

Information Asymmetry and Market Signaling in Hospital Selection: A Study among the Chronically Sick in Kannur District

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Abstract: Individuals have the choice to live a healthy life; reasonable life span is crucial attributes in the notions of personal well-being. The study is an academic enquiry into the human development implications of information asymmetry and market signaling in hospital selection observed in the Kannur district of Kerala. The present study is proposed to explore the information gap between service providers (hospitals) and service recipients (patients) and the degree of information asymmetry in selecting the hospital among the chronically sick in the selected region. To what extent this information gap has led to the health adversities of chronic patients and subsequent economic and educational setbacks of the stakeholders are the core problem addressed. The study is based on primary and secondary data. The study reveals that there exists information asymmetry especially in the absence of proper usage of available market signals.

Index Terms - Information asymmetry, market signaling, hospital selection, chronic diseases.

I. INTRODUCTION

Information economics plays progressively a significant role in modern economics. The starting point for the economic analysis is the examination that information as economic value, since it facilitates the individuals to develop choices that give up better expected payoffs than they would attain from the choices developed in the deficiency of information (Kevin Lane Keller and Richard Staelin, 1987). Most of the theories in economics are rooted in the critical assumption that economic agents have full information regarding the economic variables. Now a relevant question is that what happens when there is information asymmetry¹ occurs? The contributions of three distinguished Nobel Prize winners for the year 2001, Joseph A. Akerlof, A. Michael Spence and Joseph E. Stiglitz for their analysis of markets with asymmetric information from the core of modern information economics during 1960s and 1970s which integrated asymmetric information into economics in compare to mainstream economics (Stiglitz, 1975; Nicholson, 1998; Ramalingam, 2001).

II. ASYMMETRIC INFORMATION IN HEALTH SECTOR:

The matter of health care quality management has brought significant focus from both academicians and practitioners over the past few years. For any individuals and society, maintaining health is very imperative at the micro level and at the macro level respectively. While considering the role of patients' health information need to be considered to search, collect, interpret and evaluate the quality of health information available, which play a very imperative role in their selection of hospitals/doctors rather than just the amount of information (Barer, 1982; Ann Bartel and Paul Taubman, 1979). Although, improved access to health information might affect a patient's decision making, it is uncertain how much information would persuade a patient to the use of health service efficiently (Deber, 1994; Jackson and McConnell, 1985; Jae-Young Lim and Changik Jo, 2007). This states that if a patient undergoes dilemma in understanding and evaluating health information, his decision making process might be complex.

In case of hospital/doctor-patient relation, patient has to face the problem of asymmetric information owing to the principal-agent problem. Here patient is the principal and hospital is the agent. The physicians and other supporting staffs in the hospital have better information than the patients about the various signals of hospitals which influences in the process of patient's hospital selection (Pandey, 2011). That is cost of gaining information is very high due to the complexity of medical information which is not easily understood by a layman and this worsen the condition by the fact that various illnesses do not repeat themselves (Jannati A. and Bahrami M. A., 2013). In general the hospital has better information than patients.

III. STATEMENT OF THE RESEARCH PROBLEM:

The present analysis is undertaken to determine the choice process of patients with regard to information asymmetry in hospital selection and to determine the most important variables/signals which influences the patient's choice of hospitals and also to verify whether the acquired information by the patients are trustworthy or not, such a study is relevant in the present economic situation, because we are living in the world of information asymmetry. Chronically sick² people have to visit hospital regularly and have to collect information about various signals in order to select the hospital from various choices available for mitigating their diseases. Chronically sick spends large portion of their income for health care. Therefore, they

¹ Having no balance or symmetry in distribution

² People with disease that persists for a long time; usually consider the diseases lasting three months or more.

need to compare the information regarding hospital fees, hospital infrastructure, degree of physician and other staffs and their approach towards the patients, opinion from other sources etc, because both eradication of sickness and selection of hospital is a long-lasting phenomena. Thus the incidence of asymmetric information is rather high among the chronically sick as compared to the general patients. Kimball (2016) argued that chronic diseases are the major reason for the incessant increase of health care spending. Spending growth is driven in part by the greater occurrence of chronic diseases and the longer life expectancy among the population. In addition to direct costs for health care, limitations in daily activities, loss of productivity and loss of days of work made chronic diseases a major burden to the economy. In such a way information asymmetry and hospital selection among the chronically sick is an under researched area in the service sector and a research study in this direction is required.

IV. OBJECTIVES OF THE STUDY:

- To examine the application of the theory of market signaling and asymmetric information in the hospital selection among chronically sick of Kannur district.
- To trace out the influencing variables on patients' preference for hospitals.
- To assess the relationship between suspected nature of diseases and hospital selection.
- To explore the significance of association between market signals and hospital selection.

V. HYPOTHESIS:

For analyzing the significance of association between market signals and hospital selection, the study proposes to test the hypothesis that; Ho: The selected market signals are not significant with the hospital selection.

VI. METHODOLOGY OF THE STUDY:

The study emphasizes the behavior of the chronically sick with respect to the information acquisition along with related market signals and hospital choice of the selected samples. Both primary and secondary data had been collected according to the need of the study. For collecting the primary data, structured questionnaire has been prepared considering the objectives of the study. It is treated as the heart of the survey operation. The questionnaire consists of several parts. Part one of the questionnaire consisted socio-economic information and treatment burden of the patients. Part two of the questionnaire is mainly related to the nature and gravity of signals reported. Finally, Part three of the questionnaire discusses the sensitivity towards the market signals, hospital selection among the chronically sick. Primary data were collected from one hundred and twenty chronically sick people of Kannur District randomly using multi-stage sampling.

The secondary data were obtained from the records of the Pain and Palliative Centers, Primary Health Centers (PHCs), annual reports and development reports of Kannur District. Other related information was collected from various institutes including Institute of Health and Family Welfare, Voluntary Health Department in the Municipality. Data analysis has been done by using Microsoft Excel and Statistical Package for Social Science (SPSS). Mean ratio, percentage, weightage, logistic regression are used as statistical tools.

VII. LIMITATIONS OF THE STUDY:

The study has limited to one hundred and twenty respondents due to constraints of time. This has limited the study to a bantam area and hence the opinion of the people of galactic area was not considered in the study. Another limitation arises where study focuses on patients' level of satisfaction and ignores the opinions of hospitals and staffs.

VIII. NATURE AND GRAVITY OF SICKNESSES REPORTED:

This section provides a brief interpretation about nature and extent of diseases and its gravity as an influencing factor in the process of hospital selection among the chronically sick. Patients' needs and preferences for hospitals are differing with the divergence in their nature of illness which is in accordance to the patients' satisfaction with the available information.

a) Relationship between Nature of Diseases and Gender:

Table 1 ascertains the possible relation between the nature of diseases and gender to determine the extent of asymmetric information while selecting a hospital. It reveals that out of 52 cancer patients 42 are females. In the case of diseases like ortho and hyper tension 7 percent are males and 8 percent are females respectively in the total 15 percent each. The diabetic, pediatrics and gynecological diseases are mostly spread among the females. On the other hand, diseases of heart, kidney, skin and obstetrics are mainly seen among males.

Table 1 Association between nature of diseases and gender among the chronically sick

Category	Male		Female		Total	
	Frequency	%	Frequency	%	Frequency	%
Cancer	10	8%	42	35%	52	43%
Diabetics	0	0	2	2%	2	2%
Heart	2	2%	0	0	2	2%
ENT	2	2%	4	3%	6	5%
Kidney	6	5%	0	0	6	5%
Ortho	8	7%	10	8%	18	15%
Skin	2	2%	0	0	2	2%

Pediatrics	0	0	2	2%	2	2%
Obstetrics	2	2%	0	0	2	2%
Gynecology	0	0	6	5%	6	5%
Hyper Tension	8	7%	10	8%	18	15%
Others	4	3%	0	0	4	3%
Total	44	37%	76	63%	120	100

Source: Survey Data

b) Relationship between Nature of Diseases and Hospital Selection:

Table 2 reflects that out of 52 cancer patients 38 percent are choosing government hospital. Only 3 percent and 2 percent of the cancer patients select private hospital and co-operative hospital respectively. The evidence from the survey realized that most of the cancer patients choose Malabar Diagnostic Cancer Centre, Kannur and Regional Cancer Centre, Trivandrum (Government sector) for their treatment. Among the total respondents, 5 percent chooses the services of kidney and ENT specialists and gynecologists of government hospital. The whole 2 percent of the each diabetic, heart, pediatrics, skin sample patients select the government hospital. About 12 percent of patients with diseases of ortho select the government hospital and remaining 3 percent selecting the private hospitals. Thus the total result reveals that majority (88 percent) of the chronic patients prefer government hospital for their treatment particularly the cancer patients.

Table 2 Relationship between nature of diseases and types of hospital selected

Category	Govt. Hospital		Private Hospital		Co-op Hospital		Total	
	Freq*	%	Freq	%	Freq	%	Freq	%
Cancer	46	38%	4	3%	2	2%	52	43%
Diabetics	2	2%	0	0	0	0	2	2%
Heart	2	2%	0	0	0	0	2	2%
ENT	6	5%	0	0	0	0	6	5%
Kidney	6	5%	0	0	0	0	6	5%
Ortho	14	12%	4	3%	0	0	18	15%
Skin	2	2%	0	0	0	0	2	2%
Pediatrics	2	2%	0	0	0	0	2	2%
Obstetrics	0	0	2	2%	0	0	2	2%
Gynecology	6	5%	0	0	0	0	6	5%
Hyper Tension	18	15%	0	0	0	0	18	15%
Any Other	2	2%	2	2%	0	0	4	3%
Total	106	88%	12	10%	2	2%	120	100%

Source: Survey Data

*Frequency

c) Relationship between Annual Income and Types of Hospitals Selected:

The table 3 shows how the annual income of the patients affects their hospital selection. Out of 35 percent of the total, 28 percent are laying in the income range between Rs. 150001-Rs. 200000 chooses the government hospital, whereas least 5 percent prefer private hospital. The whole 32 percent of the patients with the income above Rs. 200000 select government hospital. Patients included in the income orbit between Rs. 100001 and Rs. 150000, that is 18 percent of the respondents opts government hospital and 3 percent preferred private hospital out of the total 22 percent. All 3 percent of the low incomes (below Rs. 50000) have chosen government hospital. The results envisage that most of the chronic patients prefer government hospitals irrespective of their income.

Table 3 Relationship between income and hospital preferred

Category	Govt. Hospital		Private Hospital		Co-op Hospital		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Below Rs.50000	4	3%	0	0	0	0	4	3%
Rs.50001-Rs. 100000	8	7%	2	2%	0	0	10	8%
Rs.100001- Rs.150000	22	18%	4	3%	0	0	26	22%
Rs.150001- Rs.200000	34	28%	6	5%	2	2%	42	35%
Above Rs.200000	38	32%	0	0	0	0	38	32%
Total	106	88%	12	10%	2	2%	120	100%

Source: Survey Data

IX. SENSITIVITY TOWARDS MARKET SIGNALS AND HOSPITAL SELECTION:

The ultimate objective of any patient is to access quality health services from the hospital. Hospital is responsible to fulfill the requirement of patients. In this way the question is how can they measure the quality of health services available? Thus, it is closely related to the information asymmetry in hospital selection.

Table 4 Ways of measuring the quality of health services

Category	Number of Respondents	Percentage
Time taken to the service	78	65%
Patients waiting for treatment	89	74%
Fee charged by the hospital	74	62%
Doctors busy in attending patients	112	93%
Doctors with supporting equipments	65	54%
Hospital infrastructure	117	98%
Distance to the hospital	118	98%
Improvement in health after treatment	120	100%

Source: Survey Data

The table 4 revealed that all the chronic patients measure the quality of health service through the net outcome after the treatment received from the preferred hospital. The patients are eager to know about hospital infrastructure, distance from resident to hospital and doctors with supporting equipment. About 74 percent of the patients ensure the quality through the criteria that waiting time for treatment and 65 percent measure the quality by the way of time taken to the service. The sample patients expect a reasonable fee by the hospital according to the quality of the services provided. They also compare the fee charged by the hospital and their financial capacity. So they wish to search the information about the fee of services charged by various hospitals before availing them. Usually different hospitals charges different fees and it is significant to note how patients respond to this unfair charging of hospital fee. It can be also observed from the survey that about 72 percent of the respondents are agreeing with the argument of low fee implies low quality services and 28 percent are agreeing with argument of high fee indicate high quality service. Dash (1999) reached the same finding that the patients measure the available quality in the hospital by the way of time taken by the service.

Sometimes patients may consider the gender while selecting specialists especially in the case of family patients. In contrast, it is observed that all of the respondents are ignored the gender of specialists. Most of the respondents have confusion in selecting the hospital due to the lack of prior experience, lack of reliable suggestions, conflicting experience of friends and relatives and different fees charged by the hospitals. The chronic patients wish to select those hospitals which satisfy their additional services such as modern medical technology, modern lab, pharmacy, canteen, etc.

X. EXTERNAL AND INTERNAL HOSPITAL SIGNALS:

Signals about the hospital information may be either external or internal to the hospital. Sources of both these signals are important to be analyzed in this section, as these signals have the capacity to solve principal-agent problem between the patients and hospitals. Internal sources include information from family doctors, friends/relatives, patients' previous involvement with this type of service, Medias, etc. External sources include reputation of the hospital, nature of doctors and staffs in the hospital, latest medical equipments in the hospital, accurate billing system, etc. Signals from both external and internal to the hospitals are explained in the below table by using the weightage of patients' responses.

a) External Signals:

Table 5 reveals that among the external sources the previous involvement with the same services has highest total weightage (534) and therefore it is the most important external factor that influences hospital selection. The second largest weightage (488) goes to the signals from the friends or relatives and next highest weightage (468) is for Medias. The least weightage is for the

signals from the medical representatives (262) and for the information from the institutions nearby the hospital (280), brochure & pamphlets (296), etc.

Table 5 Information from external sources affects hospital selection

Sources	Strongly Agree		Agree		Disagree		Total	
	Freq	Wtg* (5)	Freq	Wtg (3)	Freq	Wtg (1)	Freq	Wtg
Previous involvement	90	450	24	72	12	12	120	534
Family doctors	34	170	44	132	78	78	120	380
Friends/relatives	76	380	32	96	12	12	120	488
Medias	72	360	30	90	18	18	120	468
Brochure & pamphlet	28	140	32	96	60	60	120	296
Medical representatives	18	90	32	96	76	76	120	262
Institutions nearby the hospital	22	110	36	108	62	62	120	280

Source: Survey Data

* Weightage

b) Internal Signals:

Table 6 shows that doctors with reputation of the hospital and accurate billing system are the most important internal signal considered by the patients, patients give highest weightage (600) to these signals. Doctor with non-technical language, disclosing of all tests results to the patients, keeping of patients' privacy and confidentiality, better guidance of all staffs, convenient appointments, service mind of the staffs, cleaning and a hospital that is attached to a medical college or research institute will be able to offer very superior diagnostic services as compared to any other hospital are consider the next important signals which has the weightage between 400- 590. Internal signals like eco- friendly hospital, identification of all hospital employees by their uniforms are considered as least important signals by the patients, which have the weightage of 176 and 264 respectively.

Table 6 Internal signals that can influence hospital selection

Criteria	Highly Important		Important		Not Important		Total	
	Freq	Wtg (5)	Freq	Wtg (3)	Freq	Wtg (1)	Freq	Wtg
Reputation of the hospital	120	600	0	0	0	0	120	600
Convenient appointment	44	220	64	192	12	12	120	424
Health information in the reception area.	42	210	32	96	74	74	120	380
Doctor with non-technical language.	100	500	20	60	0	0	120	560
Support staffs should guide patients.	106	530	14	42	0	0	120	572
Doctor and staffs to be service minded.	96	480	24	72	0	0	120	552
Tests results should be disclosed to patients.	112	560	8	24	0	0	120	584
Medical re-imbursement facility	6	30	70	210	44	44	120	284
Employees identifiable in uniforms.	0	0	28	84	92	92	120	176
Bathrooms, bed linen, ICU etc. clean to use.	56	280	64	192	0	0	120	472
Eco- friendly hospital	16	80	40	120	64	64	120	264
Latest medical equipments	94	282	12	36	14	14	120	332
Accurate and reliable billing system	120	600	0	0	0	0	120	600
Keep patient privacy and confidentiality	110	550	8	24	2	2	120	576
A hospital that is attached to a medical college or research institute will be able to offer very superior diagnostic services as compared to any other hospital.	60	300	74	222	18	18	120	540

Source: Survey Data

* Weightage

XI. MULTINOMIAL LOGISTIC REGRESSION:

The significance of association between market signals and hospital selection are analyzed by using the Multinomial Logistic Regression in order to recognize the most influencing market signals on hospital selection. Multinomial logistic regression is used to analyze relationships between a non-metric dependent variable and metric or dichotomous independent variables. Multinomial logistic regression compares multiple groups through a combination of binary logistic regressions. The group comparisons are equivalent to the comparisons for a dummy-coded dependent variable, with the group with the highest numeric score used as the reference group.

Table 7 Likelihood ratio tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
Intercept	40.071	7.770	2	.021
Nature of Disease	41.841	9.540	2	.008

Income	36.347 ^a	4.046	2	.132
Doctor availability	39.381	7.080	2	.029
Reputation	38.998	6.697	2	.035
Appointments	43.798	11.497	2	.003
Latest equipments	40.169	7.868	2	.020
The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.				
a. Unexpected singularities in the Hessian matrix are encountered. This indicates that either some predictor variables should be excluded or some categories should be merged.				

Source: Survey Data as in SPSS result

Multinomial logistic regression analysis requires that the dependent variable be non-metric. Dichotomous, nominal, and ordinal variables satisfy the level of measurement requirement. Multinomial logistic regression analysis requires that the independent variables be metric or dichotomous. Since SPSS will automatically dummy-code nominal level variables, they can be included since they will be dichotomized in the analysis.

In SPSS, non-metric independent variables are included as “factors.” SPSS will dummy-code non-metric IVs. The likelihood ratio test evaluates the overall relationship between an independent variable and the dependent variable. In this example, there is a statistically significant relationship between the independent variables such as nature of disease ($0.008 < 0.05$), convenient appointment ($0.003 < 0.05$), latest equipments ($0.020 < 0.05$), doctor availability ($0.029 < 0.05$), reputation of the hospital ($0.035 < 0.05$) and the dependent variable. These variables are individually significant to the dependent variable.

The overall test of relationship among the independent variables and groups defined by the dependent is based on the reduction in the likelihood values for a model which does not contain any independent variables and the model that contains the independent variables. This difference in likelihood follows a chi-square distribution, and is referred to as the model chi-square. The significance test for the final model chi-square (after the independent variables have been added) is our statistical evidence of the presence of a relationship between the dependent variable and the combination of the independent variables.

Table 8 Model fitting information

Model	Model Fitting Criteria		Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	Df	Sig.	
Intercept Only	48.969				
Final	32.301	16.668	12	0.163	

The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the final model chi-square in the SPSS table titled "Model Fitting Information". In this analysis, the probability of the model chi-square (16.668) is 0.163, which is greater than the level of significance of 0.05. The null hypothesis that there is no difference between the model without independent variables and the model with independent variables is accepted. This may be due to the fact that the variables are highly interdependent. This occurs when the numbers of variables are more and the values taken by these variables are less. Thus market signals such as nature of disease, convenient appointment, latest equipments, doctor availability, and reputation of the hospital are highly significant to the hospital selection. That is these variables have the capacity to solve information asymmetry between the patients and hospitals.

XII. CONCLUSION:

Maintaining health is both significant and challenging for the individual and society. It is significant because quality health is the main determinant of labour productivity and economic efficiency. It is far challenging because health care has become an expensive service. Health care choice is not an independent decision by the patients. It is influenced by an array of economic, non-economic, social, emotional, and psychological variables. The prominent issue is how well the decision makers sensitive to the signals provided by the service providers. The present enquiry is aimed at examining this issue. It is found that there is information asymmetry among the patients regarding the above aspects. Most of the chronically sick are cancer patients and they prefer Government hospital according to their nature of diseases. Patients consider hospital infrastructure as an inevitable market signal for selecting a hospital. Chronic patients consider the previous involvement with the services received is the most important internal signal and reputation of the hospital and accurate billing system are the important external signals to the hospital selection. There exist a statistically significant relationship between hospital selection and the independent variables such as nature of diseases, convenient appointment, latest equipment, doctor availability and reputation of the hospital. These variables are individually significant to the dependent variable. Besides, chronic patients concern their nature of diseases rather than market signals while selecting a hospital in the study area. There is information asymmetry especially in the absence of proper usage of market signals.

REFERENCES:

- [1] Ann Bartel and Paul Taubman. (1979). Health and Labour Market Success: The Role of Various Diseases. *Review of Economics and Statistics*, 61 (1), 1-8.

- [2] Barer, M. L. (1982). Case mix adjustment in hospital cost analysis Information theory revisited. *Journal of Health Economics*, 153-180.
- [3] Dash, P. C. (1999). Status of Hospital Autonomy in Andhra Pradesh, India.
- [4] Deber, R. B. (1994). The Patient-Physician Partnership: Changing Roles and the Desire for Information. *Canadian Medical Association Journal*, 151, 171-176.
- [5] Jackson and McConnell. (1985). Information Asymmetry and Search in the Market for Physicians' Services. *Journal of Health Economics*, 8, 53-84.
- [6] Jae-Young Lim and Changik Jo. (2007). The Effect of patient's asymmetric information problem on elderly use of medical care. *Journal of Applied Economics*, 39, 154-162.
- [7] Jannati A. and Bahrami M. A. (2013). —A Survey of Factors Affecting Patients Decision in Selecting Governmental and Private Hospitals in Tabriz, Iran. *J Tourism Res Hospitality*, 2 (1).
- [8] Kevin Lane Keller and Richard Staelin. (1987). Effects of Quality and Quantity on Decision Effectiveness. *Journal of Consumer Research*, 14 (2), 200-213.
- [9] Kimball, R. (2016). Improving Patient Outcomes and Lowering Patient Cost of Care.
- [10] Nicholson. (1998). Socio-Economic Status and Use of Physician Services: A Reconsideration. *Medical Care*, 10 (3).
- [11] Pandey, S. (2011). Status Report on Training Activities in Selected Hospitality Industry Units in Pune. *Journal of Economic Ethics*, 28-36.
- [12] Ramalingam, A. (2001). Nobel Economists and Asymmetric Information Analysis. *Southern Economist*, 40 (14), 7-10.
- [13] Stiglitz, J. E. (1975). The Theory of Screening, Education and the Distribution of Income. *American Economic Review*, 65 (3), 283-300.

