific service not available and long waiting lines. The data also contains the information about the consumers about the prior LoC choice and the subsequent Loc choice. Using these three values, a model is conceived in Figure 2.

Table 3. Probabilities are calculated for the various paths of choices consumers make

Hospital 1	# H1	P(H1)	Hospital 2	# H2	P(H2)	Hospital 3	# H3	P(H3)
0. NH	32177	0.34	1. GH	17444	0.54	0. NH	4508	0.258
0. NH			1. GH			1. GH	12210	0.700
0. NH			1. GH			2. CT	51	0.003
0. NH			1. GH			3. PH	282	0.016
0. NH			1. GH			4. PC	335	0.019
0. NH			1. GH			5. IHC	58	0.003
0. NH			2. CT	615	0.02	0. NH	98	0.159
0. NH			2. CT			1. GH	42	0.068
0. NH			2. CT			2. CT	392	0.637
0. NH			2. CT			3. PH	60	0.098
0. NH			2. CT			4. PC	22	0.036
0. NH			2. CT			5. IHC	1	0.002
0. NH			3. PH	14118	0.44	0. NH	1932	0.137
0. NH			3. PH			1. GH	416	0.029
0. NH			3. PH			2. CT	64	0.005
0. NH			3. PH			3. PH	10658	0.755
0. NH			3. PH			4. PC	1026	0.073
0. NH			3. PH			5. IHC	22	0.002
1. GH	29118	0.31	1. GH	24894	0.85	0. NH	3450	0.139
1. GH			1. GH			1. GH	20977	0.843
1. GH			1. GH			2. CT	50	0.002
1. GH			1. GH			3. PH	188	0.008
1. GH			1. GH			4. PC	157	0.006
1. GH			1. GH			5. IHC	72	0.003
1. GH			2. CT	308	0.01	0. NH	36	0.117
1. GH			2. CT			1. GH	87	0.282
1. GH			2. CT			2. CT	146	0.474
1. GH			2. CT			3. PH	31	0.101
1. GH			2. CT			4. PC	8	0.026
1. GH			2. CT			5. IHC		0.000
1. GH			3. PH	3916	0.13	0. NH	440	0.112
1. GH			3. PH			1. GH	663	0.169
1. GH			3. PH			2. CT	30	0.008
1. GH			3. PH			3. PH	2581	0.659
1. GH			3. PH			4. PC	191	0.049
1. GH			3. PH			5. IHC	11	0.003

Hospital 1	# H1	P(H1)	Hospital 2	# H2	P(H2)	Hospital 3	# H3	P(H3)
2. CT	1041	0.01	1. GH	202	0.19	0. NH	44	0.218
2. CT			1. GH			1. GH	105	0.520
2. CT			1. GH			2. CT	45	0.223
2. CT			1. GH			3. PH	3	0.015
2. CT			1. GH			4. PC	4	0.020
2. CT			1. GH			5. IHC	1	0.005
2. CT			2. CT	652	0.63	0. NH	56	0.086
2. CT			2. CT			1. GH	20	0.031
2. CT			2. CT			2. CT	560	0.859
2. CT			2. CT			3. PH	12	0.018
2. CT			2. CT			4. PC	1	0.002
2. CT			2. CT			5. IHC	3	0.005
2. CT			3. PH	187	0.18	0. NH	14	0.075
2. CT			3. PH			1. GH	7	0.037
2. CT			3. PH			2. CT	49	0.262
2. CT			3. PH			3. PH	111	0.594
2. CT			3. PH			4. PC	6	0.032
2. CT			3. PH			5. IHC		0.000
3. PH	19508	0.21	1. GH	1844	0.095	0. NH	265	0.144
3. PH			1. GH			1. GH	1295	0.702
3. PH			1. GH			2. CT	10	0.005
3. PH			1. GH			3. PH	243	0.132
3. PH			1. GH			4. PC	29	0.016
3. PH			1. GH			5. IHC	2	0.001
3. PH			2. CT	259	0.013	0. NH	21	0.081
3. PH			2. CT			1. GH	12	0.046
3. PH			2. CT			2. CT	112	0.432
3. PH			2. CT			3. PH	111	0.429
3. PH			2. CT			4. PC	3	0.012
3. PH			2. CT			5. IHC		0.000
3. PH			3. PH	17405	0.892	0. NH	1425	0.082
3. PH			3. PH			1. GH	328	0.019
3. PH			3. PH			2. CT	47	0.003
3. PH			3. PH			3. PH	15321	0.880
3. PH			3. PH			4. PC	245	0.014
3. PH			3. PH			5. IHC	39	0.002

Hospital 1	# H1	P(H1)	Hospital 2	# H2	P(H2)	Hospital 3	# H3	P(H3)
4. PC	11287	0.12	1. GH	3887	0.34	0. NH	723	0.186
4. PC			1. GH			1. GH	2437	0.627
4. PC			1. GH			2. CT	7	0.002
4. PC			1. GH			3. PH	85	0.022
4. PC			1. GH			4. PC	626	0.161
4. PC			1. GH			5. IHC	9	0.002
4. PC			2. CT	289	0.03	0. NH	27	0.093
4. PC			2. CT			1. GH	8	0.028
4. PC			2. CT			2. CT	161	0.557
4. PC			2. CT			3. PH	31	0.107
4. PC			2. CT			4. PC	62	0.215
4. PC			2. CT			5. IHC		0.000
4. PC			3. PH	7111	0.63	0. NH	665	0.094
4. PC			3. PH			1. GH	138	0.019
4. PC			3. PH			2. CT	18	0.003
4. PC			3. PH			3. PH	4046	0.569
4. PC			3. PH			4. PC	2231	0.314
4. PC			3. PH			5. IHC	13	0.002
5. IHC	794	0.01	1. GH	488	0.61	0. NH	86	0.176
5. IHC			1. GH			1. GH	350	0.717
5. IHC			1. GH			2. CT	1	0.002
5. IHC			1. GH			3. PH	3	0.006
5. IHC			1. GH			4. PC	4	0.008
5. IHC			1. GH			5. IHC	44	0.090
5. IHC			1. GH	8	0.01	0. NH		0.000
5. IHC			2. CT			1. GH	1	0.125
5. IHC			2. CT			2. CT	5	0.625
5. IHC			2. CT			3. PH	1	0.125
5. IHC			2. CT			4. PC	1	0.125
5. IHC			2. CT			5. IHC		0.000
5. IHC			3. PH	298	0.38	0. NH	25	0.084
5. IHC			3. PH			1. GH	10	0.034
5. IHC			3. PH			2. CT	1	0.003
5. IHC			3. PH			3. PH	227	0.762
5. IHC			3. PH			4. PC	26	0.087
5. IHC			3. PH			5. IHC	9	0.030

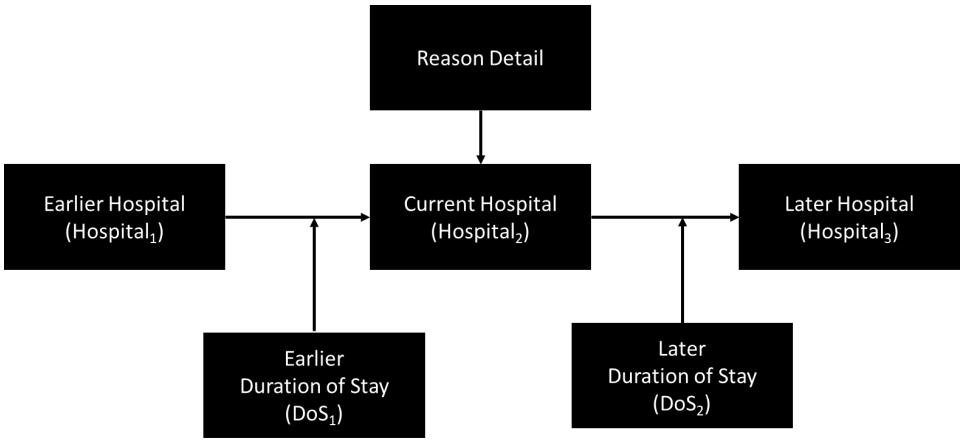

Figure 2. Consumers about the prior LoC choice and the subsequent Loc choice

Where
Hospital1: the LoC prior to the current hospitalization
Hospital2: the current LoC
Hospital3: the LoC subsequent to the current hospitalization
DoS1: Duration of Stay in Hospital1
DoS2: Duration of Stay in Hospital2
Reason Detail: The reason why the consumer has not chosen Government or Public Hospital
With the data points available, the probabilities for each decision have been calculated using the Table 3.

5. Results and Discussion

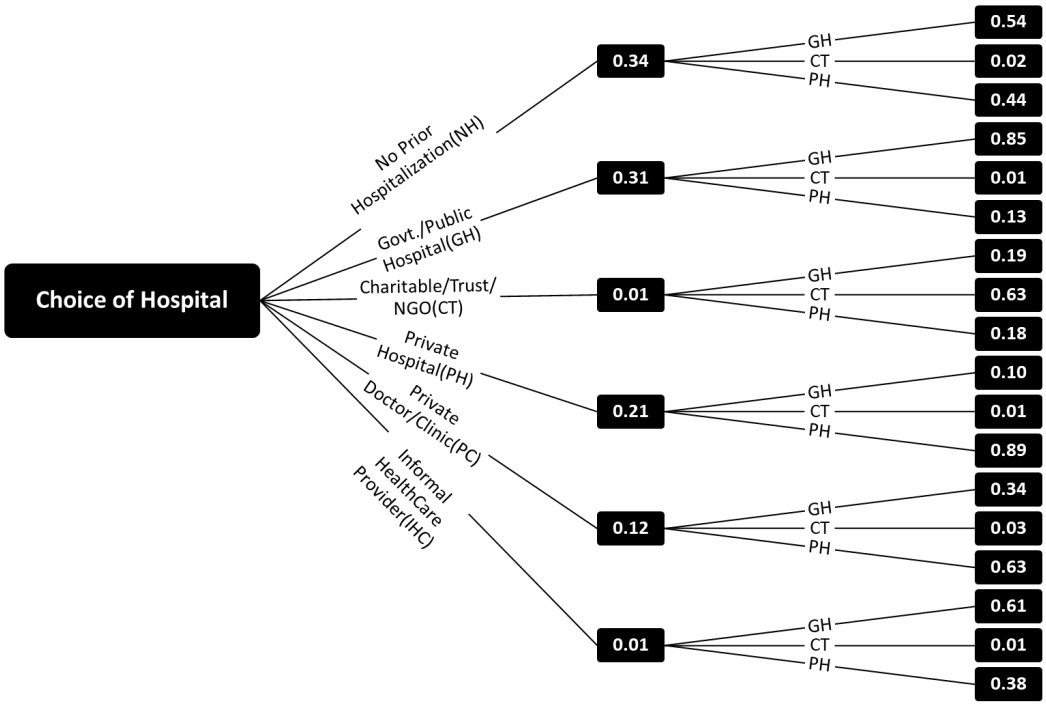

Figure 3. Decision tree

While analyzing the choice of hospital, we looked into the various choices available for people based on their prior hospitalization experience (Figure 3). The choices they made in the past could be as follows:

a. First time Hospitalization / No Prior Hospitalization (NH)
b. Govt/Public Hospital (GH)
c. Charitable/Trust/NGO (CT)
d. Private Hospital (PH)
e. Private Doctor /Clinic (PC)
f. Informal HealthCare Provider (IHC)

The probabilities of the choice as calculated in Table 3 is used. The next step is the current choice of the hospital. As the current choice is analyzed for GH, CT and PH, the decision tree is created for these combinations from the first choice of the hospital.

For Example: In No Prior Hospitalization (NH), the choices of GH, CT and PH score 0.54, 0.02, 0.44 respectively. These calculations from Table 3 were used to build the decision tree.

Now, for understanding the probability of someone choosing the GH, the various combinations of someone choosing the GH are summed up.
In this case, the prior hospitalization choices could have been any of the six choices, namely, NH, GH, CT, PH, PC, HC and the current choice is GH. The probabilitis of these six combinations are summed up as follows:

A decision tree was created to evaluate the probability of someone choosing a GH. It is calculated as
(0.34 X 0.54) + (0.31 X 0.85) + (0.01 X 0.19) + (0.21 X 0.10) + (0.12 X 0.34) + (0.01 X 0.61)
= 0.1836 + 0.2635 + 0.0019 + 0.021 + 0.0408 + 0.0061
= 0.5169 0r 51.69%

5.1 Proposed Improvements

This model could also be further elaborated and analyzed for the following hypotheses.

- Earlier Experience ($Hospital_1$) impacts the current choice of Hospital ($Hospital_2$).
- Earlier Experience ($Hospital_1$) and the Reason explain the choice of $Hospital_2$.
- DoS_1 moderates the relationship between $Hospital_1$ and $Hospital_2$.
- $Hospital_2$ impacts the choice of $Hospital_3$.
- DoS_1 moderates the relationship between $Hospital_1$ and $Hospital_2$.

5.2 Validation

Addressing these top four reasons will help consumers choose more Government and Public hospitals. As the research evolves, there would be a greater clarity to identify more variables, mediators and modifiers and arrive at an equation that can best describe the proposed system. That would constitute the basic research. The aim of this research is to be applied research and more work in needed in establishing the networks, identifying the important stakeholders, decision makers and socializing the research idea and getting the appropriate support. In successful research, this would pave the way either through shared contracts or not for the appropriate mechanism that would increase the availability and accessibility of GSHIS.

6. Conclusion

This paper is not an end-to-end paper for achieving health insurance for everyone. However, it has identified a major source of data and the analysis has yielded a direction for further research in arriving at the service design for healthcare in India. This analysis is very helpful to assess the Level of Care (LoC) and the decisions people make regarding their healthcare choices. This study is envisaged to help address the areas of improvement to elevate the quality of service in healthcare in India.

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