Factors Influencing Type of Health Services and Duration of Suffering from Diseases in Rural Bangladesh: A Case Study

Roushan Jahan ^{1*}, Mohammad Kabir¹, Mobarak Hossain Khan¹, Mohammad Nora¹, Alam Bhuiyan¹ and Mohammad Ferdows²

¹Department of Statistics, Jahangirnagar University, Dhaka, Bangladesh

² Department of Mechanical Engineering, Tokyo Metropolitan University, 1-1 Minami-osawa, Hachioji, Tokyo 192-0397, Japan

*Corresponding author. E-mail: <u>rjsumi@yahoo.com</u>

ABSTRACT

Regression methods are important to analyse any data which attempt to describe the relationship between a binary-qualitative and any number of predictor variables. The logistic regression analysis of the Government health facility suggests that variables age, sex and visit to the health facility are the influencing factors of the duration of a particular disease. In case of private health care facility, only one variable, that is sex of the patients, has influence on the duration of suffering from a particular disease. The patients who use private health facility may not need to suffer for a long period. The patients of the Government health facility generally come from a poor socio-economic background and most of them are poor and cannot afford to go to the health facility because of financial constraints. The results suggest that health care needs to be targeted to the poor so that they will not suffer longer duration from a particular disease.

Key words: Logistic regression, Dichotomous data, Influencing factor, Health facility, Socio-economy

INTRODUCTION

Health is a function, not only a medical care, but of the overall integrated development of the society. A dismal scenario can be observed in the health sector where both primary and specialized health care services are still inadequate. Here, a serious demand for services exist for doctors, nurses, medicines, hospital care and so on. At present, doctor- population ratio is 1:5,506; hospital bed -population ratio is 1:3,231 and nurse-population ratio is 1:10,714 and per capita health expenditure is TK^{*}. 135 per annum. At the same time, public health facilities are running at only 50% of capacity.

^{* 1} US\$ = 58 Taka (approx.)

In some regression problems, (McCabe, 1980). The response variable is categorical, often either success or failure. For such problems, the normal linear model is inappropriate because normal errors do not correspond to a zero or one response. One important method that can be used in this situation is called logistic regression (Hosmer and Lemeshow, 1989). The logistic regression method has become the standard method for regression analysis of dichotomous data in many fields, especially in the health sense (Knoke, 1975).

In our study, a logistic regression analysis has been made to identify the factors that influence the client's utilization of health care services rendered by the providers.

METHODOLOGY

For this analysis, the quantitative data were taken from only the exit interviews. We chose exit interviews (Planning perspectives, 1998; Planning perspectives, 2000) as the optional evaluation methodology because they are simpler than other possible choices (such as household interviews), are more practical, are less expensive to carry out and allow for the most rapid feedback.

We selected the government and private hospital services of Savar Thana of Bangladesh as our case study. A total of 250 clients were interviewed for the study. Every fifth client was interviewed once he or she was ready to leave the center, regardless of who provided the treatment. If the fifth person leaving the center was unwilling to be interviewed, then the sixth or seventh person would be interviewed. If the client was a child, his or her attendant was selected as the respondent. If the respondent received services for himself or herself as well as for one or more of his or her children, information was collected from all of them, but was considered as a single record. A structured questionnaire was pre-tested and necessary adjustments were made, based on the results of the pre-test. Analysis was carried out, using the SPSS statistical software package. The presence of service providers, the Govt. and private hospital, was observed during the interview days.

It should be mentioned that this study considered only those clients who used the services during the days when the interviews were carried out. There was no attempt to collect information from past-users and non-users. Thus, this study has the limitation of presenting only the government and private hospital user's opinions regarding the services received.

The original model questionnaire developed to assess client satisfaction during exit interviews contained 77 questions and took 10-20 minutes to complete, on average (Health and population sector program 1998-2003).

Factor influencing health care services:

In this study, our

Dependent variable Y: Dichotomous response variable, whether suffered from diseases more than one month is taken as one otherwise it is zero.

The independent variables are:

- X_1 Age is continuous variable
- X_2 Sex: Male = 1 and female =2
- X_3 Whether visited any health facility before: If yes it is 1 otherwise it is zero
- X_4 Whether satisfied with the waiting time: If yes it is 1 otherwise it is zero
- X₅ Monthly income of the family is continuous variable
- X_6 Whether satisfied with services: If yes it is 1 otherwise it is zero.

Given the categorical nature of some variables, we see that the logistic regression analysis is suitable to model the data.

In the logistic regression analysis, we denote the expected value of Y (dependent variable) by:

 $E(Y) = P(Y=1) = \pi_i$ and $P(Y=0) = 1 - \pi_i$ The logistic regression model is given by:

Loge (
$$\frac{\Pi_i}{1 - \Pi_i}$$
) = $\beta_0 x_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k$

The odds of making response 1 instead of response zero (0) are:

$$\frac{\Pi_i}{1-\Pi_i} = e^{x_i \beta}$$

Where π is the dependent variable

 $\beta_0,\,\beta_1,\,\beta_2.....,\,\beta_k$ are the logistic regression coefficient

 $x_0, x_1, x_2, \dots, x_k$ are the explanatory variables.

Table 1. The results of the logistic regression analysis are shown with significance level and odds ratios.

Variables	β Coefficient	Significance level	Exponential β
X ₁	-0.0018	0.0150	0.9982
X ₂	-0.9067	0.0018	0.4039
X ₃	-0.6816	0.0172	0.5059
X ₄	-0.3970	0.1609	0.6722
X ₅	0.6441	0.0595	1.9042
X ₆	0.0003	0.2186	1.0000
Constant	1.5052	0.0005	-

2log X² likelihood is 323.11 Significant at p<0.001

A total of six variables were considered to identify the factors that influenced the client's utilization of health care services rendered by the providers, Among the variables considered in the regression model were variables age, sex of the patients and previous experience of visit to the health facility which were important and significantly correlated with the suffering duration from a disease.

The variable age shows that higher is of the patient, the lower is the likelihood of visiting health facility. Sex of the patient is also associated with the duration of sickness of the disease. The sign of the coefficient indicates that females are highly likely to suffer longer duration than their male counterparts.

The finding also demonstrates that previous experience of health care facility is also indirectly associated with the duration of the suffering of the patients. The regression coefficients of duration of sickness and the income are positive. It is difficult to explain it. One explanation may be that patients who are economically better visit health facilities particularly in private clinics more frequently than expected. It is to be mentioned here that about half of the exit sample patients interviewed were from private clinics. The variable whether satisfied with the services of health care services is not significant.

Factors influencing health care services in Government and non-Government health care facilities:

Logistic regression analyses were carried out in Government and non-Government health care service patients to identify the factors which have influence on the duration of suffering of the clients. Here dependent variable Y: Dichotomous response variable, whether suffered from diseases more than one month is taken as one otherwise it is zero.

The independent variables are:

- X₁: Age is continuous variable
- X_2 : Sex: Male = 1 and female =2
- X_3^{2} : Whether visited any health facility before: If yes it is 1 otherwise it is zero
- X_4 : Whether satisfied with the waiting time: If yes it is 1 otherwise it is zero
- X_5 : Whether get medicine from the facility: If yes it is 1 otherwise it is zero
- X₆: Monthly income of the user is continuous variable

Variables	β Coefficient	Significance level	Exponential β
X ₁	-0.0019	0.0587	0.9981
X ₂	-0.7071	0.0885	0.4931
X ₃	-0.5368	0.4603	0.5846
X ₄	-0.8445	0.0480	0.4298
X ₅	0.3005	0.4720	1.3506
X ₆	6.70E-05	0.2637	1.0001
Constant	1.8109	0.0035	-
-2log likelihood X ²		143.6111	

Table 2. The results of the logistic regression analysis of the government health facilities are shown with significance level and odds ratio.

Significant at p<0.001

Table 3. The results of the logistic regression analysis of the non- government. health facilities are shown with significance level and odds ratio.

Variables	β Coefficient	Significance level	Exponential β
X ₁	-9.2E-05	0.0011	0.9999
X ₂	-1.1174	0.4287	0.3271
X ₃	0.9353	0.9167	2.5480
X ₄	-0.0284	0.4197	0.9720
X ₅	0.3486	1.0939	1.4170
X ₆	2.48E-05	2.519E-05	1.0000
Constant	0.2049	0.5894	-
-2log likelihood X ²		138.454	

Significant at p<0.001

The regression coefficients in the government area suggest that variables age, sex, visit to the health facility are the influencing factors of the duration of a particular disease. In the case of private health care facility, only one variable that is sex of the patients has influence on the duration of suffering from a particular disease. Generally, the patients who use private health facility are rich and as soon as they become sick, they visit health facility for recovery. The patients who use private health facility may not need to suffer for a long period. The disease is burden more among the poor segment of the population and they suffer from a disease for longer period than expected.

CONCLUSION

The logistic regression analysis shows that only three variables are statistically significant. The variables are age and sex of the patients and previous experience of visit to the health facility. The variable age shows that higher is the age of the patient, the lower is the likelihood of visiting health facility. Sex of the patient is also associated with the duration of sickness of the disease. The finding also demonstrates that previous experience of health care facility is also indirectly associated with the duration of the suffering of the patients.

REFERENCES

Health and population sector program 1998-2003. Bangladesh service delivery survey; Second cycle, 2000.

Hosmer, D.W., and S. Lemeshow. 1989. Applied Logistic Regression, New York: Wiley.

International family planning perspectives vol. 24, No. 4, December 1998.

International family planning perspectives, vol. 26, No. 2, June 2000.

Knoke, D. 1975. A comparison of Log-Linear and Regression models for systems of Dichotomous Variables. Sociological methods and research. 3(May): 416-433.

McCabe, G. P., Jr. 1980. The interpretation of regression analysis results in sex and race discrimination problems. The American Statistician 34: 212-215.