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Chapter Impact of Burden of Disease on Utilisation of Healthcare Services and on Out-of-pocket Healthcare Expenditure of the People of Siliguri Municipal Corporation Area (SMCA)

7.1 Introduction to Econometric Analysis

This chapter deals with the econometric analysis of the impact of burden of disease on utilisation of healthcare services and on out-of-pocket healthcare expenditure (OOPHE) using the cross sectional data collected through field survey in the study area. In this regard, two separate models were developed using econometric approaches to measure the impact of disease burden on utilisation of healthcare services and on out-of-pocket healthcare expenditure of the households in SMCA. First one is logistic regression model, which attempts to examine the relationship between disease burden and utilisation of healthcare services, considering demographic, socio-economic and disease characteristics or health disorder of the people or household members of the study area. The other one is log linear multivariate regression model in the log-log form, which makes an effort to establish the relationship between different factors associated with diseases of people and out-of-pocket healthcare expenditure through the process of utilisation of healthcare services during the reference period.

7.1.1 Determinants of Utilisation of Healthcare Services

As our predicted logistic regression model is linear in the log odds, we expect a unit change in explanatory variable resulting into a change in the log odds of that variable, considering all other variables are constant. Further, value of odds ratio is of great importance in the study as it helps in deciding whether the probability of occurrence of interest increases or decreases as one unit change in the variable of interest. If value of odds ratio is more than one for any variable, likelihood or probability of occurrence of interest increases. On the other hand, if the same value lies between zero and one, chance or probability of occurrence of variable of interest decreases

as one unit change in variable under consideration. In our study, odds of utilising healthcare services are the event of occurrence of interest. Logistic regression results show the impact of demographic, socio-economic and health disorder characteristic of the people on the probability of utilising the healthcare services compared to the reference category during the reference period, when the effects of other variables are controlled.

Use of logistic regression is an attempt made to find the parameters affecting the utilisation of healthcare services by the sick people in SMCA. The study deals with the decision of whether the sick person utilised any healthcare facility or not, and also which pattern of healthcare services household member utilised during the reference period. To analyse the utilisation behaviour of the sick people, five different logistic models were built up, with respect to (1) utilisation of all types of healthcare facilities, (2) utilisation of healthcare facilities from modern care in contrast to traditional care, (3) utilisation of IPD services in contrast to OPD services, and (4) utilisation of allopathy and ayurveda systems of medicine in contrast to homeopathy medicine, and (5) utilisation of public and private healthcare facilities in contrast to other sources of care. In each of the first three models, parameters were estimated separately by using binary multivariate logit model and in the last two models, parameters were estimated by applying multinomial logit regression model.

In the first two models, utilisation of healthcare services is the dependent variable and explanatory variables are gender, age, education level, religion, caste, marital status, family size, monthly household income, economic class of household, category of disease, severity of disease and nature of disease. On the other hand, only three variables which are directly associated with the burden of disease such as category of disease, severity of disease and nature of disease were considered as explanatory variables in last three models.

In the first model, utilisation of healthcare facility was coded as 1, 0 otherwise; in the second model, utilisation of healthcare facilities from modern care was coded as 1 and that of from traditional care was coded as 0; in the third model , utilisation of IPD services was coded as 1 and utilisation of OPD services was coded as 0; in the fourth model, utilisation of allopathy and ayurveda system of medicine was coded as 1 and utilisation of homeopathy and other systems of medicine was coded as 0; lastly , in the fifth model, utilisation of public and private healthcare facilities was coded as 1 and other sources of care was coded as 0. These five models were analysed separately to get the understanding of the impact of different dimensions of disease

burden on health seeking behavior of the people, considering their demographic and socio-economic characteristics.

7.1.1.1 Model 1: Binary Logistic Regression of utilising all types of Healthcare Facilities

Table 7.1 shows the parameter estimates of binary logistic regression of utilising all types of healthcare services, irrespective of pattern of utilisation, type of visit, system of medicine and source of care people utilised during the reference period. Results show that probability of utilising healthcare facilities (hence forth only utilisation) by males is about 2 times more than females, as reflected from the odds ratio of 2.047, which is significant at 5 per cent level. In line with the same, it may be checked that utilisation by Hindu is 5.5 times greater than the other counterparts and utilisation by currently married is 3 times more than non-currently married. Further, results indicate that as age of the sick people increases, likelihood of utilisation decreases. On the other hand, household characteristics reveal that as family size and monthly family income increase, households are more likely to utilise the healthcare services compared to respective reference categories. It is also to be noted that utilisation increases by 3.1 times for GII category diseases, as compared with reference category of GIII category cases. It conveys that category of disease has significant impact on utilisation healthcare services. Finally, odds ratio of utilisation of healthcare services increases by 9.1 times for chronic diseases compared to acute diseases, indicating that nature of disease significantly affects utilisation of healthcare facilities. Therefore, it can be said that irrespective of pattern of utilisation, category of disease and nature of disease suffered by the people has significant impact on utilisation of healthcare facilities in SMCA.

Table 7.1: Log odds and Odds ratios of utilising all types of healthcare facilities: Results of binary multivariate logistic regression analysis

Variable	β	Exp.(β)	Reference category
Gender (Male)	0.716[2]	2.047[2]	Female
Age	-0.866[1]	0.421[1]	Less than or equal to 5 years old
Education Level			NASA
Upto Primary	1.010	2.747	NASA
Primary to Secondary	1.093	2.983	NASA
HS to Graduate	0.920	2.509	NASA
Post Graduate	1.360	3.896	NASA

Religion	1.701[1]	5.478[1]	Non-Hindu (others)
Caste			SC & ST
General	0.742	2.101	SC & ST
OBC	0.500	1.648	SC & ST
Marital status (Currently married)	1.112[1]	3.041[1]	Not-Currently married
Family Size	0.839[3]	2.315[3]	Less than or equal to 4 members
Monthly Household Income	0.662[1]	1.940[1]	Less than Rs. 10,000
Economic class of Household	0.535	1.707	BPL
Category of Disease			GIII
GI	0.228	1.257	GIII
GII	1.135[2]	3.110[2]	GIII
Severity of Disease			Low
Medium	0.322	1.380	Low
High	0.614	1.848	Low
Nature of Disease (Chronic)	2.212[1]	9.130[1]	Acute
Constant	-2.852[3]	0.058[3]	
Cox & Snell R Square	0.154		
Nagelkerke R Square	0.353		

Sig. level: [1]p<0.01, [2]p<0.05, [3]p<0.10

7.1.1.2 Model 2: Binary Logistic Regression of utilising Modern Healthcare Facilities in contrast to Traditional Pattern of Healthcare Services

Table7.2 shows the log odds (and odds ratios) of utilising modern healthcare facilities in contrast to traditional pattern of healthcare services by the people of SMCA. Results reveal that age, religion, and marital status are negatively associated with the utilisation of healthcare services, implying that one unit change of each of these variables with respect to their reference categories lead to a decrease in chance of utilising the modern healthcare services in contrast to traditional one (hence forth only modern care).It was predicted that with age of an individual risk of health problems increases and thereby, chance of utilisation of modern care also increases. Though age is shown to be statistically significant, but it does not have considerable impact on utilisation of

healthcare services. But result reveals the fact that as age of the people increases from the 5-year group, likelihood of using modern healthcare services increases by 0.688 times as compared to the reference category. Difference in likelihood of utilising modern care is found among the different religions. Hindus are as much as about 25 percent less likely to seek modern healthcare services compared to other counterparts. As marital status of the people changes, odds ratio increases only by 0.897 times when compared with single (not currently married persons). Likelihood of treating with modern care varies as the caste of the sick people varies as found in the regression results, while likelihood of utilising modern care increases by 1.9 times for general category and same increases by 2.2 times for OBC category, when compared with people belonging to SC and ST categories. In the study, it was predicted that small sized family (due to high per capita income, affordability, too much attentive on each member and others) will utilise the modern care more than the large sized family. But result shows the opposite. Further, monthly household income and economic class of household are also found statistically significant. Result indicates that likelihood of utilising the modern care by households belonging to APL class is 3.6 times greater than those belonging to BPL class. Model provides significant results for the variables which are directly associated with the burden of disease such as category of disease, severity of disease and nature of disease. Results regarding category of disease reveal that probability of utilising modern care increases by 2.3 times for GI category diseases (infectious, communicable and maternal conditions) and by 4.8 times for GII category diseases (non-communicable) respectively, when compared with GIII category diseases (injuries). On the other hand, probability of utilising modern care is abruptly high (i.e. approximately 35 times) when a person experiences high severe disease, compared to the reference category of low severe disease. Finally, result shows that likelihood of using modern care for chronic diseases is 2.3 times greater than for acute diseases, implying that probability of utilisation of modern care for long duration disease is much higher than short duration diseases.

Table 7.2: Log odds and Odds ratios of utilising modern healthcare facilities in contrast to traditional pattern of healthcare services: Results of binary multivariate logistic regression analysis

Variable	β	Exp.(β)	Reference category
Gender (Male)	-0.258	0.773	Female
Age	-0.374[2]	0.688[2]	Less than or equal to 5 years old
Education Level			NASA
Upto Primary	1.133	3.105	NASA
Primary to Secondary	0.948	2.581	NASA
HS to Graduate	1.685[2]	5.390[2]	NASA
Post Graduate	0.681	1.977	NASA
Religion	-1.375[1]	0.253[1]	Non-Hindu (others)
Caste			SC & ST
General	0.655[3]	1.925[3]	SC & ST
OBC	0.801[3]	2.227[3]	SC & ST
Marital status (Currently married)	-0.109	0.897	Not-Currently married

Family Size	0.542	1.720	Less than or equal to 4 members
Monthly Household Income	0.473[1]	1.605[1]	Less than Rs. 10,000
Economic class of Household	1.285[1]	3.613[1]	BPL
Category of Disease			GIII
GI	0.823[2]	2.276[2]	GIII
GII	1.575[1]	4.829[1]	GIII
Severity of Disease			Low
Medium	0.726[2]	2.068[2]	Low
High	3.546[1]	34.689[1]	Low
Nature of Disease (Chronic)	0.827[2]	2.287[2]	Acute
Constant	-3.000[1]	0.050[1]	
Cox & Snell R Square	0.260		
Nagelkerke R Square	0.461		

Sig. level: [1]p<0.01, [2]p<0.05, [3]p<0.10

7.1.1.3 *Model 3: Binary Logistic Regression of utilising IPD Services in contrast to OPD Services*

Table 7.3 shows the log odds of utilising IPD services in contrast to OPD services by the people of SMCA. Here, OPD services include outdoor visits, visiting chambers or clinics, non-hospitalised cases etc., and IPD services indicate inpatient stay or hospitalised cases in public, private and others institutions. Hospitalisation takes place when illnesses are perceived as high severe by the sick person or his or her family members. On the other hand, it is comparatively expensive phenomenon. Thus, OPD is preferred, particularly, by low income groups for the treatment of different illness episodes. This model shows the impact of disease on hospitalisation episodes irrespective of background characteristics of the sick people. Result reveals that a change in the category of disease from GIII category to GI category odds ratio of getting hospitalised increases by 0.42 times, implying that probability of getting hospitalised is more for GIII category diseases than for GI category diseases. Further, study found that severity of disease is one of the important factors determining the decision of being hospitalised by the sick person.

Results show that as severity of disease changes from low to medium, probability of being hospitalised increases by approximately 1.9 times and similar changes from low to high resulted into an increase in odds ratio by 3.6 times.

Table 7.3: Log odds and Odds ratios of utilising IPD services in contrast to OPD services: Results of binary multivariate logistic regression analysis

Variable	β	Exp.(β)	Reference category
Category of Disease			GIII
GI	-0.866[2]	0.421[2]	GIII
GII	-0.055	0.946	GIII
Severity of Disease			Low
Medium	0.630[3]	1.877[3]	Low
High	1.291[1]	3.635[1]	Low
Nature of Disease (Chronic)	0.222	1.248	Acute
Constant	-5.624[1]	0.004[1]	
Cox & Snell R Square	.081		
Nagelkerke R Square	.152		

Sig. level: [1]p<0.01, [2]p<0.05, [3]p<0.10

7.1.1.4 Model 4: Multinomial Logistic Regression of utilising Allopathy and Ayurveda systems of medicine in contrast to Homeopathy system of medicine

Table 7.4 presents the impact of burden of diseases on different systems of medicine people followed during their illness episodes. Further, table shows the results of multinomial logistic regression in the form of odds ratio of utilising allopathy and ayurveda systems of medicine in contrast to homeopathy. Results reveal that the probability of following allopathy system of medicine etc. in contrast to homeopathy for GI category diseases increases by 2.778 times and for GII category diseases increases by1.954, compared to GIII category. However, in contrast to homeopathy medicine, likelihood of adopting ayurveda and others (such as physiotherapy, yoga, unani etc.) system is quite higher for GI and GII category diseases. In both the panels, as severity

of disease increases, probability of treating with allopathy as well as with ayurveda and others increases, as shown in the following table. It clearly indicates that category of disease and severity of disease have considerable effect on various systems of medicine among the people of SMCA.

7.4 Log odds and Odds ratios of utilising Allopathy and Ayurveda system of medicine: Results of Multinomial logistic regression analysis

		β	Exp.(β)	Reference category
Allopathy (rc: Homeopathy)	Intercept	3.645[1]		Disease category -GIII
	GI	1.022[2]	2.778[2]	Disease category - GIII
	GII	0.670[3]	1.954[3]	Disease category - GIII
	GIII	0[b]	.	
	Low	-2.692[1]	0.068[1]	Severity – High
	Medium	-1.749[2]	0.174	Severity – High
	High	0[b]	.	Severity – High
	Nature of Disease (Chronic)	0.408	1.503	Acute
	Acute	0[b]	.	
Ayurveda and others (rc: Homeopathy)	Intercept	-.694		Disease category -GIII
	GI	2.815[1]	16.695[1]	Disease category - GIII
	GII	2.139[1]	8.492[1]	Disease category - GIII
	GIII	0[b]	.	
	Low	-1.979[2]	0.138[2]	Severity – High
	Medium	-0.393	0.675	Severity – High
	High	0[b]	.	Severity – High

	Nature of Disease (Chronic)	0.327	1.386	Acute
	Acute	0[b]	.	
	Cox & Snell R Square	0.179		
	Nagelkerke R Square	0.243		

Sig. level: [1]p<0.01, [2]p<0.05, [3]p<0.10; a. The reference category is: Others.
b. This parameter is set to zero because it is redundant.

7.1.1.5 Model 5: Multinomial Logistics Regression of utilising Public and Private Healthcare Sources in contrast to Other Sources of Care

Table 7.5 demonstrates probability of using public and private cares in contrast to other sources available to the people of SMCA. Other sources include Non-Government Organisations (NGOs), charitable healthcare institutions, self-medication, family advice, purchasing medicines from chemist shops etc. Considering different disease characteristics of the people, it is found that in contrast to other sources, probability of using both public and private healthcare services increase as the severity of disease changes from low to medium. However, when the nature of disease changes from acute to chronic (i.e. from short duration to long duration), probability of utilising private healthcare services increases by2.087 times implying that in contrast to other sources, likelihood of using private healthcare services is much higher for chronic diseases than for acute diseases.

7.5: Log odds and Odds ratios of utilising public and private healthcare sources: Results of Multinomial logistic regression analysis

		β	Exp.(β)	Reference category
Public Healthcare (rc: others)	Intercept	-2.257[3]		Disease category -GIII
	GI	0.043	1.044	Disease category - GIII
	GII	-0.535	0.585	Disease category - GIII

	GIII	0[b]	.	
	Low	-2.676[1]	0.069[1]	Severity – High
	Medium	-1.290[2]	0.275[2]	Severity – High
	High	0[b]	.	Severity – High
	Nature of Disease (Chronic)	-0.149	0.861	Acute
	Acute	0[b]	.	
Private Healthcare (rc: others)	Intercept	-1.522[3]		Disease category -GIII
	GI	-0.388	0.678	Disease category - GIII
	GII	0.174	1.190	Disease category - GIII
	GIII	0[b]	.	
	Severity-Low	-2.684[1]	0.068[1]	Severity – High
	Medium	-1.560[1]	0.210[1]	Severity – High
	High	0[b]	.	Severity – High
	Nature of Disease (Chronic)	0.736[3]	2.087[3]	Acute
	Acute	0[b]	.	
	Cox and Snell	0.422		
	Nagelkerke	0.546		
	McFadden	0.370	.	

Sig. level: [1]p<0.01, [2]p<0.05, [3]p<0.10; The reference category is: Homeopathy.

a. This parameter is set to zero because it is redundant.

7.1.2 Econometric Analysis of the Impact of Disease Burden on Out-of-pocket Healthcare Expenditure

In the descriptive analysis, it is shown that how out-of-pocket healthcare expenditure (OOPHE) incurred by the people during the reference period of twelve months (i.e. one year) varies as the category of disease, severity of disease, nature of disease, number of days suffered, pattern of utilisation, sources of care, system of medicine, nature of utilisation and other related factors

changes as well. However, applying econometric approach, a log linear multivariate regression model in log-log form was developed to measure the impact of burden of disease and other related factors on OOPHE incurred by the people of SMCA through the utilisation of healthcare services. Here, dependent variable is natural log (henceforth only log will be mentioned) of out-of-pocket healthcare expenditure (OOPHE) incurred by the people of SMCA during the reference period of one year and explanatory variables are log of burden of diseases, log of choice of care, log of socio-economic conditions and log of demographic composition of the household.

In the present study, burden of diseases is measured by four variables, viz. category of disease, severity of disease, number of days suffered and nature of disease experienced by a person during the reference period. Again, choice of care is evaluated by four variables, viz. pattern of healthcare facility adopted, source of healthcare facility utilised, systems of medicines followed and type of visit made by the person during the illness episode. Socio-economic condition of the sick person is represented by the three variables, affordability of the household, educational attainment and place of residence of the sick person. Finally, demographic composition of the household is represented by four variables, namely, age, gender, marital status and family size of the sick person. Here, category of disease indicates the type of disease the person suffered; it could be communicable, maternal, peri-natal and nutritional conditions or, non-communicable diseases, or injuries and accidents or any of the two or more. Severity of disease indicates how serious the disease was; nature of disease indicates the character of disease episode, whether it was acute or chronic. Number of days represents the total number of days the person suffered due to illness. Pattern of utilisation indicates the treatment method which the sick person adopted, whether it was traditional method or modern method; sources of care indicates the place or institution from where sick person received the treatment; system of medicine reveals what different alternative systems of medicine the sick person followed to get relief from illness, whether from allopathy or from other system of medicines; type of visit represents the nature of healthcare facility utilisation, whether for IPD or for OPD purpose healthcare services were utilised. In addition, demographic composition represents the demographic characteristics such as age, gender, marital status and family size of the sick person. Here, affordability of the households represents the financial capability of the household to bear the burden of healthcare expenditure or in other words, income group in which the sick person belongs to and family size

is represented by the number of family member staying together in the family. OOPHE of each of these explanatory variables were transformed into natural log values. However, in the present econometric analysis, log-linear regression model is applied to capture the effect of different dimensions of disease burden and health seeking behaviour on self-financed healthcare expenditure made by the people from their own resources. Each of the components of explanatory variables was coded accordingly to run the multivariate regression model as per the conceptual framework.

Table 7.6: Description of the Explanatory Variables

Type of explanatory variable	Explanatory Variable (Natural logarithm of the following)	Categories	Code (before natural logarithm)
Burden of Diseases	Category of Disease	GIII GII GI	1 2 3
	Number of days suffered	1-3 4-6 7-10 More than 10 days	1 2 3 4
	Severity of Disease	Low Medium High	1 2 3
	Nature of Disease	Chronic Acute	1 2
Choice of Care	Pattern of Utilisation	Traditional Modern	1 2
	Sources of Care	Self- medication Private Public NGOs and others	1 2 3 4
	System of Medicine	Allopathy Yoga Homeopathy Ayurveda and others Combination of two or more	1 2 3 4 5
	Nature of Utilisation/ Type of	OPD IPD	1 2

	visit		
	Affordability of the households (Monthly Household Income)	Less than Rs. 10000	1
		Rs.10001-20000	2
		Rs.20001-30000	3
		Rs.30001-40000	4
		Rs.40001-50000	5
		More than Rs. 50000	6
Socio-economic conditions	Education	Illiterate	1
		NASA	2
		Up to Primary level	3
		Primary – Secondary	4
		Secondary-HS*	5
		HS- Graduate	6
		Post Graduate	7
	District (place of residence)	Darjeeling	1
		Jalpaiguri	2
	Age	Less Than 5 years	1
		5-14 years	2
		15-24 years	3
		25-44 years	4
		45-60 years	5
		More than 60 years	6
Demographic composition	Gender	Male	1
		Female	2
	Marital status	Unmarried	1
		Married	2
		Widow/Widower	3
		Divorcee	4
	Family Size	Less or equal to 4 members	1
		5 and more than 5 members	2

Note: GI: Communicable, maternal, peri-natal and nutritional conditions; GII: Non-communicable diseases; GIII: Injuries and accidents; Low: Normal activity with symptoms; Medium: Impairment of activities; High: Bed ridden for seven days or more; Acute Disease: Suffering for less or equal to 30 days; Chronic Disease: Suffering for more than 30 days continuously; Modern source where opinions or advices are taken from doctors and medical experts by one group, and utilisation of healthcare facilities from 'traditional source' where treatment is sought from paramedical staff including personnel in chemist's shop, self-medication or and from any systems of medicine; Public includes Urban Primary Health centre, Govt. Hospital, Medical etc., Private includes Chambers, Clinics of the doctors or Private nursing Homes, Others include NGOs, Charitable Organisations and others trusts etc.; OPD: Non-hospitalisation cases; IPD: Hospitalisation cases. HS: Higher Secondary; * NASA indicates not attaining school age, they cannot be treated as illiterate though their education level is nil. Here, preparatory school qualification is not considered.

7.1.3 Interpretation of the results of log-linear regression model

It is generally assumed that a person suffering from either of the type of illness with high severity for a long duration (i.e. suffering from chronic diseases) will require more OOPHE than the other counterparts. On the other hand, OOPHE may also be higher when a sick person chooses modern method of treatment in private sources of healthcare facilities following allopathy system of medicine than the other possible combinations. Further, the more is the IPD cases experienced by the person, the more is the likelihood of incurring OOPHE than the expenditure for OPD cases. It is also assumed that high income groups have higher affordability to meet the high healthcare expenditure than the lower income groups, so chances of incurring OOPHE is higher for high income groups than lower income groups. Finally, it is believed that the more will be children and elder members in the family, the more will be healthcare burden and the higher will be OOPHE. On the other hand, due to high per capita income small sized households have higher probability of incurring OOPHE than large sized households. Results of log-linear regression model are presented below.

Table 7.7: Parameter estimates of Log-linear multivariate regression model

Variables	**B**	Tolerance	VIF
Constant	6.274[1]	-	-
Ln (Category of disease)	0.119	0.739	1.353
Ln (Number of days suffered)	0.532[1]	0.573	1.745
Ln (Nature of disease)	-0.027	0.746	1.340
Ln (Severity)	0.978[1]	0.792	1.263
Ln (Pattern of utilisation)	0.423[1]	0.675	1.482
Ln (Type of care)	2.270[1]	0.891	1.123
Ln (System of medicine)	-0.271[1]	0.801	1.249
Ln (Sources of care)	-0.372[1]	0.917	1.090
Ln (Affordability category of household)	0.451[1]	0.630	1.586
Ln (Education)	-0.092	0.672	1.489
Ln (District – place of residence)	-0.335[1]	0.780	1.281
Ln (Age category)	0.332[1]	0.360	2.778

Ln (Gender category)	-0.037	0.900	1.111
Ln (Marital status category)	-0.029	0.487	2.053
Ln (Familysize category)	-0.030	0.685	1.460
Number of observation	638	-	-
R-square	0.792	-	-
Adjusted R-square	0.627	-	-
F-value	69.837	-	-
SEE	0.79424	-	-

a Dependent Variable: Ln (Out of pocket Healthcare Expenditure); Ln: natural logarithm; [1]$p<0.01$, [2]$p<0.05$, [3]$p<0.10$

Empirical results of the log-linear regression model show the high proportion of variation explained by the independent variables (i.e. R-Square =0.792, Adjusted R-Square =0.627).The goodness of fit for the model is tested by using ANOVA and F-value at normal level of significance. The contribution of individual independent variables is tested using t-test at normal level of significance. Result shows that estimated F value is 69.837 and is significant at 0 percent level. Results also reveal that out of the four variables of burden of disease, only two explanatory variables such as number of days suffered and severity of disease have emerged out statistically significant at normal level of test of significance. On the other hand, all four explanatory variables such as pattern of utilisation, sources of care, system of medicine and type of visit (or nature of utilisation) representing choice of care of the sick person are found to be statistically significant at normal level of test of significance. Further, out of total three variables representing socio-economic conditions of the sick person, only two variables viz. affordability of the household and place of residence appear to be statistically significant at 0 percent level. Finally, age of the sick person is found to be statistically significant at 0 percent level and rests of the variables of demographic composition are not significant. Therefore, statistical results reveal that number of days suffered, severity of disease, pattern of utilisation, sources of care, system of medicine, nature of utilisation, affordability of the household, place of residence and age of the sick person are the important factors determining the OOPHE in SMCA. Thus, it conveys that a change in the all these predictor variables lead to a change in OOPHE incurred by the people. However, positive sign of the coefficient of any variable indicates that the variable of interest has direct effect on OOPHE made by the people of SMCA during the reference period of one year.

In other words, it can be said that as the contribution of these explanatory variables increases likelihood of incurring OOPHE by the people of SMCA increases accordingly. On the contrary, negative sign of the coefficient indicates that as the contribution of variable of interest increases, chances of making OOPHE decreases.

In our present study, significant variables such as number of days suffered, severity of disease, pattern of utilisation, nature of utilisation, affordability of the household and age of the sick person are having positive mathematical signs. It indicates that likelihood of incurring OOPHE increases as these variables change their magnitudes from lower code to higher code. In other words, it can be said that positive sign of the coefficients represent that when number of days of suffering increases, severity of disease increases, use of the modern method of treatment increases, hospitalisation case increases, affordability of the households increases and age of the sick person increases, OOPHE incurred by the people also increases. On the other hand, negative coefficient of the significant variables, such as sources of care, system of medicine and place of residence of the sick person indicates that as the sick person moves from private care to other sources of care, from allopathy treatment to other alternative system of medicine likelihood of incurring OOPHE decreases. It may be due to the fact that treatment at private institutions is costlier that other sources, allopathy system of medicine is expensive than the other alternative system of medicine. On the other hand, socio-economic conditions of the people living in Jalpaiguri district area is not good as compared to people living in Darjeeling district area, this may the reason of decrease in OOPHE.

Since the model is specified in log-log form, the co-efficient estimates are elasticity and therefore, it facilitates us to interpret the relationship of OOPHE with different dimensions of burden of disease and its associated variables. Here, the dependent variable and independent variable(s) are log-transformed variables, the estimated coefficients can be considered as elasticities of OOPHE with respect to explanatory variables of interest. The estimated OOPHE elasticities with respect to number of days suffered is 0.532, severity of disease is 0.978, pattern of utilisation is 0.423, type of care is 2.270, system of medicine is -0.271, sources of care is -0.372, affordability of household is 0.451, place of residence is -0.335 and age of the sick person is 0.332 respectively. Now, comparing all these elasticities, it is clear from the results that OOPHE elasticity with respect to type of care is larger than any of the other elasticities. It suggests that type of care is more important to explain the variations in OOPHE in SMCA. It is

probably because of as nature of healthcare utilisation or type of care changes from OPD to IPD, healthcare expenditure increases by manifolds, as latter type is much more expensive phenomenon than the former category.

Co linearity test is done to check whether there is any correlation among one predictor variable and the remaining predictor variables. In multiple regression, two statistics are generally used to diagnose the co linearity. They are variance inflation factor (VIF) and tolerance. Tolerance is just the reciprocal of VIF (Miles, 2014). Further, both tolerance and VIF are used as an indicator of multi-co linearity. Higher levels of tolerance and lower levels of VIF are always desired as it directly affects the results associated with a multiple regression analysis. Minimum accepted value of tolerance is 0.10 (Tabachnick and Fidell, 2001). Study finds that tolerance statistics for Log of number of days suffered is 0.573(henceforth log will not be mentioned), for severity of disease is 0.792, for pattern of utilisation is 0.675, for type of care is0.891, for system of medicine is 0.801, for sources of care is 0.917, for affordability of household is 0.630, for place of residence is 0.780 and for age is 0.360 respectively. Results reveal that tolerance value for each of the variable of interest is reasonably much greater than 0.1. It indicates that there is no chance of multi-co linearity among the significant variable of interest and other remaining predictor variables used in regression analysis. On the other hand, VIF is used to measure the magnitude of the inflation in the standard errors associated with a particular beta weight due to multi-co linearity. Maximum accepted value of VIF is 5 (Rogerson, 2001). Results show that VIF for number of days suffered is 1.745, for severity of disease is 1.263, for pattern of utilisation is 1.482, for type of care is1.123, for system of medicine is 1.249, for sources of care is 1.090, for affordability of household is1.586, for place of residence is 1.281 and for age is 2.778 respectively. Here, VIF for each of interest is much less than 5 indicating there is very negligible or no correlation exists among the significant variables of interest and the remaining predictor variables (i.e. no multi-co linearity).Thus, the estimated model provides us a better insight into the variations of OOPHE with respect to different dimensions of burden of disease through the process of utilisation of healthcare services.

7.2 Summary

The study finds mixed observations for utilising healthcare facilities, in case of gender, when on the one hand, likelihood of utilising all types of available healthcare facilities is higher for males than for females, on the other hand, likelihood of utilising exclusively modern healthcare facilities is higher for females than for males. It indicates that males practice self-medication, buy drugs from chemist shop, adopt home therapy etc. more than females do. Higher utilisation of healthcare services by below 5-year age-group could be utmost care taken for them in the family, opposite for the people aged above 60 years. Though there was no such difference in morbidity prevalence among the different castes, econometric analysis shows the caste difference in utilising modern healthcare services. Further, due to higher affordability, probability of utilisation of healthcare is higher among the high income groups than the low income groups. Sometimes, multiple sources of income of the large sized family leads to an increase in healthcare spending capacity and thereby leading to increase in probability of utilisation of healthcare facilities by the large sized households. As majority of the respondents were suffering from GII category diseases (non-communicable) than from GI category diseases (infectious, communicable and maternal conditions), so likelihood of using healthcare services for former category is higher than latter, while other factors remain constant. As severity of disease increases, need for medical care is sought, resulting into higher chances of utilisation by the sick people. When the duration of disease increases, nature of disease changes from acute diseases to chronic diseases, in those cases continuous medical care or regular interval medical checkup becomes important, so chance of utilising all healthcare facilities, particularly, modern care increases. On the other hand, particularly for the treatment of GIII category illness (injuries) patient needs special care, equipment and other arrangements, which are rarely available at home, so probability of utilising IPD services is comparatively higher than for other categories. In addition, when severity of disease goes out of control, and nature of disease changes, chances of hospitalisation increase. Higher use of allopathy system of medicine may be due to quick relief, easy availability etc, but probability of utilising other system of medicine including

ayurveda by the people cannot be ignored in the study area, indicating that people have the tendency towards alternative systems of medicine. It is a fact that public healthcare facilities provide all the drugs and other treatment facilities for the treatment of communicable related diseases including child delivery, peri-natal, maternal at free of cost or little costs, so likelihood of utilising government health facilities is higher, particularly, among the low income groups. On the other hand, quality of care, better facilities, better treatment, high success rate, affordability of the higher income groups etc. may be the reasons for higher likelihood of utilisation of private healthcare services for all types of diseases of the people.

On the other hand, it is evident from the results of log-linear multivariate regression model that all the estimated OOPHE elasticities are less than one, therefore, they are said to be inelastic in nature. It implies that when any of the explanatory variables of interest changes, OOPHE also changes, but proportionate change in OOPHE is less than proportionate change in variable of interest. Moreover, the same results can be interpreted that a 10 percent increase in number of days of suffering will increase the OOPHE5.3 percent. Similarly, we expect that a 10 percent increase in severity of disease, pattern of utilisation, affordability of household and age of the sick person lead to an increase in OOPHE by 9.8 percent, by 4.2 percent, by 22 percent and by 3.3 percent respectively. On the contrary, results reveal that 10 percent change in system of medicine from allopathy to other systems leads to a decrease in OOPHE by 2.7 percent. Similarly, when source of healthcare services changes by 10 percent from private care to others sources, OOPHE decreases by 3.7 percent. On the other hand, when place of residence of the sick person changes from Darjeeling district area to Jalpaiguri district area, possibility of incurring OOPHE decreases by 3.3 percent, this may be due to the fact that people living in Jalpaiguri district area have comparatively low economic background and low affordability than people living in Darjeeling district area. Thus, results indicate that along with the other factors, burden of disease of the people affects the out-of-pocket healthcare expenditure in SMCA. Thus, the estimated models provide us a better insight into the variations of OOPHE with respect to different dimensions of burden of disease and utilisation of healthcare services. Therefore, from the econometric analysis also, it can be concluded that burden of disease of the people has significant impact on utilisation of healthcare services and on out-of-pocket healthcare expenditure of the households in Siliguri Corporation Area.