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An Analysis of Demand for and Supply of Health Care in Bangladesh: An Econometric Approach

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An Analysis of Demand for and Supply of Health Care in Bangladesh: An Econometric Approach

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Philosophy in the Department of Economics, University of Rajshahi, Rajshahi, Bangladesh.

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The author

DECLARATION

I do hereby declare that this thesis entitled "An Analysis of Demand for and Supply of Health Care in Bangladesh: An Econometric Approach" Submitted by me to the university of Rajshahi for the degree of Master of Philosophy in Economics is an original work. It has not been submitted earlier either partly or wholly to any other university or institute for any degree.

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CERTIFICATE

This is to certify that Kazi Julfikar Ali has been working under my supervision. I am pleased to forward his thesis entitled "An Analysis of Demand for and Supply of Health Care in Bangladesh: An Econometric Approach" which is the record of bona fide research carried out at the department of Economics, University of Rajshahi. He has fulfilled all the requirements for submission of the thesis for award of M. Phil degree.

Date: August 2008

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Dedicated

To

My Parents

ABSTRACT

The study attempts to estimate the factors, which influence the demand for health care as well as supply of health care in Bangladesh. A binary logistic regression has been employed with two urban samples in Bangladesh for analyzing the demand for health care. The empirical results of this research shows that price of healthcare has negative effects on the demand for healthcare in both study areas. The levels of education and income have positive effect on demand for healthcare in the both study areas. Duration of illness has a negative effect on demand for health care in both study areas. In both areas there is no remarkable health insurance because the concept of health insurance is not popular. On the other hand, ordinary least square has been employed to estimate the supply of health care in Bangladesh. The empirical results of supply of health care shows that average price of physician visit and gross domestic product are positively related to supply of health care and it is statistically significant at 5 percent level.

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Abbreviation and Acronyms

BBS	Bangladesh Bureau of Statistics
BSMMU	Banghabandhu Sheikh Mujib Medical University
CT	Computed Tomography
DC	Differential count
DH	Directorate of Health
DGHS	Directorate General of Health Services
DGFP	Directorate General of Family Planning
ECG	Electrocardiogram
ENT	Ear, Nose & Throat
EPI	Expanded Program for Immunization
EOC	Emergency Obstetric Care
ESR	Erythrocyte Sedimentation Rate
FBS	Fasting Blood Sugar
FWA	Family Welfare Assistant
FWCs	Family Welfare Centers
FWVs	Family Welfare Visitors
GDP	Gross Domestic Product
GOB	Government of Bangladesh
GTT	Glucose Tolerant Test
1HAB	1 Hour After Breakfast
2HAB	2 Hour After Breakfast
Hb%	Hemoglobin %
Hbs Ag	Hepatitis B Surface Antigen
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
ICMH	Institute of Child and Mother Hospital
IDH	Infection Diseases Hospital
IDCH	Institute of Diseases of Chest and Hospital
KMSS	Khulna Mukti Seba Services
LGERD	Local Government Engineering and Rural Department

MA	Medical Assistant
MBBS	Bachelor of Medicine and Bachelor of Surgery
MCH	Maternal and Child Health
MCWC	Maternal and Child Health Welfare Center
MP	Malarial Parasite
MRI	Magnetic Resonance Imaging
NGO	Non Government Organization
NICVD	National Institute of Cardioviscular diseases
OLS	Ordinary Least Square
PHC	Primary Health Care
PPBS	Post Partum Blood Sugar
PSTC	Population services and Training Center
RA	Rheumatoid Arthritis
RBS	Random Blood Sugar
R/E	Routine Examination
RH titer	Rhesus titer
RMCH	Rajshahi Medical College Hospital
SAARC	South Asian Association for Regional Cooperation
SAMCOs	Sub-assistant Community Medical Officer
SGPT (ALT)	Serum Glutamic Pyruvate Transaminase, (Alanine Transaminase)
SZMCH	Shahid Ziaur Rahman Medical College Hospital
TB	Tuberculosis
TC	Total Count
UHC	Upazila Health Complex
UH&FWCs	Union health and family welfare centers
USCs	Union Sub-centers
VDRL	Venereal Disease Research Laboratory
WHO	World Health Organization

Chapter One

Introduction and Background Information

1.1 Introduction

Bangladesh is one of the poorest countries of the world with a per capita GDP $447 in 2005 and life expectancy of its people is 65.1 years in 2004 (GOB 2007). Maternal mortality rate (MMR), infant mortality rate (IMR) and under five mortality rates are among the highest in the world which is shown in Table 1.1. In Bangladesh about 40 percent of the population is considered as poor and about 19 percent is considered as Hard-Core poor (GOB 2005). The malnutrition situation is very serious among pregnant women. In Bangladesh 70 percent of mothers suffer nutrition deficiency, about 70 percent pregnant woman does not receive antenatal care and 90 percent of woman does not receive postnatal care. Nutrition deficiency contributes to low birth weight of newborn babies. Besides, more than 45 percent of rural families and 76 percent of urban families are below the acceptable caloric intake level. In Bangladesh less than 40 percent of the population has access to basic health care and the quality of health care services is still much below compared to the level of many other developing countries. Over the 36 years of independence, the health situation of the population has improved quite remarkably. Smallpox, malaria and cholera have been reduced because of awareness of the population as well as the proper initiative of the government. The crude death rate dropped from 11.3 in 1988 to 5.6 in 2006 per 1000 population due to the recent success in the EPI program, control of diarrhoeal disease program and prevention of acute respiratory infection program. More than 45 percent of rural families and 76 percent of urban families are below the acceptable caloric intake level. About two-thirds of all families received insufficient protein and vitamins. In Bangladesh 75 percent of people have access to water supply and the achievement is less than other countries in South Asia. As a result 25 percent of population in Bangladesh each year suffers from water related diseases. In Bangladesh the price of drug is very high in comparison to the others developing countries. Presently the healthcare institutes are facing shortage of qualified professionals and there is still shortage of doctors, nurses. The doctor-nurse

ratio is 2:1, which is a highly unsatisfactory situation. Bangladesh has one of the lowest ratios of nurses per capita in the world, which is 1:7180 in 2004. In addition, the situation for the health technologists and several categories of paramedical professional are even worse. That is why people of Bangladesh do not get proper healthcare service from these institutes. Moreover many of those nurses who are employed in the country are not adequately trained in their own profession. During last one decade, private hospitals and clinics emerged in urban city areas because of insufficient and poor quality of public health services. A large number of government employed doctors' carry on private practice in the health sector in Bangladesh. For this reason they would not like to stay the rural areas. Hence, the rural patients get less care in the government hospitals. According to population censes 76.61 percent of population resides in the rural areas. So, government healthcare services are poorly utilized. Even though, the most vulnerable groups use the government hospital facilities. So, the poor people cannot afford this treatment because they charge a handsome amount of money against their treatment. Most of the rural patient are receiving healthcare services from informal providers (quacks, kabiraj, hakimi etc.) those without any recognized qualification to practice. Recently NGOs play the vital role in the health sectors. They established new hospitals and clinics both in urban and rural areas. Generally the people of Bangladesh only get primary health care from these hospitals and clinics. Socio economic condition as well as health care facilities of Bangladesh is very low at world standard. As a result, about half of the population cannot contribute to the country's development efforts. We know that a well-developed human resource base is a precondition for healthy economic development.

Table 1.1 Health related indicators of Bangladesh

Indicator	1990	2000	2005
Under five mortality rate (per 1000)	149	92	73
Child malnutrition, underweight (% of under age 5)	66	48	48
Child immunization, measles (% of ages 12 -13 mos.)	65	76	81
Access to improved water source (% of total population)	72	..	74
Access to improved sanitation (% of urban population)	55	..	51

Source: World Development Indicator 2007

1.2 Objectives of the Study

The principal objective of the study is to identify the major problems of our health care system so that appropriate policy measures could be suggested and the people can get maximum benefit of our health care system. More specifically the objectives could be written as,

i) to make a comprehensive presentation of our present health care system in order to get a complete picture of coverage of different systems;
ii) to examine the demand as well as the supply side of our health care system;
iii) to identify the problems and challenges of health care system currently facing; and
iv) to make appropriate policy recommendation based on the findings of the study.

1.3 Justification of the Study

Bangladesh is a developing country, which is characterized by low income, low rate of education, poor quality of health care and unemployment resulting in high incidence of poverty. Malnutrition and ill health would have an adverse effect on productivity, which is a common picture in Bangladesh. That being the reason ill health individuals needs their high degree of health care. In addition, most patients who come to a public hospital both in rural and urban area are very poor. Even the service delivery is not up to an acceptable standard level and do not give what the patient really need. Health care facilities in rural area are under utilized whereas in urban areas it is over utilized in Bangladesh. To improve the health care facilities the knowledge about the determinants of demand for health care is very important. Degree of influence of these factors on the demand for health care is also important to know. Again the socio-economic factors as well as the factors associate with supply of health care should be analyzed properly. So this study is designed to address all of these issues.

In addition analysis of demand for health care will help the policy maker to formulate policies and adopt the strategies for health sector in Bangladesh. The government of Bangladesh is always trying to improve the supply of health care as

well as increasing the effective demand for health care so that the people of Bangladesh can be benefited. Many research works have been done on this field both in national and international context. Most of the research has focused on discrete choice model among the provider and they used multinomial logit model, mixed multinomial logit model, nested logit model and multinomial probit model to estimate the parameters of demand for healthcare. But we attempt to estimate the parameters of demand for health care in Bangladesh by using logistic regression model as well as to estimate the parameters of supply of healthcare by using ordinary regression model. In addition, there is no remarkable research on this field in the both study areas. So the study on this issue is highly demanding and this attempt is to fulfill the need.

1.4 Microeconomic Model of Demand for Health Care: A Conceptual Framework

The framework is a model where utility depends on level of health care and on the consumption of goods. Generally when individuals fell sick he/she must take decision whether he/she seeks medical care or not. Individual faces a lot of health care provider. But sick person will not reach to the all provider due to the limited resources. So preferences on the use of household resources for health care may differ from individual to individual.

An Individual tries to maximize his/her utility subject to the budget constraint. Individual has a fixed amount of income and he/she has to spend whole of his/her income on the health care and other goods and services.

$U = f(X, H)$

$Y = P_x X + P_h H$, Where H = health Care and X = other goods and services

Y = income of the patient, P_x = price of other goods and services and P_h = price of health care,

Health care consists of many health care inputs such as physician or medical visit (inpatient visits or outpatient visit), cost of medicine, pathological, osteopath, cost of immunization of population, therapy. So we can say that health care is some aggregate measure and its measurement is very complex and vast.

The demand for health care is a derived demand from the demand for health. Health care is demanded as a means for consumers to achieve a large stock of health capital. Grossman explained that health care is a consumer good as well as an investment good. As a consumer good health is desired because it makes people feel better. As an investment good health is also desired because it increases the number of healthy days available to work and earn income.

1.4.1 Utility Maximization

Here the budget line shows the affordable possibilities for the patient to spend his income on health care and other goods. If an individual is ill then he is willing to sacrifice consumption of other commodities for health care because his money income is fixed. So he would like to maximize his utility subject to budget constraint up to this level in which price line touches the indifference curve.

At the equilibrium point the slope of the budget line is exactly equal to the slope of the indifference curve. The satisfaction is maximized at the point where

$$MRS = \frac{P_h}{P_x}$$

Where MRS = Marginal rate of substitution
P_h =Price of health care
P_x =Price of other goods and services

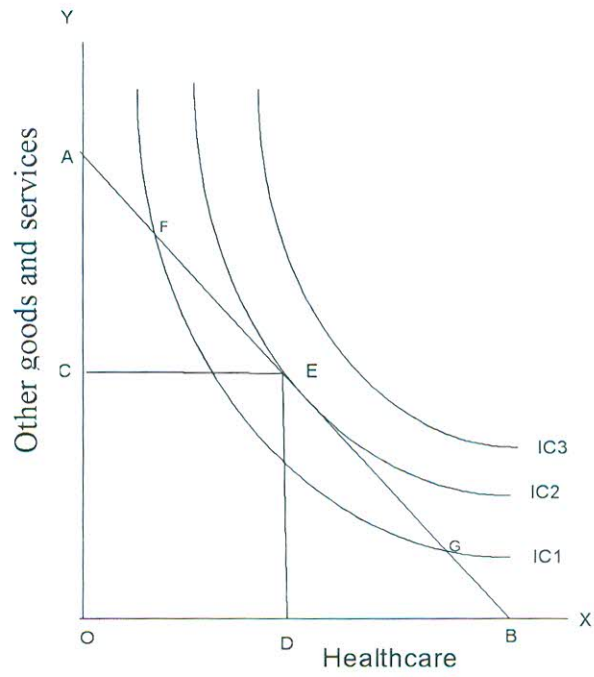


Figure: 1.1 Utility Maximization of a patient
Source: Author

If the MRS is less or greater than the price ratio, the consumer's satisfaction will not be maximized. For example, at point D the MRS or marginal benefit is greater than the price ratio or marginal cost. As a result, the individual is willing to substitute one unit of others good for one unit of health care with loss of satisfaction. On the other hand, at point E the MRS or marginal benefit is less than the price ratio or marginal cost. As a result, the

individual is willing to substitute one unit of health care for one unit of other goods and services with loss of satisfaction.

1.4.2 Derivation of Demand for Health Care Curve from Indifference Curve analysis

We assumed that health care is a normal good. If the price of health care decreases, the demand for health care increases.

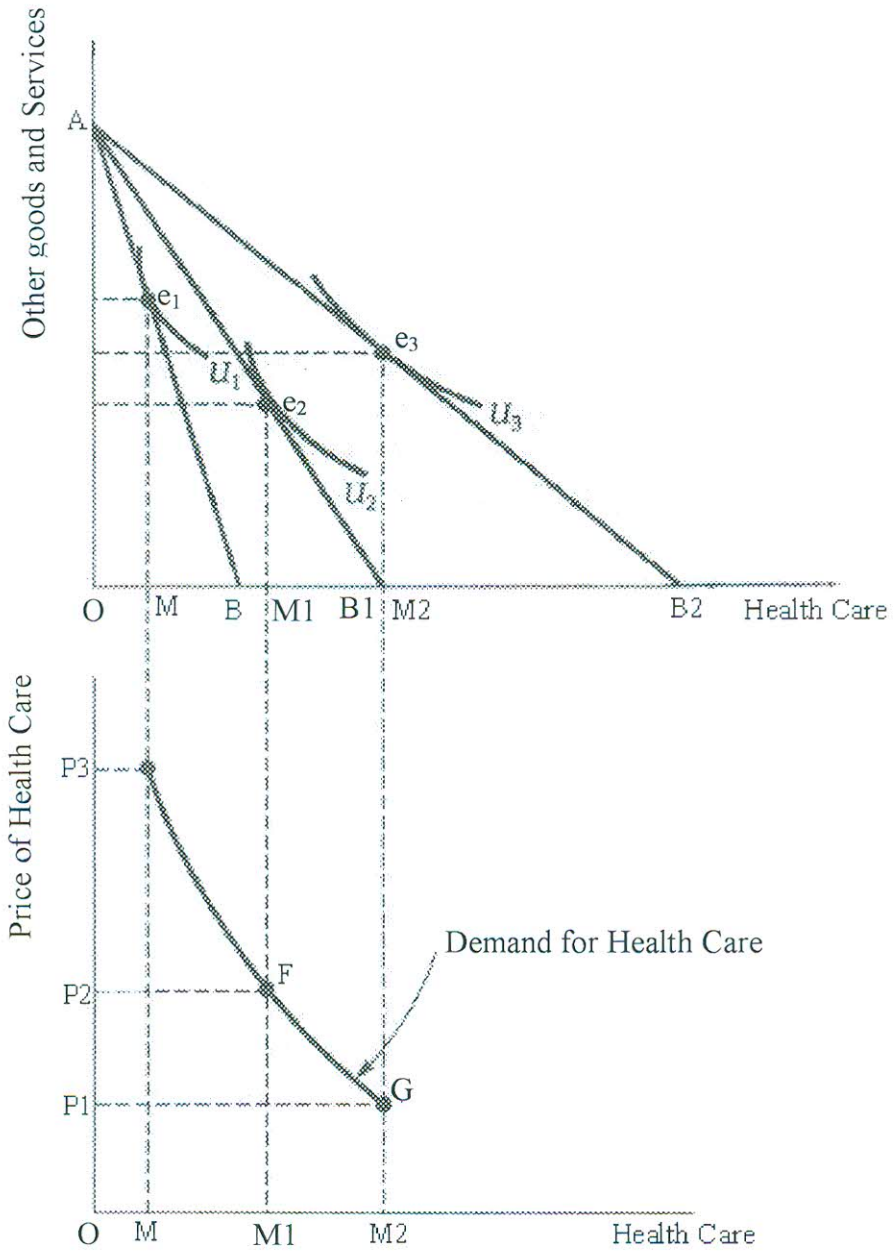


Figure: 1.2 Derivation of Demand for Health Care Curve of an individual

Source: Author

The individual demand for health curve is generated by plotting these quantities as a function of price of health care. Assume that the consumer has the budget line AB in Figure1.2 and the indifference curve U1. At point e1 the budget line AB is tangent to indifference curve U1. So, e1 is a equilibrium point. When the price of health care falls, while the price of other goods and services remain constant, the price line will shift toAB1 and the consumer will be in equilibrium at e2, where the new budget line AB1 touches the indifference curve U2. So, the consumer will consume a large amount of health care. In that case, purchasing power of the given money income increases. If we allow the price of health care to fall continuously the patient will buy more of health care.

We say that a fall in the price of health care from P3 to P1 resulted in an increase the quantity demanded from M to M2. By joining point E, F and G we derive DD, the patient's demand curve for health care which is negatively sloped. Individuals demand curve for a health care shows how his/ her desired purchases of it vary its price varies, other prices and income being held constant.

1.5 Utilization of Health Care Service of Public Hospital at Urban Areas in Bangladesh

In Figure 4(A) the supply of health care curve is parallel to the vertical axis, which implies that quantity supplied does not change with price and elasticity of supply is zero. But the demand curve is downward sloping. In Figure 4(B) DD is the market demand curve and SS is the market supply curve. Pm is the market price, which is determined by the market forces. If the government changes the price of Pg, which is below the market price so in this situation quantity demeaned is greater than quantity supplied. That is why in urban area health care facility of public hospital is being over utilized in Bangladesh.

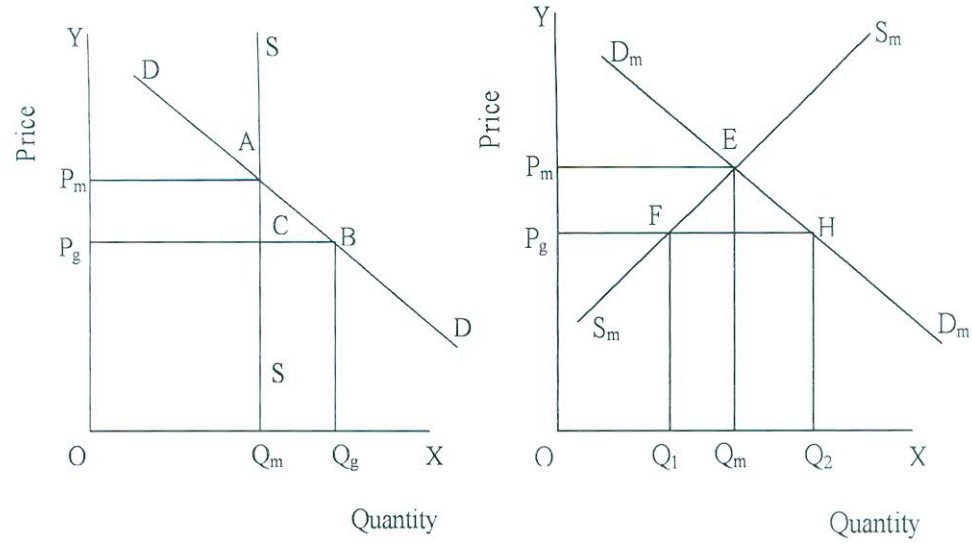


Figure 1.3 Utilization of healthcare service at urban area
Source: Author

In Figure 1.3 (A) and (B) horizontal axis represents the quantity of demand for health care and supply of health care. In Figure 1.3 (A) and (B) vertical axis represents the price of health care. In Figure (A) supply curve is parallel to the vertical axis because supply of health care is fixed so there is no influence between price and supply of health care and elasticity of supply is zero.

1.6 Health Indicators of SAARC Countries

Since independence, the health situation of the population of Bangladesh has improved significantly. Now a day's smallpox, malaria and cholera are no longer major killers' disease. The maternal and infant mortality rate has been declined remarkably.

Table1.2 Health Indicators of SAARC Countries

Country	Total Population 2004	Growth Rate% 1994-2004	Dependency Ratio		% Of Population 60+ years		Total Fertility rate		Life Expectancy at Birh year 2004	Infant Mortality Rate per 1000 2004
			1994	2004	1994	2004	1994	2004		
Bangladesh	139215	2.0	76	65	5.1	5.6	3.9	3.2	62	77
Bhutan	2116	2.2	89	77	6.3	6.9	5.4	4.2	63	80
India	1087124	1.7	68	60	7.0	7.8	3.7	3.0	62	85
Pakistan	154794	2.3	90	74	5.5	5.8	5.5	4.1	62	101
Nepal	26591	2.3	83	76	5.4	5.7	4.8	3.6	61	76
Maldives	321	2.8	99	81	5.3	5.1	5.8	4.1	67	46
Sri Lanka	20570	1.0	56	46	8.7	10.5	2.3	1.9	71	14

Source: The World Health Report 2006

Table 1.2 shows the basic health indicator of SAARC countries in 2004. In Table 1.1 revels that the overall health conditions are relatively poor in Nepal and Bangladesh. Life expectancy at birth of Nepal and Bangladesh was 61and 62 respectively in 2004. Infant mortality rate was highest in Pakistan in 2004 among the SAARC countries. But Infant mortality rate of Sri Lanka was lowest in 2004. In Bangladesh mortality rate was about 5.5 times higher than in Sri Lanka. Population growth rate was highest in Maldives whereas lowest was in Sri Lanka. In Bangladesh, population growth rate was 2.0 in 1994 - 2004. Dependency ratio was 81, which was very high in Maldives among SAARC countries. The position of dependency ratio in Bangladesh was 65 in 2004. Fertility rate was highest in Bhutan and lowest in Sri Lanka.

1.7 Scope and Limitations of the Study

The analysis of demand for health care is a survey type work and it is based on only two study areas namely Rajshahi city and Bogra town. The study could not cover all the population of Rajshahi city and Bogra town due to the shortage of time and budget constraints. Since the socio-economic condition and demographic structure of the entire area of Bangladesh are almost homogeneous so we firmly believe that from the two selected study have represented the whole area of Bangladesh

On the other hand the analysis of supply of health care in Bangladesh is not a survey type work. The study covers all the population of Bangladesh, because secondary data are used in this part.

There are a number of limitations to this study that need to be considered. These are described in the following paragraphs

In the both study areas, some respondent did not co-operate and also shown negative attitudes with the researcher. Generally the respondent suggested to the researcher please don't wasting our time and advised to go to another person. Even some times the head of the family who is male did not permit any female respondent to talk to the researcher. Besides, some respondent is reluctant to speak with researcher because they consider that we can not get any opportunity.

The researcher could not collected data from the whole area of this study due to inadequate logistic support, shortage of financial resources and constrained of time. In addition, the collection of required research materials from different sectors has been extremely difficult for the researcher.

1.8 Present Public Health Care System in Bangladesh

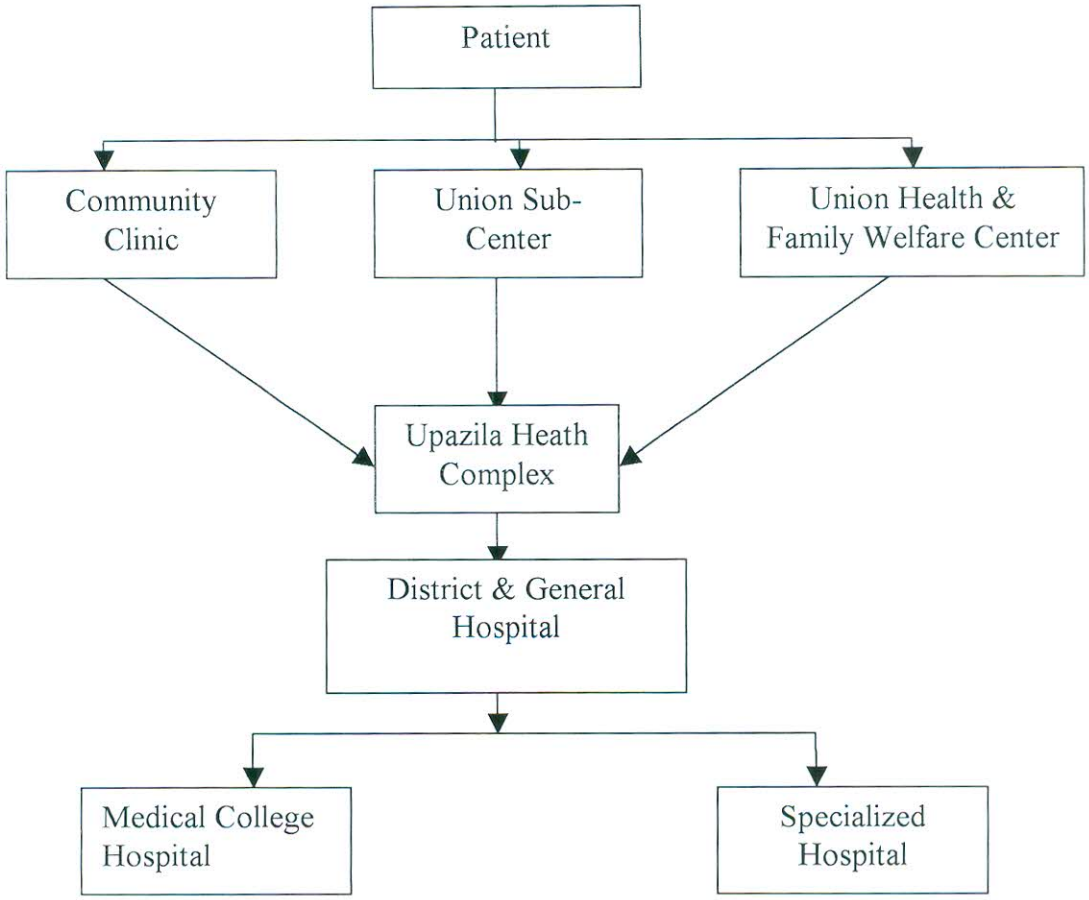
The government of Bangladesh is committed to ensuring basic health care services to the people of the country. The government has taken different endeavors to extent health facilities to the people through MOHFW. People get health service from three different sectors. These are

a) **Public sector** – **Government Hospital**
b) **Private sector** – **Private Hospital or Clinic and**
c) **Non profit organization** – **Non Government Organization (NGO)**

a) Public Sector

Public sector provides health service to the population in Bangladesh by four different stages through MOHFW. Ministry of health and Family Welfare is overall responsible for developing, coordinating and implementing the national health and mother and child health program. The MOHFW is divided into two separate directorates namely Directorate General of Health Services and Directorate General of Family Planning. The Directorate General of Health Services is responsible for curative, preventive and also family welfare services and some aspects of public health, such as immunization. On the other hand, the Directorate General of Family Planning is responsible for family planning services and some maternal and child health services, such as prenatal and postnatal care.

Figure 1.4 Structures of Health Services in Bangladesh.



Source: Author

The stages of public health care system are given below

1) Primary health care
2) Secondary health care
3) Tertiary health care and
4) Super specialized health care

1.8.1 Community Clinics

Primary health care consists of community centers, union sub-centers (USCs) and union health and family welfare centers (UH & FWCs) as well as upazila health complexes (UHCs). Generally Primary health care involves promotive, preventive, curative and rehabilitative service. In Bangladesh most of the population meets up their health service from primary health care facilities.

This is the lowest stage of health facilities in Bangladesh. Each community clinics provide minimum primary health facility to the population and one community clinic services about 6000 people. Community clinic is staffed by a health assistant and a family welfare assistant. The FWVs visit house to house to inform couples about family planning and to supply contraceptives and other necessary goods. All FWAs are women. In addition, the female field workers make selective visitation to pregnant women at the household level and motivate them so that they visit paramedics for antenatal check ups at the community clinic. Community clinic provides only outpatient services. At present there are 12000 community clinics in Bangladesh.

1.8.2 Union Sub-Centers and Union Health and Family Welfare Centers

These centers mainly provide primary and basic health cares to the people and also act as a referral centers. Both these centers provide only outpatient services like community clinics. In these centers people gets health services and medicine with fully free of cost. The UH&FWCs at the union level mainly provide maternal and child health services especially antenatal and postnatal care including limited curative care and treatment for simple injuries and ailments. Even Government provides medicine only for family planning and mother and child health. In addition, patients receive health promotion advice from the UH&FWCs. The union sub-centers are run by a doctor, two medical assistant and one pharmacist as well as the UH&FWCs is staffed by a sub-assistant community medical officer (SACMO), a family welfare visitor (FWV) and other supporting staff. Generally the UH&FWC delivers service to 15-20,000 population. Those centers are under the management of DGHS. Notice that USCs and FWCs are the closest health facilities for the people. Each SAMCOs and FWVs have residential arrangement in FWCs as well as each MA and Pharmacist has a residential facility at USCs. At present there are 4062 union health facilities of which 1362 Union Sub Centers are under health wing and 2700 union health and family welfare centers are under the family planning wing in Bangladesh. Besides, there are 87 UH&FWC which has been constructed with the financial support of Netherlands Government. At present the UH&FWC is working under the health wing.

Table 1.3 Distributions of union sub centers and UH&FWC (Netherlands) by division

Division	No. of USC &UH&FWC (Netherlands)
Dhaka	415
Chittagong	271
Rajshahi	413
Khulna	145
Barisal	70
Sylhet	85
Total	**1399**

Source: Health Bulletin (2007)

1.8.3 Upazila Health Complex

Upazila health complex is the last stage for providing primary health care services to the people in Bangladesh. Each upazila health complex has indoor and outdoor facility. At upazila health complex acts as a referral centers. At upazila health complex provides health service and medicine both indoor and outdoor patient with free of cost. Even UHC provides food for the indoor patient with free of cost. The upazila health complex services about 200000 people. The upazila health complex places strong emphasis on maternal and child health care as well as family planning and child immunization. Each upazila health complex is staffed by 11 doctors, 2 medical assistants, 2 pharmacist, 12 nurses and 1 EPI technician. Generally the UHCs provide promotive, preventive and curative services. At upazila health complex has limited X-ray facilities, family planning services, limited laboratory investigations and ambulance services. Besides, the UHC provides domiciliary services through its field workers. Notice that patient only pay to the hospital for using ambulance facility at Tk. 8 per kilometer. Recently in some of the UHCs EOC (Emergency obstetric care) have been introduced gradually it will be introduced to other UHCs also (GOB 2005). Despite these improvements yet the quality of health services are lacking in Bangladesh. At present there are 400 upazila health complexs except the sadar upazilas of districts and 14 rural health centers in Bangladesh.

Category of health facilities of upazila level in terms of their numbers and bed strengths are given below:

Table1.4 Hospitals facilities & no. of beds at primary health care facilities

Category of Facilities	No. of Facilities	Total No. of Beds
31 Bedded Upazila Health Complex	376	11666
10 Bedded at different level	10	100
50 Bedded Upazila Health Complex	13	650
51 Bedded Upazila Health Complex	01	51
Total Govt. Upazila Health Facilities	**414**	**12,457**

Source: Health, Nutrition and population 2005

1.8.4 Secondary Health Care

Secondary level of the health care is available at the district level hospital, which provides limited specialist services and acts as a referral center. So district hospitals are regarded officially as secondary level facilities. Initially this level deals with comparatively more complicated health problems. On the other hand, secondary health care is mostly curative in nature. The district level hospital has indoor and outdoor facility. Patients get only free medicine from district hospital but patients must have to pay usage fee for getting health services. Laboratory, radiographic and ambulance facilities are available at district hospital. Generally each district hospital has a 50 to 250 bedded facility with provision of wide rang of modern diagnostic and treatment facilities. There are 58 district hospitals in Bangladesh of which no of total beds are 5445 because 6 divisional headquarters have no districts hospitals. Besides there are 96 maternal and child welfare centers are functioning in Bangladesh with 748 beds and one maternal and child health training institute with provision of 173 beds, which provide maternal and child health services. All sorts of obstetrical health care services are available from these centers. Category of health facilities of district hospitals are given below:

Table1.5 Hospitals facilities & no. of beds at secondary health care facilities

Category of Facilities	No. of Facilities	Total No. of Beds
50 Bedded Hospitals	17	800
75 Bedded Hospitals	01	75
100 Bedded Hospitals	33	330
120 Bedded Hospitals	01	120
200 Bedded Hospitals	04	600
250 Bedded Hospitals	02	500
Total	**58**	**5445**

Source: Health, Nutrition and population 2005

1.8.5 Tertiary Health Care

Medical College hospitals, leprosy hospital, infection disease hospital and chest clinics and chest hospital provide tertiary health care to the people in Bangladesh. In Bangladesh medical college hospital is available at the regional level in which much wider range of specialists doctors as well as better laboratory facilities are available for the treatment of complicated and difficult case. Medical college hospital is a teaching hospitals as well as a referral center. There are 14 government medical college hospitals, 1dental college hospitals along with 2 dental college units, 3 leprosy hospitals and 5 infections diseases hospitals in Bangladesh, which provide preventive, curative and rehabilitative services and specialized care to the people of the whole country. They provide both outdoor and indoor services for the patients.

1.8.6 Super Specialized Health Care

Super specialized health care is available at the national level institutes, which are highly specialized. This is the highest lever of medical care available in the public sector in Bangladesh and these institutes are mostly located in the capital city. There are 10 specialized hospitals in Bangladesh providing specialized health Care for the patient. Health facilities of super specialized level is given below:

Table1.6 Hospitals facilities & no. of beds at super specialized health care facilities

Name of the Institution	Total No. of Beds
BSM Medical University (BSMMU)	750
Institute of Diseases of Chest and Hospital (IDCH)	600
National Institute of Cardiovascular diseases (NICVD)	250
National Institute of Traumatology &Orthopedic Rehabilitation	500
National Institute of Cancer Research & Hospital	100
National institute of Opthalmology and Hospital	100
Pabna Mental Hospital	400
National Instritute of Mental Research and Hospital	50
National institute of Kidney Disease and Urology	100
National Centre for Control of Rheumatic Fever and Heart diseases	
Institute of Child and Mother Hospital (ICMH)	200

Source: Health, Nutrition and population 2005

1.9 Private Sector

There are 37 private medical colleges, 8 dental colleges, 1170 private hospitals and 1760 clinics and 18 private medical technology institutes with a total of 26,510 beds in Bangladesh in 2007. In addition to these facilities, many modern diagnostic centers and specialized hospital like National Heart Foundation, Cancer Hospital Apollo Hospital, etc. established in Bangladesh. They provide preventive, curative and rehabilitative services. Private medical college hospital, dental college and clinic provide indoor and outdoor facilities to the people at different levels. To enhance the private investment, government has been providing grants to various hospitals/clinics and other organizations from revenue budget. In Bangladesh private health care facilities are mostly managed by public sector professional. Bangladesh achieved admirable in the pharmaceutical industry. There are 239 allopathic, 261 yunani, 161 ayurvedic and 77 homeopathic pharmaceutical industry in our country. They produce essential drug and export drug to about 62 countries of the world.

1.10 Non Profit Organization or Non Government Organization (NGO)

At present NGOs are working in health, population and nutrition sector in Bangladesh. NGO provides primary health care service including family planning service and MCH services. NGOs are also promoting awareness to the people about existing health care delivery system. Besides NGOs are closely involved HIV/AIDS program activities of the population sector. Recently, the Government has been increasing NGO involvement in providing primary and community based health care and nutrition services. Furthermore, 350 community clinics of 100 unions are managed by NGOs, Which are delivering essential services to community (GOB, 2007).

Chapter Two

Literature Review

2.1 Introduction

The literature review is a clear and logical presentation of the relevant research work. The main purpose of literature review is to find out and highlight the research gap in the field of proposed research work. The literature review provides the foundation for developing a conceptual framework. Besides literature review helps the researcher to focus further research work more precisely. Many research works have been done in health care System in abroad but only a few research works in the field of health care System are done in Bangladesh. The relevant research works that have been studied in the field of health care System are discussed below.

Luke Nancy and Munshi kaivan (2005) examined that by using a simple household resource allocation model low caste house holds spend more money on their children's health than high caste house holds and they also shown health expenditures do not vary by gender within either caste group in south India

Rashid.S and Savehenko.Y (2005) shown that the population of Bangladesh is steadily growing with the lowest of doctors and nurses per 100000 inhabitants on the other hand the population of Ukraine has been steadily declining with the ranks among the highest in the world and they also showed that if they are poor they will be denied adequate care and if they are in rural areas even this minimum level of care may be missing for both country due to lack of regulation and decentralization of hospital.

Hanson kara *et al.* (2004) found that demand for outpatient services in Cyprus highly depends on quality of care than price even patients are more sensitive to interpersonal quality than technical and system quality. They also explained that demand for private services more quality elastic than the demand for public services and waiting time of public provider is higher than private provider this is why patients are likely to choose private provider.

Nirupam Bajpai and Sangeeta Goyal (2004) found that overall primary health care facilities in India are far from satisfactory, especially in rural areas and they also found that most people in India, even the poor, choose expensive health care services provided by the unregulated private sector as a result of the poor people not only do face the double burden of poverty and ill-health but also ill-health can push the non-poor into poverty. For this reason public investment in health needs to be much higher in order to reduce poverty and to raise the rate of economic growth.

Alia Ahmad (2003) marked that the public health facilities in Bangladesh function poorly due to lack of proper decentralization resulting from a majority of the clients seek medical services in private sector-both for-profit and not-for-profit. She has found that in Bangladesh these services are far from satisfactory because the government has failed to perform its regulator and coordinator role.

Rous, Jeffrey J. *et al.* (2003) examined that income directly influences health expenditure. Higher per capita households are more likely to choose either a private health care provider or a public hospital that is most expensive source of care in Nepal. By improving environmental conditions lead to reduce household health care expenditure. They also found that male-headed households spent more on health care service than female-headed households.

Hamid *et al.* (2002) explained that consumers choice of provider depends on a number of factors like service fee, quality of care, access to care, perception of the providers flexibility of illness and socioeconomic and demographic conditions of the consumers and they also explained that income and education level affect the choice of health providers. He also found that less educated patients and poor patients have taken medical care from informal providers. Besides, patients sought health care from informal care due to some factors like cheap treatment, and easy access.

Moazzem *et al.* (2002) observed that Bangladesh has already achieved some remarkable development of public health area but yet such achievements did not reach the poorest among the poor. That is why national resources have to utilize in the socially productive way. The way of this resource utilization mostly is being in a centralized manner in our country

H.Naci Mocan *et al.* (2000) shown that the price elasticity of demand for medical care is inelastic and income elasticity shows that medical care is a necessary goods. They also show that wealthy households spend more on medical care and price elasticity of medical care with respect to food price is negative so the medical and food items are complementary goods. They observed that demand for medical care is negatively related to own water tap and own bath at work's units.

Sushil Ranjan Howlader (2000) stated that provision of health care to the poor will positively affect on household income and alleviate their poverty as well as poor people will contribute to industrial development only if the economy is much below the carrying capacity level and the population growth of the economy is zero.

Matin A. M (1999) has stated that Bangladeshi people are still deprived of and are struggling for their right to health. He marked that more than 60% of our population do not have formal access to health care due to the present limited infrastructure, low health budget, departmental corruption, institutional mismanagement, bureaucratic and harassing administration, lack of commitment and ethics among the professionals.

Li Masako (1996) examined the determinate of demand for medical care in urban areas in Bolivia. He observed that consulting fees have negative effect on the demand for medical care but demand elasticities are very low. He examined that income has a substantial effect on the demand for medical care. He also observed that patients who are rich seek more formal care and prefer private facilities. Education of an individual has positive effects on the demand for medical care. He also examined that waiting times and travel times have negative effects on the demand for medical care but duration of illness is positively related to the demand for medical care.

Ching Panfila (1995) examined that price not only plays a significant role in the demand for child health care but also the poor children are more sensitive to change in price than rich children.

Lavy *et al.* (1993) examined that household income is and important determinant of the demand for quality and intensity of medical care but price of medical care is less important determinate of the demand quality and intensity of medical care.

Yoder, Richard A. (1989) observed that an increased in user fee for services on a national wide level low income patients multiple visitor patients as well as ailment patients reduce their use of health service. In order to get quality of care patients are used mission sectors than government sector.

Schwartz. J. Batel (1988) shown that the choice of delivery service type is relatively insensitive to change in price and income. He found that in rural area travel time is an important factor in the choice and travel time is negatively related to delivery choice but in urban area travel time is not an important factor in the choice though travel time is negatively related to delivery choice. Besides, mother's education has also affect on delivery choice in both areas.

Germanom Mwabu (1986) showed that the majority of the patients seek medical treatment outside the free government healthcare system and he again showed that patients get treatment more than one providers. Because patients are unable to tell with certainty the provider who will cure their illness, patients think that successful treatment of some illness requires more than one provider and patients believe that in order that to get cure they must be used by more than one provider. He also showed that the importance source of treatment of patients in the study area was non-government clinics of providers. That is why he suggested that the government should increase the health service coverage for the people so that patients can get easily treatment from these health facilities.

John S. Akin *et al.* (1986) examined that economic cost of medical care does not greatly affect demand patterns either for essential services or for optional services in the Bicol region of Philippines.

Peters Heller S. (1982) examined on empirical analysis of the determinants of demand for medical services in peninsular Malaysia and found that demand for medical care is highly inelastic to the cash price and income both outpatient and

inpatient care but income influence the level and structure of per capita medical consumption.

Johns. Akin *et al.* (1981) showed that money costs were a minor factor for determining the demand for child health service but waiting time and distance cost strongly influence the demand for child health service in Philippines. They also showed that more educated mothers tend to prefer modern private medical care services than others. They also find that provider choice depends on distance and waiting time. If the distance and waiting time of public facilities is increased the patients will largely use private facilities. On the other hand private services have a smaller effect on public service used. Notice that they also show that Philippine families do not treat male and female children differently in health demand decision both urban and rural residence.

Acton, Jon, Paul (1975) estimated the demand for health care using two stage least squares method and found that when money price falls because of increasing insurance coverage, opportunity cost of time and prospect of national health insurance then non monetary factors such as travel distance influence the demand for medical services. He also found that persons with higher earned income are more likely to use the private sector, which is less time intensive than the public sector.
Grossman (1972) showed that quantity of health demanded is negatively related with its shadow price. An increase in shadow price may reduce the quantity of health demanded and increase the quantity of medical demanded, if other things remain constant. He showed that if the elasticity of the marginal efficiency of capital is less than one, the more educated will demand more health but less medical care. He also suggested that more educated persons are more efficient produces of health.

Chapter Three

Methodology of the Study

3.1 Introduction

Research methodology is the philosophy of research to solve systematically the research problem. It provides an understanding of how research is conducted and organized in order to obtain information. It also provides the characteristics of the research developed, explains the methods to obtain information from respondents, describes how data will be collected and processed. This chapter covers the economic model of demand for and supply of health care, sampling technique, methods of data collection, technique and analysis of data and research design.

3.2 Specification of Model and Relative Estimation Formulas

3.2.1 An Economic Model of Demand for Health Care

The dependent variable Qd is dichotomous. It indicates the demand for health care of a patient. Its takes on the value on (Qd = 1) with probability P if a patient has demand for health care and zero (Qd = 0) with probability 1-P if a patient has no demand for health care. Some of the explanatory variables are used in the model. The explanatory variables may be quantitative or qualitative. Price of medical service that get from physician or the price per visit price of other consumer goods, patients coinsurance rate, income of the consumer (household income not per capita income), waiting time, patient's age, patient's education level, duration of illness, are quantitative variables whereas quality of care is only qualitative variable. To facilitate better interpretation some of the explanatory variables such as the level of education can be divided into six categorizes and the income of the respondent has been taken into interval scale, the quality of care variable can be divided into three categories.

Demand for health care function:

$$Q_d = \beta_0 + \beta_1 P_1 + \beta_2 P_2 + \beta_3 R + \beta_4 Y + \beta_5 Age + \beta_6 Ed + \beta_7 T + \beta_8 W + \beta_9 K + \beta_{10} S + \beta_{11} T_1 + U_i$$

Where

Q_d = demand for health care.

P_1 = price of medical service that get from physician or price per visit.

P_2 = cost of drug

R= patients coinsurance rate.

Y= income of the consumer (household income)

Age = patient's age.

Ed = patient's education level

T = distance.

W = waiting time.

K = quality of care.

S = duration of illness.

T_1= taste of the consumer

U = error term.

Demand for medical care depends on both observed and unobserved characteristics of the patients and the provider. Observed characteristics of individual is age, sex, education and so on whereas observed characteristics of an provider are user fee, waiting time, distance that an individual has to travel to access care from the provider. An unobserved characteristic of an individual is taste and preference and perception of the quality of care.

Demand for health care of a patient depends on consultation fee i.e. price of health care, cost of medicine, distance to the provider, waiting time, duration of illness, age, level of education, quality of care, etc.

3.2.2 An Economic Model of Supply of Health Care

Supply of health care depends on price of visit; price of others expenses (price of bed, price of diagnostics) factor prices (labor, capital and technology), knowledge of technology of treatments, management efficiency.

If other things remain constant price of visit increases supply of health care increases. So price of visit and supply of health care is positively related. Price of other expenses increases supply of health care also increases if other things remain constant. Input price increases supply of health care decreases if other thing remains constant. There is a positive relation between knowledge of technology of treatment and supply of health care. Management efficiency will go up the supply of health care. Only three variables of the above factors are considered for the estimation of supply function, which is given below

$Q_s = (p_h, p_o, y)$

Where

Q_s = supply of health care

p_h = price of visit

p_o = price of other expenses

y = gross domestic product

The other variables could not be incorporated because of quantification difficulties as well as limited scope of this study.

3.3 Data Collection Method

3.3.1 Selection of the Study Area

This study is conducted to the urban areas with reference to Rajshahi metropolitan city and Bogra town. The metropolitan area of Rajshahi consists of 30 wards whereas the Bogra town consists of 12 wards. The researcher lived the two areas during the research work and in these areas there is no research work in this field for this reason the research was chosen the two study areas. Besides Rajshahi is a divisional headquarters in which a very big public health care set up is available. In addition, private health care facilities are also well developed here. On the other hand Bogra is also a town in which maximum health related information about the topic could be obtained.

3.3.2 Selection of Sample and Sampling Technique

Selection of sample and sampling technique are a very important part of any research. To estimate the demand for health care, only two urban samples namely Rajshahi metropolitan area and Bogra town are selected for this study purposively. In this study, the primary data are collected from ward no12 in Bogra town and ward no 30 in Rajshahi metropolitan area for analysis the demand for health care. Due to time and costs limitation in data collection it is impossible to cover the entire area of both study areas.

In this study, purposive sampling technique is used for primary data collection. Most importantly is should be noted that the person surveyed during that period was selected based on suffering from any sort of diseases or injury within one month.

3.3.3 Sources and Collection of Data

To analyses the demand for health care, patients were the target respondents of the study, so the researcher was collected primary data. Thus the researcher was conducted fieldwork both the areas. Even in order to estimate the demand for health care of both areas the researcher collected socioeconomic and demographic variables of each respondent at each area.

The study of demand for health care is a survey type of work based on both descriptive and inferential analysis of both quantitative and qualitative data. The data were collected from both primary and secondary sources. Primary data were collected through one set of structured questionnaire. The secondary data collected from different hospitals (Rajshahi Medical College Hospital, Shahid Ziaur Rahman Medical College Hospital, Bogra, Mohammad Ali Hospital, Bogra and NGOs clinics of Rajshahi), civil surgeon office of Rajshahi and Bogra, books, statistical yearbook, various journals etc. During the survey the questionnaire was in Bengali but after necessary editing and coding, the questionnaire was translated into English. A copy of the questionnaire used in this study is shown in Appendix 1

Detail information on demand for health care is collected from every household member who was suffered from any disease or injury during the last four weeks and

the survey collected information regarding socioeconomic and demographic attributes of the patients of the household. In Rajshahi total household is 1,33,903 and in Bogra there are 2,9931. In Rajshahi 215 individuals were selected for interview and in Bogra 276 individuals were selected for interview for convenience. The survey was carried out during the period of March –May 2007 in Bogra and June to July 2007 in Rajshahi area. If the patient is child, the interview is conducted with the mother or father of the child. In absence of the respondent or patient, interview is conducted with adult or reliable person of the family who has well knowledge about the patient and his/ her disease.

Due to lack of necessary primary and secondary data to estimate the supply function in the study area (Bogra and Rajshahi) separately. So, secondary data of Bangladesh is selected for this purpose. Secondary data are collected from various statistical yearbooks of Bangladesh and Bangladesh economic review.

3.3.4 Techniques of Data Processing and Analysis

After the collection of any types of data, the researcher will go for processing of data and analysis of data in order to achieve the logical result with reference to the research objective. Processing of data involves many steps these are: Editing, coding, classification, tabulation etc.

3.3.4.1 Editing

After the collection of primary data through structural questionnaire the researcher edited the data in order to minimize non –sampling error of the study as well as to make accuracy and consistency.

3.3.4.2 Coding

It refers to the process of assigning of symbols to each response of a category. After completion of editing of data the researcher himself coded the data efficiently.

3.3.4.3 Classification

In order to get meaningful relationships the research classified the data according to its attributes or on the basis of class intervals.

3.3.4.4 Tabulation

After completion of editing, coding and classification the data are organized in tabular form. Classified and tabulated data are also presented in the forms of graphs and diagrams.

3.4 Analysis of Data

The next step is data analysis and the analysis is divided in two major branches namely descriptive and inferential analysis

3.4.1 Descriptive Analysis

Descriptive statistics is used to organize, summarize and describe the data or measure the relationship between two or more variables. Descriptive statistics is also used to analyze the data for frequency, means, standard deviation etc.

3.4.2 Inferential Analysis

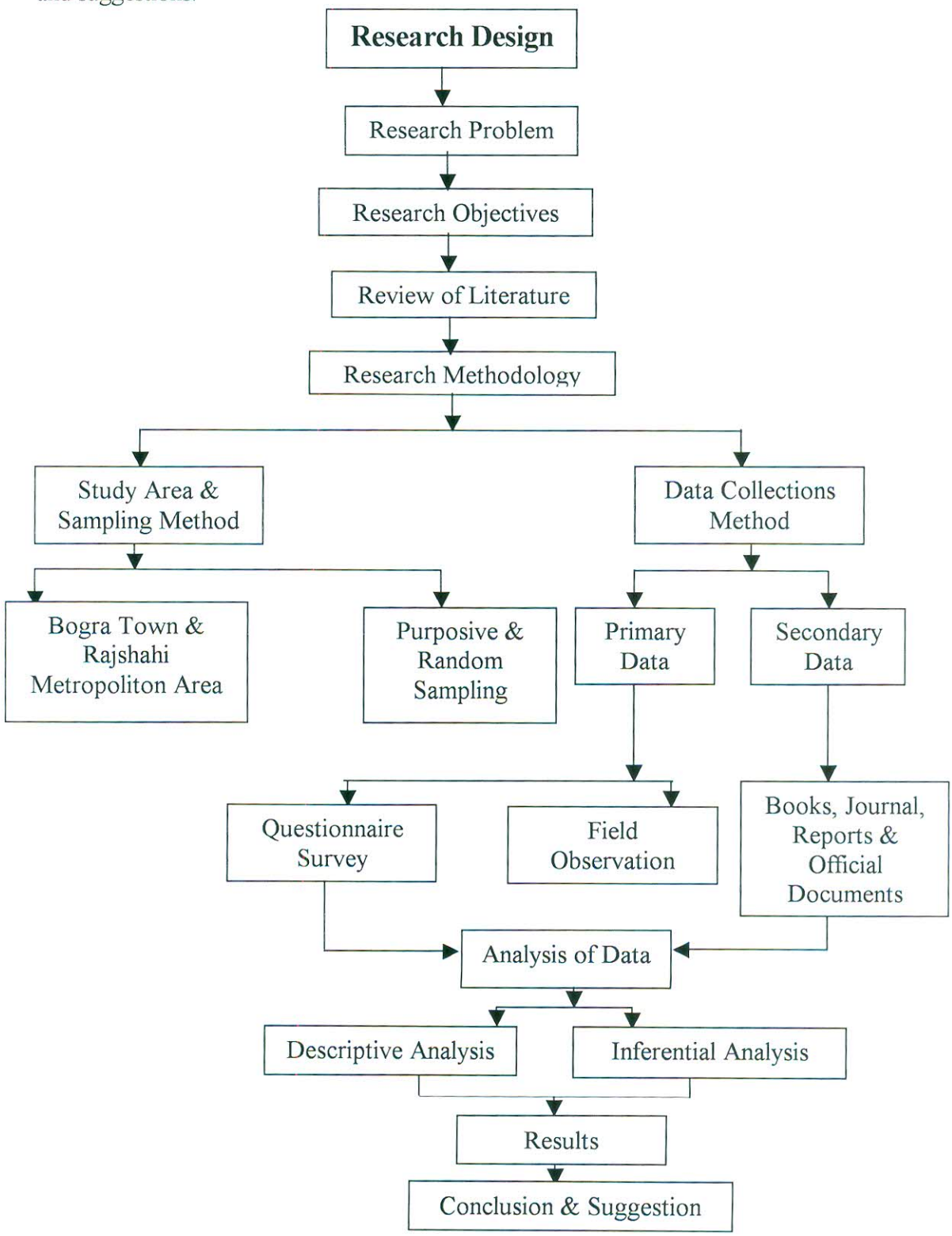
Inferential statistic is used to interpret and generalize the findings from sample data. Inferential statistics is concerned with estimation of parameter and test of hypotheses.

3.4.3 Computerization

For descriptive and inferential analysis, Statistical Package for Social Science (SPSS) program for windows version 11.5 has been used. The Microsoft office 2007 program has been used for developing the text of the thesis and graphical presentation.

3.5 Research Design

A research design is a plan of the proposed research work or the blueprint of the proposed research work. This research consists of four sections. The section one is identification of the problems, and formulation of research questions and objectives strengthening by the literature review. The second section is the collection of primary data and secondary data. The third section is the processing and analysis of data. The fourth section is conclusion and suggestions.



3.6 Determination of Sample Size

Research accuracy or reliability depends on the sample size. If the sample size is too small it may not serve to achieve the objectives and if it is too large it may involve huge cost and time. So the sample must be of an optimal size. If the population is finite the optimal sample size can be determined by the following statistical formula:

$$n = \frac{z^2 p.q.N}{e^2(N-1)+z^2.p.q}$$

Where,

N= size of population or household.

n= size of the sample.

e= acceptable error (the precision).

z= level of significance. (5%)

p= sample proportion, and q =1-p

A total of 491 respondents are interviewed in two sample areas of which 276 respondents from Bogra and 215 respondents from Rajshahi. Since the respondent is patient, it is very difficult to figure out the accurate number of patient during the survey. So the above statistical formula can not be used for determination of sample size. From the statistical point of view the sample size of the both study areas is large (if the sample is greater than 30 then the sample size is large).

3.7 Empirical Methodology

In our study, various statistical techniques have been applied to analyze the primary and secondary data these statistical techniques are discussed in the following way:

3.7.1 Logistic Regression Model

The logistic regression model is a popular model for data analysis in various areas of social sciences, medical research as well as epidemiological research. The logistic

regression model is used in any study when the dependent variable is categorical or dichotomous and explanatory variables are either qualitative, quantitative or a mixture thereof. In most practical situation that dependent variable is qualitative and explanatory variables are of both types. Logistic regression model explain the relationship between qualitative variable and one or more qualitative and quantitative variables.

3.7.2 Reason for Choosing Logistic Regression Model

Many distribution functions have been proposed for use in the analysis of a dichotomous outcome variable. Cox and Snell (1989) discuss some of these. However there are two primary reasons for choosing the logistic distribution. First, from a mathematical point of view, it is an extremely flexible and easily used function, and second, it lends itself to a clinically meaningful interpretation.

Consider the following regression model:

$$Y = \beta_1 + \beta_2 Xi + ui$$

The logistic regression model can be explained as follows:

If Y is the dichotomous response dependent variable which takes value 1 and 0 with the probability Pi and 1-Pi respectively and If the vector of Xi be either qualitative or quantitative variable then the logistic model can be explained as follows:

$$P_i = E(Y_i = 1/X_i) = \frac{1}{1+e^{-(\beta_1+\beta_2 Xi)}}$$

$$= \frac{1}{1+e^{-z}} \quad \text{Where } z = \beta i + \beta_2 Xi$$

$$= \frac{1}{1+\frac{1}{e^z}}$$

$$= \frac{1}{\frac{e^z+1}{e^z}}$$

$$= \frac{e^z}{e^z+1} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Equation (2) is known as the logistic distribution function.

And 1-Pi =E ($Yi = {}^{0}\!/_{Xi}$) =1- $\frac{1}{1+e^{-(\beta_1+\beta_2 Xi)}}$

$$=1-\frac{1}{1+e^{-z}}$$

$$\therefore (1-Pi)=\frac{1}{e^{z}+1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

Therefore, odds ratio can be written as

$$\frac{Pi}{1-pi}=\frac{\frac{e^{z}}{1+e^{z}}}{\frac{1}{1+e^{z}}} \quad \beta$$

$$\therefore \frac{Pi}{1-Pi}=e^{z} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

$$Odds=\frac{p_i}{1-p_i}=\frac{\Pr obability\ of\ presence\ of\ characteristic}{\Pr obability\ of\ absence\ of\ characteristic}$$

Notice that Pi is a nonlinear not only in Xi but also in $\beta's$. So we cannot estimate the parameters by using OLS (Ordinary least square) method.

To overcome the non-linearity problem we take natural log of (3).

We obtain

Li =ln($\frac{Pi}{1-Pi}$) =ln e^{zi}

Li =ln($\frac{Pi}{1-Pi}$) = Zi.....(5)

Li =ln($\frac{Pi}{1-Pi}$) = $\beta_1 + \beta_2 Xi$ .....(6)

The left-hand side of this equation is called the log odds ratio. Thus in the logit model the dependent variable is the log of the odds ratio which is a not only linear function of in the explanatory variables but also linear in the parameters. The logit, g(x), is linear in its parameters, may be continuous, and may range from -α to +α depending on the range of x. Li is called the logit and hence the model (6) is called logistic regression model.

3.7.3 Types of Logistic Regression Model

1) Binary logistic regression model
2) Multinomial logistic regression model

3.7.3.1 Binary Logistic Regression

Binary logistic regression is a form of regression, which is used when the dependent variable is a dichotomy and the independent variables are of any type.

Let Yi be a dichotomous dependent variable such that

$$Y = \begin{cases} 1, \text{ if demand for health care} \\ 0, \text{ if no demand for health care} \end{cases}$$

3.7.3.2 Multinomial Logistic Regression

Multinomial logistic regression is a from of regression which is used when the dependent variable is categorical with more than two and the independent variables are of any type

Let Yi be a categorical dependent variables which takes the value more than two such that

$$Y = \begin{cases} 1, \text{ if the patient chooses public hospital} \\ 2, \text{ if the patient chooses private hospital/clinic} \\ 3, \text{ if the patient chooses other facilities} \end{cases}$$

3.7.4 Method of Estimation

The coefficients and standard errors in a logistic regression model are usually estimated by either maximum likelihood methods or by iterative weighted least squares because the logistic regression model does not follow the equal variance of the disturbances and normality condition of the disturbances (0,1). In that case the logistic regression model suffers from heteroscedasticity and non-normality problem in the error term. That is why we cannot estimate the coefficient by OLS (ordinary least square) method. The maximum likelihood method is a large sample method so the coefficient estimates are consistent (approach the population parameters as the sample size increases) and has an approximate normal distribution (0, 1) in most cases. For small data sets or data sets in which the average value of Y is close to zero or one, the method of maximum likelihood can provide poor results.

3.7.5 Interpretation of the Estimated Logit Model

Interpretation of parameters in logistic model is not straightforward as in linear regression model. Interpretation of parameters in logistic regression model can be explained by logit as well as odds ratio.

3.7.5.1 Logit

The logit transformation of logistic regression model is called the logit and it can be defined as

$$g(x) = \ln\left[\frac{\pi(x)}{1-\pi(x)}\right]$$

$$g(x) = \beta_0 + \beta_1 x$$

Now we can interpret the estimated parameter of logistic regression model by using the arguments of linear regression model. The rate of changes in logit for one unit change in X, or the slope coefficient represents the change in the logit corresponding to a change of one unit in the independent variable if other things remaining constant.

3.7.5.2 Odds Ratio

The odds ratio (OR) is simply defined, as the ratio of two odds which is given by the following equation

$$\text{OR} = \frac{\frac{p}{(1-q)}}{\frac{q}{(1-q)}} = \frac{p(1-q)}{q(1-p}$$

The odds ratio takes values between zero and infinity. One is the neutral value, which implies that there is no difference between two groups. Close to zero or infinity means that there is a large difference between two groups. An odds ratio is greater than one that indicates the event is more likely in the first group. If an odds ratio is less than one, which indicates, the condition or event is less likely in the first group. The reference group is indicated by a value of 1 for the odds ratio. If an odd

ratio is less than 1(one) then the dependent variable Y=1 outcome is less likely to occur. If an odd ratio is greater than 1(one) then the dependent variable Y=1 outcome is more likely to occur. It explains the measure of effect size. In the theory, for large enough sample size the distribution of odd ratio is normal

3.7.6 Test of Hypothesis

There are there commonly used large sample tests that are based on the ML (Maximum likelihood) method:

i) Wald Test

ii) Likelihood Ratio Test

iii) Scores Test

3.7.6.1 Wald Test

In linear regression, t statistic is used in assessing the value of individual regressors when other regressors are in the model. The t statistic is given below under the following hypotheses.

Suppose we would like to test the following hypothesis

$$H_0 : \beta_i = 0$$

$$H_1 : \beta_1 \neq 0$$

For linear regression model, the test statistic

$$t = \frac{\hat{\beta}_i - \beta_i}{SE(\hat{\beta}_i)} \approx t_{n-k}$$

For logistic regression model, the test statistic

$$\text{Wald statistic} = \frac{\hat{\beta}_i}{S.E(\hat{\beta}_i)} \approx AN(0,1)$$

Notice that W does not have a t- distribution rather W is approximately normal distributed with a large sample size. It should be noticed that the W statistic follows as approximately a chi-square distribution with one degree of freedom.

We can compare the calculated value and the tabulated value with corresponding d.f and we may conclude the comment for the bases of the above result. Hosmer and Lemeshow (1989) and Hauck and Donner (1977) have found that Wald statistic performed poorly.

3.7.6.2 Likelihood Ratio Test

Likelihood ratio test, introduced by Neyman and Pearson, is used for testing a hypothesis. This test is a generally large sample test based on the ML (Maximum likelihood) method. Likelihood ratio tests also have been used to compare two nested models. If the sample size is large, the test statistic will be distributed as a chi-squared random variable with degree of freedom equal to the difference in the number of parameters between the two models.

Suppose we would like to test the following hypothesis

$$H_0 : \beta_i = 0$$

$$H_1 : \beta_1 \neq 0$$

The likelihood ratio statistic

$$\lambda_{LR} = -2\ln\left(RLF/ULF\right)$$

$$= 2(\text{ULF-RLF})$$

Where RLF = restricted log-likelihood function

and ULF = unrestricted log-likelihood function

Null hypothesis is rejected if $\lambda_{lr} \geq \chi^2_{(TA)}$

3.7.6.3 Scores Test

The score test is based on the distribution theory of the derivatives of the log likelihood. In multivariate case, this test is based on matrix calculation while in the univariate case, this test is based on the conditional distribution of the derivative.

The Score test (ST) statistic is

$$\text{ST} = \frac{\sum_{i=1}^{n} xi(yi - \bar{y})}{\sqrt{\bar{y}(1-\bar{y})\sum_{i=1}^{n}(xi - \bar{x})^2}}$$

This follows chi- square distribution with K degrees of freedom.

3.7.7 R Square in Logistic Regression

When the researcher analyzes data with a logistic regression there is a problem with the use of conventional R^2 type measures in which the explained variables Y are probabilities and the actual values Y are either 0 or 1.

R square computed as in linear regression model but it should not be used in logistic regression model. This is because in logistic regression model the nature of dependent variable is qualitative and takes value 1 and 0. R square measure seeks to make a statement about the percent of variance explained in the linear regression model. But the variance of a dichotomous or categorical dependent variable depends on the frequency distribution of that variable. So, logistic regression does not provide any measure of R square in which OLS- R square range from 0 to1 but pseudo R square does not range from 0 to 1. Logistic regression model calculates a pseudo R square. Even R square of logistic regression model does not measure goodness of fit but rather attempts to measure strength of association. Because they are not calculated to minimize variance, so goodness of fit does not hold. For this reason R Square of logistic regression model has been termed as pseudo R square. In this situation the higher pseudo R squared indicates which model better predicts the outcome. Various alternative forms of R square have been used in the analysis of logistic regression model. In which only two types of R square have been explained in this research work because SPSS out put shows only two types of R square. These are

3.7.7.1 Cox and Snell (1989)

$$R^2 = 1 - \left\{ \frac{L(M_{Full})}{L(M_{Intercept})} \right\}^{-2/n}$$

$$= 1 - \left[\frac{L(M_{Intercept})}{L(M_{Full})} \right]^{\frac{2}{n}}$$

Note that Cox and Snell's pseudo R squared has a maximum value that is not 1; If the full model predicts the outcome perfectly and has a likelihood of 1 the Cox and Snell's R squared max is following

$$R^2 \max = 1 - \left\{L\left(M_{Intercept}\right)\right\}^{\frac{2}{n}}$$

Always the value of Cox and Snell (1989) R squared would be less than 1.

3.7.7.2 Nagelkerke(1991)

Nagelkerke R squared can be defined by Cox and Snell's R squared is divided by its maximum possible value. It is the modification of Cox and Snell's coefficient to assure that R squared can vary 0 to 1

The Nagelkerke R square statistic measures the percentage of cases that were correctly predicted by the model.

$$\overline{R}^2 = R^2 \Big/ \max\left(R^2\right)$$

Where $R^2 \max = 1 - epx\left[2\left(n^{-1}\right)LL(0)\right]$

The coefficient of Nagelkerke R Square can achieve a maximum value of 1. The value of Nagelkerke R Square will normally be higher than the value of Cox and Snell's R Square.

3.7.8 Goodness of Fit Chi- Square

For logistic regression model analysis we may use maximum likelihood estimation procedure. One can directly compare the likelihood L0 for the null model where all slope parameters are zero, with the likelihood L1 for the fitted model.

Chi- square = -2 (log (L0) – log (L1))

The degree of freedom for this chi square value is equal to the difference in number of parameters for the null model and the fitted model. Thus, the degrees of freedom will be equal to the number of independent variables in the logistic regression. If the p value is significant then we can say that the estimated model yields a significantly better fit to the data than null model, that is, that the regression parameters are statistically significant.

Chapter Four

Demand for Health Care

4.1 Introduction

In the preceding chapter methodology of the study has been discussed. This chapter describes the demand for health care measurement, health care provider choice model, socio-economic and demographic structure of the respondent and utilization of healthcare facility in both study areas.

4.2 Demand for Health Care Measurement

Consumers need demand for health care but they cannot simply purchase it. They must purchase health care services from various alternative providers that are used to produce their health. The measurement of demand for health care is quite complex. Because the demand for health care is a service so it can not be measured directly in terms of quantity or unit. So the analysis of demand for health care can be used as a qualitative variable, which is used as a dependent variable in this study. Some economist measures the demand for health care as a quantity of services used by inpatient days, out patient visits or prescription. Some times it is measured by the services of the drug cost or the total cost of the services.

Demand for a particular type of health care service produced by a given provider is the quantity of that service that people are willing to obtain as a function of the characteristics of the individuals (for example, perception of need, income, location, insurance coverage) and the characteristics of all the providers (for example prices, location, quality)(Bitran, R. A. and McInnes, D.K. 1993)

In our analysis the demand for health care explains when an individual who consults doctor and take medicine together if he suffers from any disease during last one month.

Generally this variable takes the value of 1 and 0, 1 designed the willingness of the patient's is to visit the hospital or clinic during the last illness and 0 designed not willingness of the patient's is to visit the hospital or clinic during the last illness. Demand for health care cannot analysis as quantity.

i) Price

The demand for health care will depend on the price of that service. The price variable used is called fees. Some times the price of health care is measured by unit price of the providers. In this study price is considered as money price and the researcher asked the individuals about the basic fee paid for their last visit to the provider.

Null hypotheses H_0: There is no relation between price and demand for health care.

Alternative hypotheses H_1: There is a relation between price and demand for health care.

ii) Cost of Drug

In this study cost of drug is considered as money price. It also influences the demand for health care.

Null hypotheses H_0: There is no relation between cost of drug and demand for health care.

Alternative hypotheses H_1: There is a relation between cost of drug and demand for health care

iii) Income

Income is an important determinant of the demand for health care. Income is measured by monthly income of a household. Income has a substantial influence on the demand for health care. High-income individual seeks more formal care and prefer private facilities because they can afford it.

Null hypothesis H_0: There is no relation between income and demand for health care.

Alternative hypothesis H_1: There is a relation between income and demand for health care.

iv) Education

Education is also important determinants of demand for health care. Better-educated individual uses health care more efficiently. Moreover in low income countries educate women are more likely to conscious about health care. Other things

remaining constant, educated individual tend to be significantly healthier. It can play an important role in promoting health and preventing ill health. Higher levels of education were associated with preventive care of health. Because more educated people were expected to be aware of health care. For this reason, the negative correlation of level of health care and demand for health care arises. Education may be correlated with medical knowledge so that a person with more education is better informed and tends to prefer a specialist to a general practitioner. Alternatively people with higher education may be able to improve their health more efficiently generating fewer general practitioner contacts.

Educated individuals use more formal care of all types. So the conventional argument holds that education increases the expected productivity of formal health care alternatives relatives to self-care.

Higher educated people visit the doctor less frequently than those with less education, with the exception of the highest educated because positive effects of education on access to preventive care. Education can also improve access to health services by increasing individuals' patience and motivation. Education can enhance the demand for health care by several ways that is awareness, knowledge of health care and motivation.

More educated person produces more health. Even education may affect health behavior. More educated people typically engaged in healthier behaviors.
In this study, education is measured by the level of schooling of an individual.

Null hypothesis H_0: Less educated individuals are more likely to seek care when they are ill.

Alternative hypothesis H_1: More educated individuals are more likely to seek care when they are ill.

v) Age

Age is an important factor for explaining the demand for health care. In this study age is a continuous variable. We assume that older individual and child tend to consume large amount of health care than other.

Null hypothesis H_0: There is no relation between age and demand for health care.
Alternative hypothesis H_1: There is a relation between age and demand for health care.

vi) Quality of Care

Quality of care also influences the demand for health care. Quality of care is measured by using a few indicators that is waiting time, consultation level of satisfaction, quality of the service provider, behavior of the provider and behavior of other staffs.

Indicators of quality of care should rely on measurement of treatment performance. Quality of care can be measured by internal quality and external quality. Measurement of external quality of care is based on consumer perception. Perceived quality of care was measured by using level of satisfaction, quality of the service provider and so on. We adopt a perceived quality of care or patient satisfaction of care in this study. For this reason, we employ a specific measure, rating scale of 2 (good), 1 (moderate) and 0 (bad).

Null hypothesis H_0: There is no relation between quality of care and demand for health care.

Alternative hypothesis $_{H1}$: There is a relation between quality of care and demand for health care.

vii) Distance

Distance variable is measured on kilometer. Distance variables affect the demand for healthcare. Generally, patient would like to short distance for getting treatment. But sometimes, patient would like to long distance for getting better quality of treatment

Null hypothesis H_0: There is no relation between distance and demand for health care.

Alternative hypothesis H_1: There is a relation between distance and demand for health care

viii) Waiting Time

Waiting time is measured in terms of minute. Waiting time may influence the demand for health care. Generally positive demand shocks will lead to higher waiting time. Patient may expect to wait for a provider who has a good reputation.

Null hypothesis H_0: There is no relation between waiting time and demand for health care.

Alternative hypothesis H_1: There is a relation between waiting time and demand for health care.

ix) Duration of Illness

Duration of illness also influences the demand for health care. It has been measured by duration of suffering which is measured by day.

Null hypothesis H_0: There is no relation between duration of illness and demand for health care.

Alternative hypothesis H_1: There is a relation between duration of illness and demand for health care

x) Insurance

Health status and health expenditure of a person is uncertain. So, People buy health insurance to protect themselves against possible financial loss in the future. Even people are trying to reduce the associated financial and no financial risks. Consumers may purchase health insurance coverage for him, a group, a family.

Null hypothesis H0: There is no relation between health insurance and demand for health care.

Alternative hypothesis H1: There is a relation between health insurance and demand for health care.

4.3 Health Care Provider Choice Model

There are many health care providers in Bangladesh. Urban patients face a wider choice of health care facilities than rural patients in Bangladesh. The model is formulated as follows.

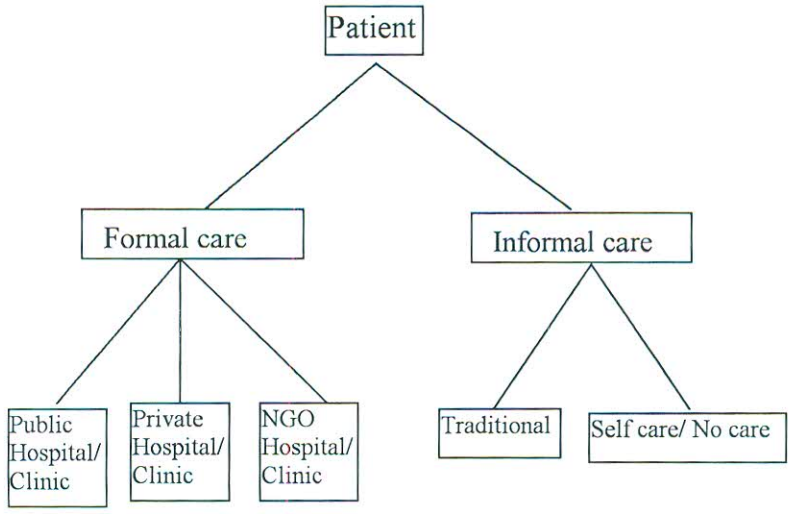


Figure 4.1 Health care provider choice in Bangladesh

Source: Author

4.4 Socioeconomic, Demographic and Healthcare Characteristics of the Respondent in Bogra: A Univariate Analysis

Socio-economic and demographic characteristics of the respondents are very important factors for explaining the demand for health care. The socio-economic and demographic status of the respondents influences on demand for health care. Some socio-economic and demographic characteristics of the respondents in Bogra are presented in this section, which is described below.

4.4.1 Level of Education of the Respondent of Bogra

The Figure 4.2 shows that in the research area 31.52 percent of the respondents are illiterate, 2.80% of the respondents have postgraduate degree and 40.00% of the respondents are secondary degree. From this Figure we can say that highly educated persons are taking preventive care rather than curative care. In addition, we can say that the highly educated people are conscious about health than others.

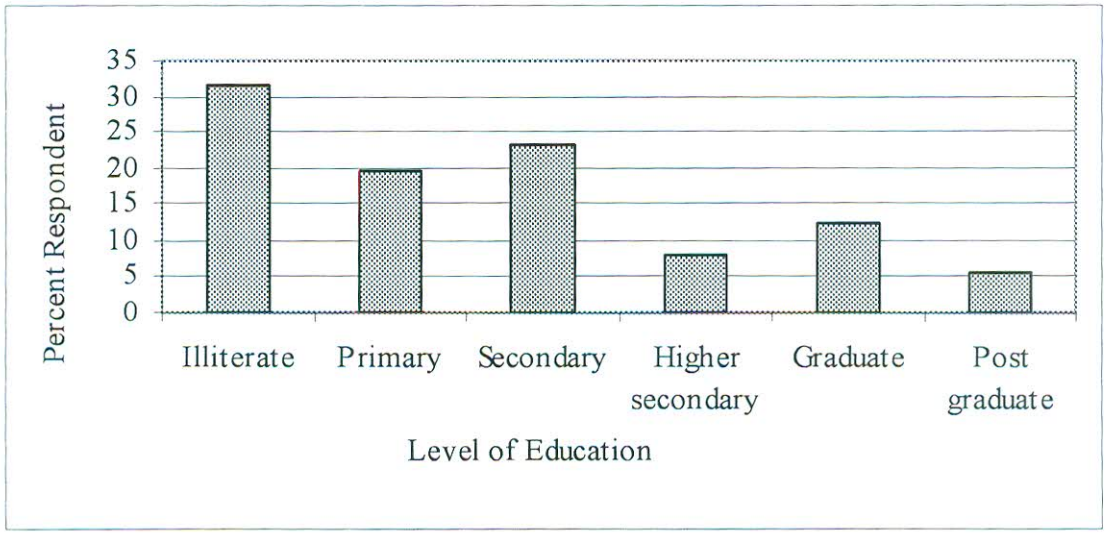


Figure 4.2 Level of education of the respondent in Bogra
Source: Field Survey, Bogra (2007)

4.4.2 Marital Status of the Respondent of Bogra

On the basis of marital status of the respondent, we divided them into four categories namely married, unmarried, divorced and widowed, which is presented in Figure 4.3. It is observed from the Figure that 71.74 percent respondents are married, 21.74 percent respondents are unmarried and 6.16 percent respondents are widowed. On the other hand, we can see that only 0.36 percent respondents are divorced in Bogra.

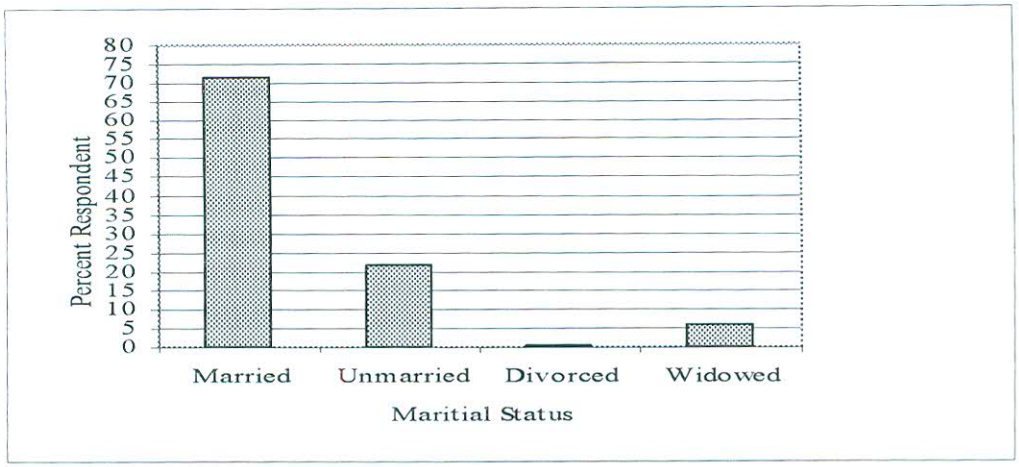


Figure 4.3 Martial status of the respondent in Bogra
Source: Field Survey, Bogra (2007)

4.4.3 Occupational Distribution of the Respondent in Bogra

Occupational status of the respondent represents their economic as well as social status in the society. Table 4.1shows that 35.51 percent of respondents are housewife, 9.78 percent respondents are student, 20.29 percent of respondents are others, 7.97 percent of respondents are government service, 14.49 percent of respondents are business, 6.52 percent of respondents are day labor, 5.07 percent of respondents are private service, 0 percent of respondents are agricultural and 0.36 percent of respondents are unemployment

Table 4.1 Occupational distribution of the respondent in Bogra

Types of Occupation	No. of Respondent	Percent
Business	40	14.49
Government service	22	7.97
Private service	14	5.07
Day labor	18	6.52
Agricultural	00	0
Unemployment	01	0.36
Housewife	94	35.51
Student	27	9.78
Others	56	20.29
Total	**276**	**100**

Source: Field Survey, Bogra (2007)

4.4.4 Age Distribution of the Respondent in Bogra

Age of the respondent influences the demand for health care. The survey result shows that majority of the respondents (42.75%) belong to age group of 20 – 40 years of which 18.64 percent of the respondents do not receive health care. About

31.52 percent of respondents belong to age group of 40 -60 years of which about 11.49 percent of the respondents do not take health care. Only 7.25 percent of the respondents have the age of 60 above of which 25.00 percent of the respondents do not receive health care. About 50.00 percent of the respondents do not take health care which age lie between 20 to 40 years. Only 11.36 percent of the respondents do not take health care which age lie 60 years above. The survey result shows that elder people are less likely to receive health care than young people.

Table 4.2 Age distribution of the respondent in Bogra

Age Group (in year)	No. of Respondent	Percent	Not taking Health care	Percent
Below 20	51 (86.27)	18.48	07 (13.73)	15.91
20 - 40	118 (81.36)	42.75	22 18.64)	50.00
40 - 60	87 (88.51)	31.52	10 (11.49)	22.73
60 above	20 (75.00)	7.25	05 25.00)	11.36
Total	**276**	**100**	**44**	**100**

Source: Field survey, Bogra (2007)
Parentheses indicates %

4.4.5 Toilet Facility of the Respondent in Bogra

In Bangladesh, toilet facilities have improved over the years. About 52.60 percent of the people use sanitary latrine of Bangladesh in 2004. Table 4.3 shows that 84.78 percent of respondents use paka toilet, 15.22 percent of respondents use semi paka toilet and zero percent of respondents use kacha toilet in Bogra.

Table 4.3 Distribution of the toilet facility of the respondent in Bogra

Classification of Toilet	No. of Used	Percent
Paka	234	84.78
Semi paka	42	15.22
Kacha	00	0
Total	**276**	**100**

Source: Field Survey, Bogra (2007)

4.4.6 Willingness to Pay for Health Insurance in Bogra

Table 4.4 shows that 75.72 percent of the respondent in Bogra is not willing to take for health insurance because they are not understand the meaning of health insurance. And they are unwilling to take for health insurance due to the lack of knowledge of health insurance. In Bogra only 24.28 percent respondent is willing to take for health insurance

Table 4.4 Distribution of willingness to pay for health insurance in Bogra

Response	No. of Respondent	Percent
Willingness to pay for health insurance	67	24.28
Otherwise	209	75.72
Total	**276**	**100**

Source: Field Survey, Bogra (2007)

4.4.7 Willingness to Take for Health Insurance Premium in Terms of Income Group in Bogra

Table 4.5 shows that only 24.24 percent of the respondents are willing to take health insurance and rest of them are not willing to take health insurance. The table shows below 2001 income group1.45 percent of respondents will not take health insurance because they are extremely poor. But 2001-5000 income groups only 5.79 percent of the respondents are willing to spend less than Tk.30 per month for health insurance. Only 6.52 percent of the respondents of 5001-8000 income groups are willing to take health insurance of which 9, 4,4 and 1 respondents are willing to give less than

Table 4.5 Distribution of respondents willing to take for health insurance premium in terms of income group in Bogra

Class interval of premium (Tk. per month)	Income Group							
	Below 2001	2001 to 5000	5001 to 8000	8001 to 11000	1101 to 14000	14001 to 17000	17000 above	Total
Less than 30	4	16	9	9	2	3	0	43
30-60	0	0	4	2	0	1	1	8
61-90	0	0	4	0	1	0	0	5
90 above	0	0	1	2	3	2	3	11
Total	4(1.45)	16(5.79)	18(6.52)	13(4.71)	6(2.17)	6(2.17)	4(1.45)	67(24.28)

Source: Field Survey, Bogra (2007)
Parentheses indicates %

Tk.30, Tk.30-60, Tk. 61- 90 and Tk. 90 above per month for health insurance premium respectively. Only 4.71 percent of the respondents of 8001-13000-income group are willing to take health insurance of which 9, 2 and 2 respondents are willing to spend less than Tk.30, Tk. 30 - 60 and Tk.90 above per month for health insurance premium respectively. Only 1.45 percent of the respondents of above17000 income group are willing to take health insurance of which 1 and 3 respondents are willing to spend Tk.30-60 and above Tk.90 per month for health insurance premium respectively.

4.4.8 Health Facility Visit in Terms of Gender in Bogra

Table 4.6 shows that only 30.07 percent of respondents visit to public hospital for their treatment of which male are 15.58 percent and female are 14.49 percent. Only 29.71 percent of respondents visit private hospital or clinic of which male are14.13 percent and female are 15.58 percent. Only 2.17 percent of respondents visit NGO hospital or clinic of which male are 0.36 percent and female are 1.81 percent. About 20.29 percent of respondents visit pharmacy or medical shop of which male are 9.06 percent and female are11.23 percent. Only 1.81 percent of respondents visit others facility of which male are0.72 percent and female are1.09 percent. About 15.94 percent of respondents do not visit any provider of which male are 6.16 percent and female are 9.78 percent. From this table we can say that female respondent do not take care from any provider than male respondent. Even female respondent prefer private hospital to male respondent.

Table 4.6 Distribution of health facility visit in terms of gender in Bogra

Gender	Public Hospital	Private Hospital or Clinic	NGO Hospital or Clinic	Pharmacy or Medical Shop	Others	No care/Self care	Total
Male	43 (15.58)	39 (14.13)	1 (0.36)	25 (9.06)	2 (0.72)	17 (6.16)	127 (46.01)
Female	40 (14.49)	43 (15.58)	5 (1.81)	31 (11.23)	3 (1.09)	27 (9.78)	149 (53.99)
Total	**83 (30.07)**	**82 (29.71)**	**6 (2.17)**	**56 (20.29)**	**5 (1.81)**	**44 (15.94)**	**276 (100)**

Source: Field Survey, Bogra (2007)
Parentheses indicates %

4.4.9 Proportion of Male and Female Having Health Care in Bogra

Figure 4.4 shows that 47.41 percent of male respondents take health care whereas 52.59 percent of female respondent take health care in Bogra.

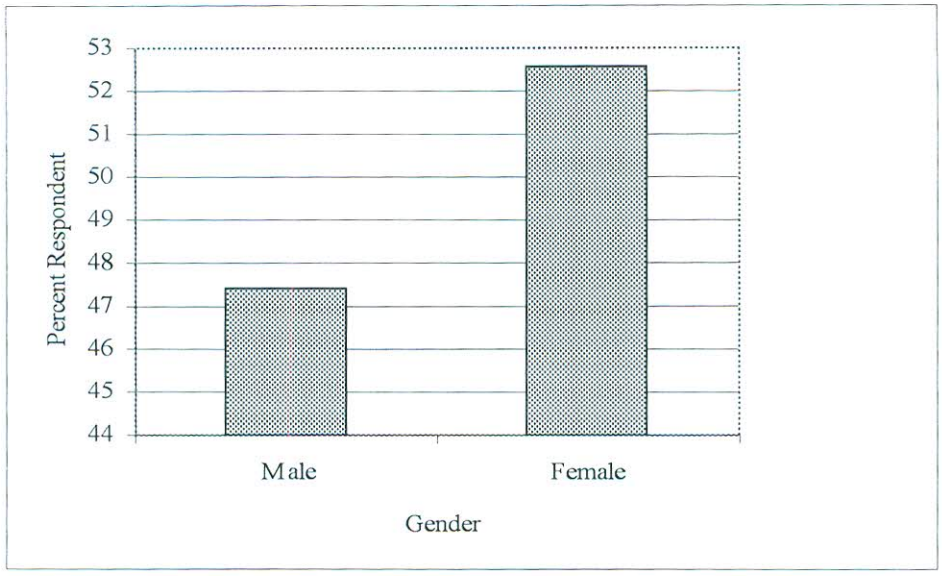


Figure 4.4 Proportion of male and female having health care in Bogra
Source: Field Survey, Bogra (2007)

4.4.10 Not Taking Health Care from Public Hospital in Bogra

Table 4.7 shows that 21.62 percent of the respondent is not taking health care from public hospital due to the lack of quality of care.12.43 percent of the respondent is not taking care from public hospital because of no assurance of providing medicine. 25.95 percent of the respondent is not taking care from public hospital because of long waiting time. 30.81 percent of the respondent is not taking care from public hospital due to long distance. 9.19 percent of the respondent is not taking care from public hospital due to other reasons. From this table we found that only 30 respondents are taking health care from public hospital.

Table 4.7 Percentage distributions of the respondents who are not taking health care from public hospital in Bogra

Reasons for not taking health care from public hospital	No. of Respondent	Percent
Lack of quality of care	37	19.17
No assurance of providing medicine	68	35.23
Long waiting time	72	37.31
Long distance	2	1.04
Other reasons	14	7.25
Total	**193**	**100**

Source: Field Survey, Bogra (2007)

4.4.11 Source of Drinking Water in Bogra

Source of drinking water is important to prevent water borne diseases. Table 4.8 shows that about 94.57 percent of the respondents use tube well for drinking water while zero percent of the respondents use other source for drinking water. 5.07 of the respondents use piped water for daily purpose and only 0.36 percent of the respondents use both source for their daily needs.

Table 4.8 Percentage distributions of sources of drinking water in Bogra

Name of the source	No. of Respondent	Percent
Tube well	261	94.57
Piped water	14	5.07
Both	01	0.36
Others (open well)	00	0.00
Total	**276**	**100**

Source: Field Survey, Bogra (2007)

4.4.12 Taking Health Care from Various Providers for Same Illness in Bogra

Table 4.9 shows that about 56.03 percent of the respondents take health care from more than one provider for same illness and only 43.97 percent of the respondents do not take care from more than one provider for same illness.

Table 4.9 Percentage distribution of the respondent who taken health cares from various providers for same illness in Bogra

Response	No. of Respondent	Percent
Yes	130	56.03
No	102	43.97
Total	**232**	**100**

Source: Field Survey, Bogra (2007)

4.4.13 Behavior of the Provider to the Patient in Bogra

Table 4.10 shows that about 51.29 percent of respondents told that the behavior of the provider was good. Where as about 45.45 percent of respondents claimed that the behavior of the provider was average and 3.45 percent of respondents claimed that the behavior of the provider was bad in Bogra.

Table 4.10 Distribution of behavior of the provider to the patient in Bogra

Types of Behavior/Mode of attitude/ Level of attitude	No. of Respondent	Percent
Good	119	51.29
Moderate/Average	105	45.45
Bad	8	3.45
Total	**232**	**100**

Source: Field Survey, Bogra (2007)

4.4.14 Encouragement for Taking Health Care in Bogra

Table 4.11 shows that 57.33 percent of respondent takes health by self-motivation. 31.90 percent of respondents take health care by motivating their head of the family. The table 4.11 also shows that 8.62 percent of the respondents take health care by both motivations. Only 2.16 percent of the respondents take health care by others motivation.

Table 4.11 Percentage distribution of respondent who encourage to take health care in Bogra

Motivation	No. of Respondent	Percent
Self	133	57.33
Head of the family	74	31.90
Both	20	8.62
Others	05	2.16
Total	**232**	**100**

Source: Field Survey, Bogra (2007)

4.4.15 Health Facility Visit in Terms of Income Group in Bogra

Table 4.12 shows that 30.07 percent of the respondent takes health care from public hospital. On the other hand, 1.81 percent respondent takes health care from others providers. 29.71 percent respondents take health care from private facility, 2.17 percent respondents take health care from non-government organization facility and 15 percent respondents do not take health care in Bogra.

Table 4.12 Distribution of health facility visit in terms of income group in Bogra

Income	Public Hospital	Private Hospital or Clinic	NGO Hospital or Clinic	Pharmacy or Medical Shop	Others	No care/ Self care	Total
Below 2001	4	4	0	6	0	4	18 (6.52)
2001-5000	28	5	1	17	1	11	63 (22.83)
5001-8000	19	16	4	12	1	11	63 (22.83)
8001-11000	13	28	0	12	2	8	63 (22.83)
11001-14000	9	8	1	2	0	2	22 (7.97)
14001-17000	7	10	0	4	0	5	26 (9.42)
17000 above	3	11	0	3	1	3	21 (7.61)
Total	**83 (30.07)**	**82 (29.71)**	**6 (2.17)**	**56 (20.29)**	**5 (1.81)**	**44 (15.94)**	**276 (100)**

Source: Field survey, Bogra (2007)

4.5 Socioeconomic, Demographic and Healthcare Characteristics of the Respondent in Rajshahi: A Univariate Analysis

Socio-economic and demographic characteristics of the respondents are very important factors for explaining the demand for health care. The socio-economic and demographic status of the respondents influences on demand for health care. Some socio-economic and demographic characteristics of the respondents in Rajshahi are presented in this section, which is described below.

4.5.1 Level of Education of the Respondent of Rajshahi

The Figure 4.5 shows that in the research area 21.40% of the respondent are illiterate, 2.80% of the respondents have postgraduate degree and 40.00% of the respondents are secondary degree. From this Figure we can say that highly educated persons are taking preventive care than curative care. In addition, we can say that the highly educated people are conscious about health than others.

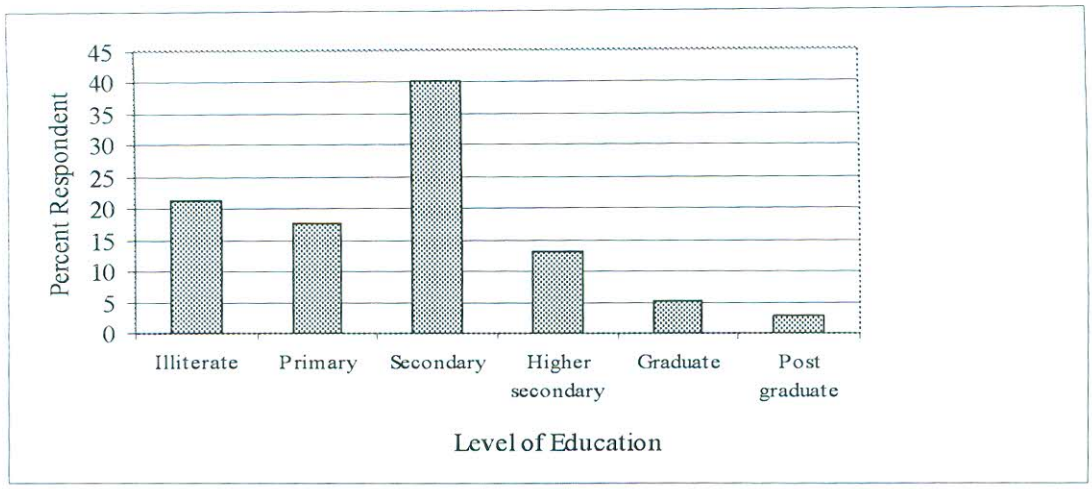


Figure 4.5 Level of education of the respondent in Rajshahi
Source: Field Survey, Rajshahi (2007)

4.5.2 Martial Status of the Respondent in Rajshahi

On the basis of marital status of the respondent, we divided them into four categories namely married, unmarried divorced and widowed, which is presented in Figure 4.6. It is observed from the Figure that 63.26 percent respondents are married and 35.35 percent respondents are unmarried in Rajshahi. We can see that only 1.40 percent respondents are widowed in Rajshahi.

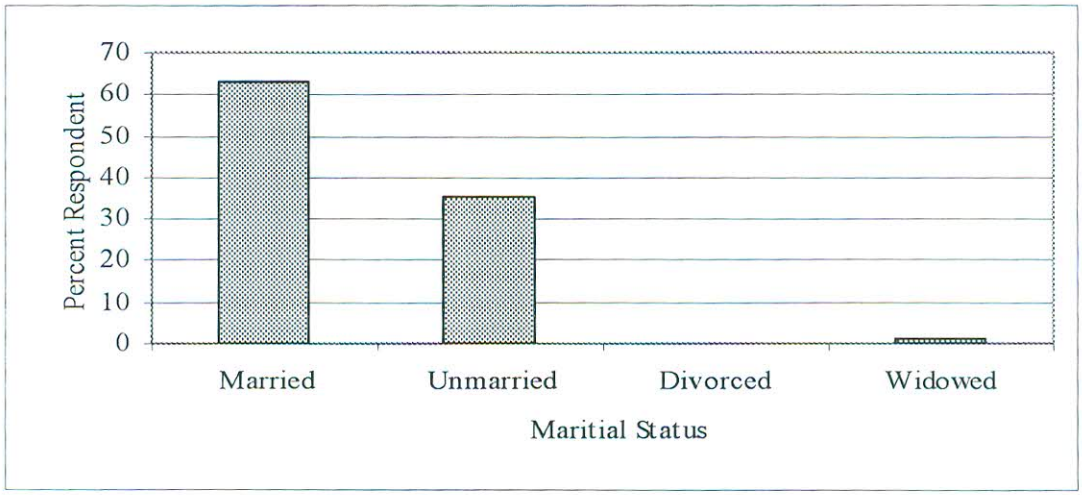


Figure 4.6 Martial status of the respondent in Rajshahi
Source: Field Survey, Rajshahi (2007)

4.5.3 Occupational Distribution of the Respondent in Rajshahi

Table 4.13 shows that 30.23 percent of respondents are housewife, 20.47 percent respondents are student, 17.21 percent of respondents are others, 11.63 percent of respondents are government service, 6.51 percent of respondents are business, 5.12 percent of respondents are day labor.

Table 4.13 Occupational distribution of the respondent in Rajshahi

Types of Occupation	No. of Respondent	Percent
Business	14	6.51
Government service	25	11.63
Private service	09	4.19
Day laborer	11	5.12
Agricultural	06	2.79
Unemployment	04	1.86
Housewife	65	30.23
Student	44	20.47
Others	37	17.21
Total	**215**	**100**

Source: Field Survey, Rajshahi (2007)

The table also shows that 4.19 percent of respondents are private service, 2.79 percent of respondents are agricultural and 1.86 percent of respondents are unemployment.

4.5.4 Age Distribution of the Respondent in Rajshahi

Age of the respondent influences the demand for health care. The survey result shows that majority of the respondents (32.09%) belong to age group of 40 – 60 years of which 15.94 percent of the respondents do not receive health care. About 30.23 percent of respondents belong to age group of 20 -40 years of which about 15.38 percent of the respondents do not take health care. Only 6.05 percent of the respondents have the age of 60 above of which 46.15 percent of the respondents do not receive health care.

Table 4.14 Age distribution of the respondent in Rajshahi

Age group (in years)	No. of Respondent	Percent	Not taking Health care	Percent
Below 20	68 (86.76)	31.63	09 (13.24)	25.00
20 - 40	65 (84.62)	30.23	10 (15.38)	27.78
40 - 60	69 (84.06)	32.09	11 (15.94)	30.55
60 above	13 (53.85)	6.05	06 (46.15)	16.67
Total	**215**	**100**	**36**	**100.00**

Source: Field Survey, Rajshahi (2007)
Parentheses indicates %

About 30.56 percent of the respondents do not take health care which age lie between 40 to 60 years. Only 16.67 percent of the respondents do not take health

care which age lie 60 years above. The survey result shows that elder people are less likely to receive health care than young people. In Rajshahi, the young age group people generally suffered from illness during the survey period.

4.5.5 Toilet Facility of the Respondent in Rajshahi

Table 4.15 shows that 87.44 percent of respondent use paka toilet, 9.30 percent of respondent use semi paka toilet and only 3.26 percent of the respondent use kacha toilet in Rajshahi.

Table 4.15 Distribution of the toilet facility of the respondent in Rajshahi

Classification of Toilet	No. of Used	Percent
Paka (Sanitary Latrine)	188	87.44
Semi paka (Semi Sanitary Latrine)	20	9.30
Kacha (Non Sanitary Latrine)	07	3.26
Total	**215**	**100**

Source: Field Survey, Rajshahi (2007)

4.5.6 Willingness to Pay for Health Insurance in Rajshahi

Table 4.16 shows that 75.81 percent of the respondent in Rajshahi is not willing to take for health insurance because they are not understand the meaning of health insurance. And they are unwilling to take for health insurance due to the lack of knowledge of health insurance. In Rajshahi only 24.19 percent respondent is willing to take for health insurance.

Table 4.16 Distribution of willingness to pay for health insurance in Rajshahi

Response	No. of Respondent	Percent
Willingness to pay for health insurance	52	24.19
Otherwise	163	75.81
Total	**215**	**100**

Source: Field Survey, Rajshahi (2007)

4.5.7 Willingness to Take for Health Insurance Premium in Terms of Income Group in Rajshahi

Table 4.17shows that only 24.19 percent of the respondents are willing to take health insurance and rest of them are not willing to take health insurance. Table 4.17 shows that below 2001 income group 0 percent of the respondents will not take health insurance because they are extremely poor. From 2001-5000 income groups only 2.33 percent of the respondents are willing to spend less than Tk.30 per month for health insurance. Only 5.12 percent of the respondents of 5001-8000 income groups

are willing to take health insurance of which 9and 2 respondents are willing to give less than Tk.30 and Tk.30-60 per month for health insurance premium respectively. Only 11.16 percent of the respondents of 8001-13000-income group are willing to receive health insurance of which 16and 28 respondents are willing to spend Tk.30-60 and Tk.61-90 per month for health insurance premium respectively. Only 5.58 percent of the respondents of above13000 income group are willing to take health insurance of which 5 and 7respondents are willing to spend Tk.61-90 and above Tk.90 per month for health insurance premium respectively.

Table 4.17 Distribution of respondents willingness to take for health insurance premium in terms of income group in Rajshahi

Class interval of premium (Taka per month)	Income Group					
	Below 2001	2001-5000	5001-8000	8001-13000	13000 above	Total
Less than 30	0	5	9	0	0	**14**
30-60	0	0	2	16	0	**18**
61-90	0	0	0	8	5	**13**
90 above	0	0	0	0	7	**07**
Total	**0 (0)**	**5 (2.33)**	**11 (5.12)**	**24 (11.16)**	**12 (5.58)**	**52 (24.19)**

Source: Field Survey, Rajshahi (2007)
Parentheses indicates %

4.5.8 Health Facility Visit in Terms of Gender in Rajshahi

Table 4.18 shows that only 13.95 percent of respondents visit to public hospital for their treatment of which male are 6.05 percent and female are 7.91 percent. Only 20.93 percent of respondents visit private hospital or clinic of which male are 10.70 percent and female are 10.23 percent. Only 3.72 percent of respondents visit NGO hospital or clinic of which male are 0 percent and female are 3.72 percent. About 33.02 percent of respondents visit pharmacy or medical shop of which male are 15.35 percent and female are 17.67 percent. Only 11.63 percent of respondents visit others facility of which male are 6.05 percent and female are 5.58 percent. About 16.74 percent of respondents do not visit any provider of which male are 7.91 percent and female are 8.84 percent. From this table we can say that female respondent do not take care from any provider than male respondent. Even male respondent prefer private hospital to female respondent.

Table 4.18 Distribution of health facility visit in terms of gender in Rajshahi

Gender	Public Hospital	Private Hospital or Clinic	NGO Hospital or Clinic	Pharmacy or Medical Shop	Others	No care/ Self care	Total
Male	13 (6.05)	23 (10.70)	0 (0)	33 (15.35)	13 (6.05)	17 (7.91)	**99 (46.05)**
Female	17 (7.91)	22 (10.23)	08 (3.72)	38 (17.67)	12 (5.58)	19 (8.84)	**116 (53.95)**
Total	**30 (13.95)**	**45 (20.93)**	**08 (3.72)**	**71 (33.02)**	**25 (11.63)**	**36 (16.74)**	**215 (100)**

Source: Field Survey, Rajshahi (2007)
Parentheses indicates %

4.5.9 Proportion of Male and Female Having Health Care in Rajshahi

Figure 4.7 shows that 47.58 percent of male respondents take health care whereas 54.19 percent of female respondent take health care in Rajshahi.

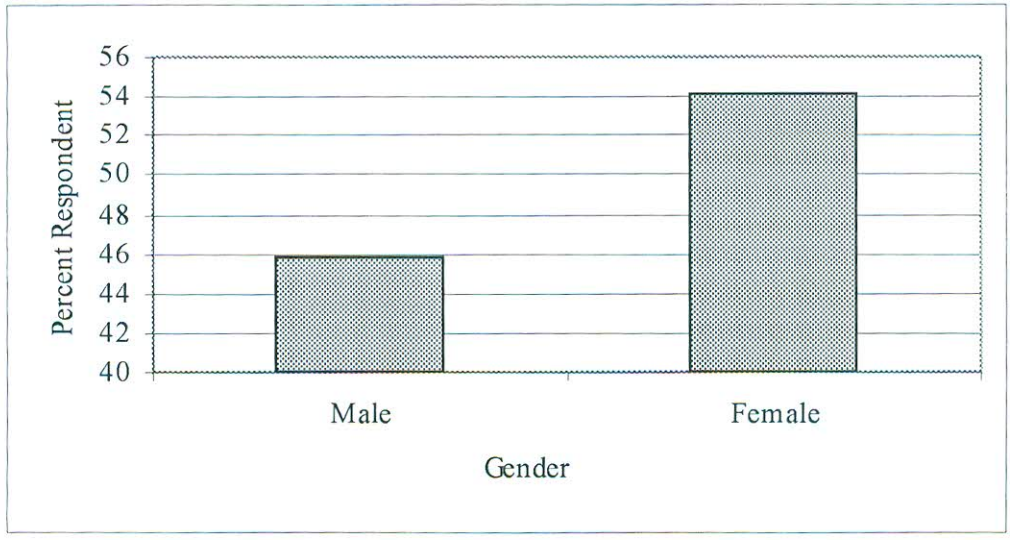


Figure 4.7 proportion of male and female having health care in Rajshahi
Source: Field Survey, Rajshahi (2007)

4.5.10 Not Taking Health Care from Public Hospital in Rajshahi

Table 4.19 shows that 21.62 percent of the respondent is not taking health care from public hospital due to the lack of quality of care.12.43 percent of the respondent is not taking care from public hospital because of no assurance of providing medicine. 25.95 percent of the respondent is not taking care from public hospital because of long waiting time. 30.81percent of the respondent is not taking care from public hospital due to long distance. 9.19 percent of the respondent is not taking care from

public hospital due to other reasons. From this table we found that only 30 respondents are taking health care from public hospital.

Table 4.19 Percentage distributions of the respondents who are not taking health care from public hospital in Rajshahi

Reasons for not taking health care from public hospital	No. of Respondent	Percent
Lack of quality of care	40	21.62
No assurance of providing medicine	23	12.43
Long waiting time	48	25.95
Long distance	57	30.81
Other reasons	17	9.19
Total	**185**	**100**

Source: Field Survey, Rajshahi (2007)

4.5.11 Source of Drinking Water in Rajshahi

Water is used for drinking, cooking, food preparation, and good personal and household hygiene. Safe water improves the health status of the people. Yet, people of Bangladesh often have a poor understanding about the relationship between health and water supply. In Bangladesh people still use unsafe sources for their daily needs. Still many people in Bangladesh do not have access to water free from arsenic contamination and bacteria safe water. People of Bangladesh get water from various ways. These are tube well, piped water, open well and ponds

Table 4.20 shows that about 80.93 percent of the respondent use tube well for drinking water while 0.93 percent of the respondent uses other source for drinking water. Only 8.37 of the respondent use piped water for daily purpose and 9.77 percent of the respondents use both source for their daily needs.

Table 4.20 Percentage distributions of sources of drinking water in Rajshahi

Name of the source	No. of Respondent	Percent
Tube well	174	80.93
Piped water supply	18	8.37
Both	21	9.77
Others (open well and ponds)	02	0.93
Total	**215**	**100**

Source: Field Survey, Rajshahi (2007)

4.5.12 Taking Health Care from Various Providers for Same Illness in Rajshahi

Table 4.21 shows that 42.70 percent of the respondents take health care from more than one provider for same illness. But only 57.30 percent of the respondents do not take care from more than one provider for same illness.

Table 4.21 Percentage distribution of the respondent who taken health care from various providers for same illness in Rajshahi

Response	No. of Respondent	Percent
Yes	76	42.70
No	102	57.30
Total	**178**	**100**

Source: Field Survey, Rajshahi (2007)

4.5.13 Behavior of the Provider to the Patient in Rajshahi

Table 4.22 shows that 52.81 percent of respondents told the behavior of the provider were good. The table also shows that about 47.19 percent of respondents claimed that the behavior of the provider was average in Rajshahi.

Table 4.22 Distribution of behavior of the provider to the patient in Rajshahi

Types of Behavior/Mode of attitude/ Level of attitude	No. of Respondent	Percent
Good	94	52.81
Moderate/Average	84	47.19
Bad	0	0
Total	**178**	**100**

Source: Field Survey, Rajshahi (2007)

4.5.14 Encouragement for Taking Health Care in Rajshahi

Table 4.23 shows that 56.18 percent of respondents take health by self-motivation. 34.83 percent of respondents take health care by motivating their head of the family. The table 4.23 also shows that about 5.06 percent of the respondents take health care by both motivations. Only 3.93 percent of the respondents take health care by others motivation.

Table 4.23 Percentage distribution of respondent who encourage for taking health care in Rajshahi

Motivation	No. of Respondent	Percent
Self	100	56.18
Head of the family	62	34.83
Both	09	5.06
Others	07	3.93
Total	**178**	**100**

Source: Field Survey, Rajshahi (2007)

4.5.15 Health Facility Visit in Terms of Income Group in Rajshahi

Table 4.24 shows that 33.02 percent of the respondent takes health care from pharmacy, 20.93 percent of respondent takes health care from private facility. The table also shows that about 13.95 percent of respondent takes health care from government facility, 3.72 percent of respondent takes health care from non government organization facility, 11.63 percent of respondent takes health care from others facility and 16.74 percent of respondent does not take health care in Rajshahi. Notice that only 13.95 percent of respondent uses public hospital because distance and waiting time impedes the use of public facility.

Table 4.24 Distribution of health facility visit in terms of income group in Rajshahi

Income	Public Hospital	Private Hospital or Clinic	NGO Hospital or Clinic	Pharmacy or Medical Shop	Others	No care/ Self care	Total
Below 1501	00	00	00	02	00	00	**2 (0.93)**
1501-5000	09	05	02	17	03	14	**50 (23.26)**
5001-8500	11	15	01	12	06	11	**56 (26.05)**
8501-12000	08	13	04	22	11	07	**65 (30.23)**
12001-15500	02	07	00	12	04	03	**28 (13.02)**
15500 above	00	05	01	06	01	01	**14 (6.51)**
Total	**30 (13.95)**	**45 (20.93)**	**08 (3.72)**	**71 (33.02)**	**25 (11.63)**	**36 (16.74)**	**215 (100)**

Source: Field survey, Rajshahi (2007)
Parentheses indicates %

4.6 Utilization of Health Care Service

Health care facility utilization is an important factor determining the efficiency of a health providing set up. Utilization of health care system depends on quality of care, price of that system, availability of doctors, availability of medicine and adequate follow up care.

4.6.1 Health Facility Utilization by Patient in Bogra

There is a one secondary level of health care facility and a one tertiary level of health care facility in Bogra. The bed number of Mohammad Ali hospital is 250. Generally, poor and low-income group takes treatment in this hospital.

Table 4.25 Health care utilization of Mohamma Ali hospital in Bogra

Month	Inpatient admission	Outpatient admission
March'06	19862	17288
April'06	19825	16405
May'06	18968	14892
June'06	18831	15943
July'06	20447	19306
Agust'06	20406	17325
September'06	17005	12993
October'06	15199	11299
November'06	12344	11691
December'06	7773	8097
January'07	5648	9158
February'07	7365	9967

Source: Mohammad Ali Hospital, Bogra (2007)

Table 4.25 shows that the monthly inpatient admission statistic of 250 bedded Mohammad Ali Hospital in Bogra between March' 06 and February'07. The number of inpatient admission increased moderately from January'06 to March'06. Over the next three months the admission declined slightly due to harvesting period. For the next two months the inpatient admission of Mohammad Ali Hospital increased due to financial improvement after harvesting. From September'06 to November'06 the admission of inpatient decreased gradually due to better weather condition. From November'06 Shahied Ziauar Rahaman Medical College Hospital was separated from Mohammad Ali Hospital. That's why, the inpatient admission in Mohammad Ali Hospital declined rapidly

Table 4.26 Distribution of monthly patient in SZMCH in Bogra

Month	Inpatient	Outpatient admission
November'06	3283	6539
December'06	10170	6886
January'07	11158	13053
February'07	13387	14418
March'07	17455	22602
April'07	18302	25124
May'07	17971	23549
June'07	17945	24055
July'07	19935	30351
Aguest'07	19299	25798
September'07	18553	26518
Octomber'07	16214	20277

Source: SZMCH, Bogra (2008)

Table 4.26 we observed that the number of inpatient admission increased gradually between December'06 and April'07. Afterwards the number of inpatient admission declined gradually in May'07. However the number of outpatient admission increased from November 06 to July 07. After that, the number of outpatient admission fluctuated between August 07 and October 07.

4.6.2 Health Facility Utilization by Patient in Rajshahi

Rajshahi medical college hospital consists of 530 beds. The hospital mainly provides curative tertiary healthcare to the patient. That's why patients come to this hospital to take healthcare from various areas in Bangladesh for taking better treatment. At present Rajshahi medical college hospital is over utilized due to better quality of care and least cost of treatment. The poor and low-income group people have to solely depend on this hospital due to low cost of treatment.

Table 4.27 Distribution of monthly patient and outpatient visit in Rajshahi Medical College Hospital in Rajshahi

Month	No. of Inpatient	No. of Outpatient
June'06	33627	41197
July'06	38565	53906
August'06	35403	51801
September'06	34828	42755
Octomber'06	29426	36395
November'06	32271	43214
December'06	29388	32856
Junurary'07	28947	32358
February'07	28436	36494
March'07	37442	40006
April'07	36324	48762
May'07	35056	47636
Jun'07	34109	42765

Source: Rajshahi Medical College Hospital, Rajshahi (2007)

Table 4.27 gives the monthly inpatient and outpatient who took healthcare from Rajshahi medical college hospital. Monthly inpatient and outpatient present in column 2 and 3 of Table 4.27 respectively. The 2nd column shows that significant numbers of patient are taken health care from outdoor facility between June'06 and June'07. The number of inpatient admission increased moderately from January '07 to March'07. From August '06 to October'o6 the admission of inpatient decreased slightly.

4.7 Urban Primary Health Care in Rajshahi

Urban primary health care is conducted by partnership agreement in between government and NGOs. Partner NGOs counsel the patient for creating awareness the patients. Generally, urban poor people receive high quality preventive, promotional and curative services from urban primary health care centers. In addition, UPHC centers will provide a full range of essential services, including EOC and newborn care. Urban primary health care center is conducted by three partner NGOs. These are (i) KMSS, (ii) PSTC and (iii) Tilottoma. Rajshahi has 17 urban primary health care centers of which 6 urban primary health care centers are run by KMSS, 6 urban primary health care centers are managed by PSTC, and 5 urban primary health care centers are directed by Tilottoma. Each partner NGO operates one maternal health care centers out of 17 urban primary health care centers. Besides, City Corporation operates one city hospital.

4.7.1 Khulna Mukti Seba Services (KMSS)

KMSS is a partner NGO. It provides health care services at Rajshahi metropolitan area through six urban primary health care centers. It provides indoor and outdoor facility.

Table 4.28 Distribution of patients visit at KMSS in Rajshahi

Time Period	No. Of Out door Patient	No. Of Indoor Patient.	Total Patient
July'06 - September'06	29263	210	**29473**
October'06 - December'06	26763	277	**27473**
January'07-March'07	24316	324	**24640**
April'07 - June'07	25514	345	**25859**

Source: KMSS, Rajshahi (2007)

Table 4.28 reveals that a large numbers of patient received outdoor treatment from urban primary health care centers. From July'06 to September'06, 210 number of patient get treatment from KMSS. Table 4.26 reveals that indoor patient increased significantly.

4.7.2 Population Services and Training Center (PSTC)

PSTC is a partner NGO and provides indoor and outdoor services. It provides child health, maternal health and other family planning services. PSTC operates six urban primary health care centers of which five centers provide only outdoor services and only one center provides inpatient facility.

Table 4.29 Distribution of patients visit at PSTC in Rajshahi

Time Period	No. Of Out door Patient	No. Of Indoor Patient.	Total Patient
July'06- September'06	11170	36	**11206**
October'06-December'06	10610	44	**10654**
January'07- March'07	13901	52	**13953**
April'07-June'07	13014	31	**13045**

Source: PSTC (Population Services and Training Center), Rajshahi (2007)

Table 4.29 reveals that a large numbers of patient received outdoor treatment from urban primary health care centers. From July'06 to September'06, 36 number of patient get treatment from PSTC. The number of inpatient increased from October'06 to March'07 moderately. The next three months number of inpatient decreased slightly. While the number of outpatient increased slightly from January '07 to June'07.

4.7.3 Tilottoma

Tillottoma is an also a partner NGO. Patient gets health care services from these health care centers. They operate five urban health care centers of which only one center provides inpatient facility. It provides outpatient health care through satellite clinic.

Table 4.30 Distribution of patients visit at Tilottoma in Rajshahi

Time Period	No. of Out door Patient	No. of Indoor Patient	Total Patient
July'06- September'06	41269	103	**41372**
October'06- December'06	42022	132	**42154**
January'07- March'07	42166	110	**42276**
April'07- June'07	39591	110	**39701**

Source: Tilottoma, Rajshahi (2007)

Table 4.30 reveals that quarterly patient visits at Tilottoma. The total number of patient increased from October '06 to March'07. Afterwards, the number of patient decreased from April'07 to June'07. The outdoor patient increased from July'06 to March'07. Afterwards the outdoor patient declined between April'07 and July'07.

Chapter Five

Supply of Health Care

5.1 Introduction

The previous chapter discusses the demand for health care with respect to descriptive statistics. This chapter includes description of the supply of health care, measurement of variables, resource allocation for medicine and surgical requisite and various health care facilities in both study areas.

5.2 Supply of Health Care

Supply of health care is very important concept in health economics. Health care is defined as the prevention, treatment, and management of illness and the preservation of mental and physical well-being through the services offered by the medical and allied health professions. This system of offering the services is called supply of health care.

In market economy, when patients go to hospitals or clinics, if they get adequate care from doctors, nurses and other supporting staffs at a given market price then it is called supply of health care. Health care is clearly a heterogeneous commodity; it is also an intermediate commodity in the sense that it is not consumed for itself (McGuire,A. *at el.* 1997). Health is not trade able but healthcare is tradable goods. The health care provider can only supply health care and this supply will improve the health status of the population. Health care can be treated as consumption goods that yields direct satisfaction to the individuals as well as investment goods that yields satisfaction to consumers directly (more productive, fewer sick days, higher wages etc.). Demand for health care will lead us to focus on supply of health care.

5.3 Measurement of Variables

i) Supply of health care

Health care is a composite goods. Quantity of health is measured as a ratio of total health care expenditure to the price index of health care service (Chow, G. C. 2006).

In this research work, the health care providers are considered as supply of health care. Generally health care provider is assumed to be a self interested supplier as well as an agent for her patient. The health care provider, when she decides to supply health care, takes account not only of health benefits to the patient but also of her own financial gain. A healthcare provider carries out the production of health care services. Organization and individual are two kinds of healthcare providers. An organization, such as a hospital or clinic, may provide healthcare services when a patient comes to take healthcare services and an individual also provide health care services.

ii) Price of physician's visit

The supply for health care will depend on the price of that service. The price variable used is called fees. Some times the price of physician's visit of health care is measured by unit price of the providers. In this study price is considered as money price and the researcher collected the price of physician visit from various statistical yearbook.

Null hypotheses H_0: There is no relation between price and supply for health care.

Alternative hypothesesH_1: There is a relation between price and supply for health care.

iii) Price of other health care expenses

The supply for health care also depends on the average price of other health care expenses. In this study the researcher collected the price of other health care expenses from various statistical yearbooks.

Null hypotheses H_0: There is no relation between price of other health care expenses and supply for health care.

Alternative hypothesesH_1: There is a relation between price of other health care expenses and supply for health care.

iv) Gross domestic product

Supply of health care is determined by gross domestic product. Data on Gross domestic product which is a proxy to economic growth, are taken from the various issues of "Statistical Yearbook in Bangladesh" published by Bangladesh Bureau of Statistics.

Null hypotheses H_0: There is no relation between gross domestic product and supply for health care.

Alternative hypothesesH_1: There is a relation between gross domestic product and supply for health care.

To make the clear relationship among the variables, all variables are transformed in logarithms. Here, LnQ_s, LnP_h, $LnP_0$and LnGDP, represent the supply of health care, average price of physician's visit, average price of other health care expenses and gross domestic product after logarithmic transformation.

5.4 Health Care Delivery System in Bogra

Bogra district is situated in the middle point of North Bangal. The healthcare system in Bogra consists of two types of provider, which are orthodox and traditional. Orthodox providers have a formal training in health care; provide modern treatment to the patient. On the other hand, traditional providers have no formal training in health care. There are 11 upazila health complex of which 2 upazali health complex are 50 bedded and others are 31 bedded and 38 Union Sub Center as well as 74 Union Health and Family Welfare Center in Bogra district which is shown in Table 5.1 and 5.2 respectively.

Table: 5.1 Distribution of 50 and 31 bedded upazila health complex in Bogra

Name of the upazila health complex	No. of bed
Sariakandi upazila health complex	50
Dunote	50
Sherpur	31
Sonatola	50
Gabtoli	50
Sibgonj	50
Kahalu	50
Adomdigy	50
Dupcacia	50
Nondigram	31
Sajhanpur	31

Source: Civil surgeon office, Bogra (2008)

Union sub center runs by one doctor (MBBS), one medical assistant, one pharmacist and other supporting staffs. Besides, there are 10 public, semi government and Christian mission hospital in Bogra town excluding NGOs hospital and others government staff service hospital which has been shown in table 5.5. About 60 private diagnostic center and clinic are present in Bogra of which 97% are situated in Bogra municipality area. In addition, there are 300 registered medical shops in Bogra municipality area in 2007.

Table 5.2 Numbers of Union Sub Center, Community Clinic and Union Health & Family Welfare Center in Bogra

Name of sub center	No. of Union sub center	No. of Community Clinic	No. of Union Health & Family Welfare Center
Sadar Bogra	05	33	11
Sajhanpur	02	18	10
Sibgonj	05	20	08
Sonatola	03	19	06
Gabtoli	07	34	07
Sariakandi	04	23	07
Dunote	04	33	08
Serpur	06	26	06
Kahalu	04	23	04
Nondigram	04	10	03
Dupcacia	01	19	04
Adomdigy	05	22	00
Total	**50**	**280**	**74**

Source: Civil surgeon office and District family planning office, Bogra (2008)

5.4.1 Health Care Delivery in Bogra Municipality Area

Mohammed Ali hospital is a 250-bedded government hospital in which there are 72 doctors and 153 nurses working. The doctor nurse ratio of Mohammed Ali hospital is 1:2.125. It offers emergency service and opens 24 hour. This hospital offers X-ray service, ultrasound service, ECG service and pathology services but there is blood bank facility in Mohammad Ali hospital. In addition it is doing minor and major operation to patient. In Mohammad Ali hospital, there are three ambulances of which 2 ambulances are active. The hospital authority provides food free of cost for per indoor patient. The food budget of per patient is Tk.45 per day. There are eleven departments in Mohammad Ali Hospital. These are given below-

Medicine	General Surgery	Dentistry
Pediatrics	Orthopedics	Pathology
Midwifery	ENT	Radiology and imaging
Dermatology	Eye	

Table 5.3 Structure of user fee of pathological and diagnostic test of Mohammad Ali Hospital

Name of pathological test	User fee (Taka)
A) Hematological test	
i) TC, DC, ESR, Hb%	49.5
ii) Single Test	12.5
iii) MP	11.00
B) Clinical Pathology	
i) Urine for R/E	16.50
ii) Urine single Test	11.00
iii) Stool R/E	16.50
C) Serologycal Test	
i) Aso Titre	110.00
ii) RA Test	110.00
iii) VDRL	60.00
iv) Hbs Ag	150.00
v) Blood Grouping	55.00
D) Bio- Chemical Test	
1) Blood sugar	
a) FBS	27.50
b) PPBS	27.50
c) RBS	27.50
d) GTT (FBS, 1HAB, 2HAB)	83.50
2) Serum Crea Tinine	49.50
3) Serum Cholesterol	55.00
4) Serum Bilirubin	44.00
5) SGPT (ALT)	55.00
6) Blood Urea	33.00
E) Ultrasound	
1) Whole abdomen	220
2) Lower abdomen	110
F) X-ray	
14x14 15x12	70
10x12 8 x10	55
G) ECG	80

Source: Mohammad Ali Hospital, Bogra (2007)

Table 5.3 provides Structure of user fee of pathological and diagnostic test of Mohammad Ali Hospital. Generally Mohammad Ali Hospital performs seven types of pathological test, which are Hematological test, Clinical Pathology, Serology cal Test, Bio- Chemical Test, Ultrasound, X-ray and ECG. The patient pays highest cost for Ultrasound and Serology cal Test; moderate cost for X-ray and Bio- Chemical Test but least cost for Hematological test

5.4.2 Shahid Ziauar Rahman Medical College Hospital

There are 183 doctors, 149 nurses and 15 departments in Shahid Ziauar Rahman hospital in Bogra. Blood bank facility is available in SZMCH. It provides radiology service, ultra sonogram service, CT scan service, ECG service and M.R.I service. In addition to echocardiogram, cardiac monitors, intensive care facilities are available in SZMCH. But there is no microbiology section, burn unit as well as nephrology department in SZMCH. Modern health technology is available in SZMCH in Bogra. There are 3 ambulances in SZMCH. General bed is fully free but cabin and other bed is not free. The bed rent of 2 sited, 1 sited, AC bed are Tk.200, Tk.400 and Tk.800respectively per patient per day. Patient must have paid Tk.5.5 to the hospital authority for taking out door treatment and inpatient official admission fee is Tk.11 in SZMCH at Bogra. The hospital authority provides food free of cost per indoor patient. The food budget of per patient is Tk.45 daily. The working hour system of SZHCH is shifting. Daily working hour is started at 8 am and closed at 2:30 pm except Friday but emergency division is opened at 24 hours. SZMCH provides health care to the patient by 15 departments, which are given below:

Medicine	General Surgery	Radiology and imaging
Pediatrics	Orthopedics	Blood Transfusion
Cardiology	Anesthesiology	Midwifery
Dermatology	ENT	Pathology
Psychiatry	Eye	Dentistry

Table 5.4 Structure of user fee of SZMCH

Services	User fee (Taka)
Consultation fee	5.50
Admission fee	11
Blood gouping	100
Hbs Ag (Latex)	150
Hbs Ag (Rapid test)	200
H.C.V	200
H.I.V	200
V.D.R.L	60
R.H antibody titer	350
Blood screening for govt. hospital at general bed	100
Blood screening for govt. hospital at cabin or private clinic or hospital	400
X-ray	
8x10	55
12x10	55
15x12	70
14x14	70
ECG	80
ECO black and white	200
ECO color	600
Blood sugar (RBS)	60
Urine	20
Lipped profile	300

Source: Shahid Ziauar Rahman Medical College Hospital , Bogra (2007)

5.4.3 Registered Medicine Shop in Bogra District

Sometimes many patients go to the medicine shop and consult his disease with shopkeeper afterwards they buy medicine without prescription from qualified provider. The medicine sellers are not professionally trained and sell all types of medicine that is needed for patient.

Table 5.5 Number of Registered medicine shop in Bogra district

Name of Thana	No. of Registered medicine shop
Bogra Sadar	865
Sherpur	277
Shibganj	234
Sariakandi	110
Dhupchachia	126
Shajahanpur	133
Gabtali	252
Kahaloo	57
Adamdighi	211
Nandigram	126
Sonatala	110
Dhunat	146
Total	**2647**

Source: Drug super office, Bogra (2008)

Table 5.5 shows the total number of registered medicine shop in Bogra is 2647 in 2008. The significant number of registered medicine shops is in Bogra sadar (865). The moderate number of registered medicine shop is in Sherpur (277), Gabtali (252), Shibganj (234), Adamdighi (211), Dhunat (146), Shajahanpur (133). The least number of registered medicine shops is in Dhupchachia (126), Nandigram (126), Sariakandi (110), Sonatala (110), and Kahaloo (57). .

5.4.4 Other HealthCare Facilities in Bogra

TB hospital is a 20-bedded government hospital. It has both indoor and outdoor facility. This hospital only offers treatment of tuberculosis as well as treatment of leprosy. TB hospital acts as a referral center

TB clinic is government clinic. It has only outdoor facility. Patient gets treatment free of cost. TB clinic act as a referral center.

School Health clinic is government clinic. It provides only outdoor facility to the school student. School health clinic provides free medicine to the student and students receive preventive health care, mental health care free of cost. Doctors advise nutritional side to the student.

The authority of municipality runs Pouroshova Health Division. It provides only outdoor facility. Patients receive health service free of cost. It provides free medicine to the poor people. In addition to these services, it provides EPI services.

Bogra Diabetic Hospital is a non-government hospital. It provides inpatient and outpatient service. This hospital provides treatment to patient who suffers diabetic disease. It provides operation facility for diabetic patient. So patient must have pay money to the hospital authority for getting treatment.

Bogra Christian (Mission) Hospital is a non-government hospital. It has indoor and outdoor facility. Patient takes service from this hospital through money payment. This hospital provides obstetrics and gynecology service, general surgery, Pediatrics and treatment of eye.

Maternal and Child Hospital is a government hospital under DGFP. It has both indoor and outdoor facility. It offers Obstetrics service, gynecology service, prenatal care, family planning services and various types of vaccination.

Asthma care & prevention Center is a non government health center which is directed by the Ziaur Rahaman foundation. It provides indoor (2 bed) and outdoor facility. It offers ECG and Spiromatic facility. Patients have to pay Tk100 per visit for taking health care from this center. However, there is no bed charge in this center.

Table: 5.6 lists of hospital and clinic at Bogra town

Name of hospital and clinic	No. of bed and facilities
Mohammed Ali Hospital	250 indoor and outdoor facilities
Shahid Ziauar Rahman Medical College Hospital	500 indoor and outdoor facilities
TB Hospital	20 indoor and outdoor facilities
TB Clinic	outdoor facilities
School Health Clinic	outdoor facilities
Pouroshova Health Division	outdoor facilities
Bogra Diabetic Hospital	30 Indoor and outdoor facilities
Christian (Mission) Hospital	52 Indoor and outdoor facilities
Maternal and child welfare center	20 Indoor and outdoor facilities
Asthma care & prevention Center	2 Indoor and outdoor facilities
Urban healthcare center	Indoor and outdoor facilities

Source: Field survey, Bogra (2008)

Urban health care is run by partner NGO (KMSS) under the control of Ministry of LGERD. It provides five PHCC (Primary Health Care Center), one CRHCC (Comprehensive Reproductive Health Care Center) and one VCT (Voluntary Counseling and Testing). CRHCC gives indoor and outdoor service to the patient but PHCC and VCT provides only outdoor services to the patient. Urban primary health care center are working in Bogra municipality area for improving health status of the urban vulnerable people.

5.5 Health Care Delivery in Rajshahi

Rajshahi is a divisional headquarters. The healthcare system in Rajshahi consists of two types of provider, which are modern and traditional. Modern providers have a formal training in health care; provide modern treatment to the patient. On the other hand, traditional providers have no formal training in health care. There are 1 medical college hospital, 9 Upazila health complex (31 bed), 32 Union Sub Center, 42 Union Health and Family Welfare Center and 196 Community clinics in Rajshahi excluding others defense and staffs hospital which is shown in Table 5.7

Table 5.7 Numbers of upazila health complex, union sub center, union health & family welfare center and community clinic in Rajshahi

Name of upazila health complex	No. of bed	No. of union sub center	No. of UH&FWC	No. of community clinic
Paba upazila	31	3	7	33
Bagmara	31	6	11	27
charghat	31	1	4	21
Mohonpur	31	1	5	16
Tanor	31	5	2	9
Durgapur	31	2	5	17
Godagari	31	1	3	30
Baga	31	8	4	19
Putia	31	5	1	24
Total	**279**	**32**	**42**	**196**

Source: Civil Surgeon Office, Rajshahi (2007) and Deputy Director of Family Planning Office (2008)

The above table shows that there are nine numbers of 31-bedded upazila health complex in and 32 union sub centers in Rajshahi district. Highest number of union sub center is in Baga but least number of union sub centers is in charghat, Mohonpur and Godagari.

5.5.1 Health Care Delivery in Rajshahi Municipality Area

TB hospital is a 150-bedded government hospital. It has both indoor and outdoor facility.

TB clinic is government clinic. It has only outdoor facility. Patient gets treatment with free of cost. TB clinic act as a referral center.

School Health clinic is government clinic. It provides only outdoor facility to the school student. School health clinic provides medicine to the student with free.

Rajshahi Diabetic Hospital is a non-government hospital. It has indoors and out door facility. So patient must have pay money to the hospital authority for getting treatment.

Rajshahi Missionary Hospital is a non-government hospital. It has indoor and outdoor facility. Patient takes service from this hospital through money payment.

Maternal and Child Hospital is a government hospital. It has both indoor and outdoor facility.

Urban Health Dispensary is a government institute, which has only outdoor facility from which patient gets primary health care service free of cost.

Raninogor City hospital is managed by Rajshahi City Corporation. It has both indoor and outdoor facility. It provides only maternal treatment to the patient and EOC facility is available here. Patient pays to the hospital Tk.10 per visit. However there is no bed charge and medicine cost.

Table 5.8 Name of the various health care facilities with their capacity in Rajshahi metropolitan area

Name of hospital and clinic	Total no. of beds and facilities
Rajshahi medical college hospital	530 (Indoor and outdoor facilities)
TB Hospital	150 (Indoor and outdoor facilities)
ID Hospital	20(Indoor and outdoor facilities)
School Health Clinic	Out door facilities
Rajshahi Diabetic Hospital	Indoor and Out door facilities
Rajshahi Missionary Hospital	Indoor and Out door facilities
Maternal Health Care Center	Indoor and Out door facilities
TB Clinic	Outdoor facility
Urban Health Dispensary (3)	Outdoor facility
Raninogor City hospital (managed by city corporation)	25 Indoor and outdoor facility
Urban Health Care Center (run by UPHCP)	17 of which 3indoor facility

Source: Field Survey, Rajshahi (2007)

5.5.2 Rajshahi Medical College Hospital

There are 288 doctors, 349 nurses and 20 departments in Rajshahi medical college hospital. So doctor nurse ratio is 1:21 in RMCH in Rajshahi. There are 3 ambulances at RMCH. General bed is fully free but cabin and other beds are not free. Non AC 2 sited bed rent is only Tk.400 per day, paying bed rent is Tk.72.50 per day. There is only one Ac bed in RMCH, which is used by V.V.I.P. The hospital authority collects Tk.6 per patient per outdoor visit as well as Tk.11 per patient indoor visit besides these authority collects Tk.20 per attendant in the name of gate pass, which is valid only 5 days. The hospital authority is providing food every indoor patient. The food budget of per patient for per day is Tk.45. The working hour system is shifting. Daily working hour is started at 8 am except Friday but emergency division is opened at 24 hours at RMCH

Department of RMCH

Medicine
Neuro medicine
Pediatrics
Cardiology
Dermatology
Psychiatary
General Surgery
Pediatric Surgery
Neuro Surgery
Orthopedics
Anesthesiology
ENT
Eye
Nefrology
Radiology and imaging
Radiotherapy
Blood Transfusion
Midwifery
Pathology and Dentistry

5.6 Resource Allocation for Medicine and Surgical Requisite

Resource allocation for medicine and surgical requisite is determined by the size of inpatient facilities and population so super specialized and tertiary health care hospital gets more resource allocation for medicine and surgical requisite.

Table 5.9 Medicine and surgical requisite of various government hospital, health center and clinic in Rajshahi and Bogra

Name of health center	Allocation (Taka)
Medical college hospital	28,000/=per patient per year
District hospital (250 bedded)	25,000/=(per year)
Upazila health complex (31 bedded)	18,000/=(per year)
Sub center	75,000/=(every sub center per year)
Urban health center	1,00000/=(every urban health center per year)
TB Clinic	1,42857/=(per year)
TB hospital	13,30000/= (per year 100 bedded)
ID hospital	----
Raninogor city hospital	600000/=(per year)
School health clinic	8400/=(per year)

Source: Civil surgeon office, Rajshahi & Bogra (2007)

Table 5.9 shows the annual medicine and surgical requisite of various government medical college hospital, health center and clinic in Rajshahi and Bogra. The medicine budget allocation for medical college hospital, district hospital, upazila health complex, urban health center, TB clinic, TB hospital and school health clinic were Tk. 28,000, Tk.25000, Tk.18000, Tk.100000, Tk.142857, Tk.13,30000, Tk.600000 and Tk.8400 respectively in 2007. The government allocated maximum budget for medical college hospital but minimum medicine budget for school health clinic.

5.7 Registered Medicine Shop in Rajshahi District

Sometimes many patients go to the medicine shop and consult his disease with shopkeeper afterwards they buy medicine without prescription from qualified

provider. The medicine sellers are not professionally trained and sell all types of medicine that is needed for patient.

Table 5.10 Number of registered medicine shop in Rajshahi district

Name of Thana	No. of Registered medicine shop
Boalia,Rajpara,Motihar,Shamokdum	625
Poba	71
Charghat	104
Mohonpur	62
Tanor	67
Baga	112
Bagmara	178
Putia	137
Durgapur	64
Godagari	101
Total	**1521**

Source: Drug super office, Rajshahi (2007)

Table 5.10 shows the total number of registered medicine shop in Rajshahi was 1521 in 2008. The significant number of registered medicine shops was in Rajshahi metropolitan area (625) i.e Boalia, Rajpara, Motihar and Shamokdum. The moderate number of registered medicine shop was in Bagmara (178), Putia (137), Charghat (112), Baga (104) and Godagari (101). The least number of registered medicine shops was in Poba (71), Tanor (67), Durgapur (64), and Mohonpur (62).

5.8 Private Clinics or Hospital of Rajshahi and Bogra

There are large number of private clinic and hospital in Rajshahi and Bogra. Both in Rajshai and Bogra, all private clinics or hospitals have indoor and outdoor facility. Private hospital or clinic offers major and minor operation and use the regional hospitals for referrals. In Bogra, information center of Apollo hospital is present. Private clinics or hospitals provide the following services:

Emergency services
Vaccination
Obstetrics and gynecology
General medicine
Family planning services
Pathology services
ECG services
Ultra sonogram services
X- ray services

Table 5.11 List of registered private clinic & their facilities in Rajshahi metropolitan area

Sl. No.	Name of the clinic	No. of bed	No. of permanent doctors	No. of temporary & specialist doctors	No. of operation theater	Blood bank service
1	Cure Nursing Home	10	3	4	1	0
2	Padma Clinic	15	6	10	1	0
3	Sharmin Nursing Home	10	3	6	1	0
4	Mukti Clinic Pvt. Ltd.	30	9	15	2	0
5	Kaisar Memorial Hospital	10	3	6	1	0
6	Christian Missionary Hospital	20	6	9	2	0
7	Janata Clinic	10	3	4	1	0
8	Endoscope & Maternity Clinic	10	3	6	2	0
9	Dolphin Clinic	30	9	15	2	0
10	Mohanagor Clinic	20	6	6	1	0
11	Ghoreb-a- Nawaj Clinic	10	3	3	1	0
12	Jam Jam Islami Hospital	30	9	16	2	0
13	Uttorbango Islamia Hospital	10	3	4	1	0
14	Motherland Hospital	10	3	4	1	0
15	Care Nursing Home	10	3	5	1	0
16	Janosheba Clinic	10	3	4	1	0
17	Islami Bank Hospital	54	15	17	2	0
18	Mother's Clinic	8	3	0	1	0
19	Rajshahi Central Hospital	10	3	4	1	0
20	Fatama General Hospital	10	3	3	1	0
21	Micro path Clinic	15	6	9	1	0
22	Al- Arafa Clinic	10	3	4	1	0
23	Ideal Clinic & Maternity Centre	10	3	3	1	0
24	Breeze Hospital	10	3	3	1	0
25	Mental Health Care	10	3	2	0	0
26	Human Care Hospital	10	3	4	1	0
27	Jamuna Clinic	10	3	4	1	0
28	Janoshastho Clinic	10	3	3	1	0
29	Modern Hospital	10	3	4	1	0
Total		**422**	**129**	**77**	**34**	**00**

Source: Civil Surgeon Office, Rajshahi (2008)

It is observed that there is no blood bank service in private clinics or hospital in Rajshahi.

Chapter Six

Results and Discussion

6.1 Introduction

In this chapter some attempts have been made to examine the demand for health care as well as supply of health care. The inferential and descriptive statistics are employed to estimate the demand for health care in the both study areas in which dichotomous dependent variable and a set of explanatory variables are used to estimate the demand for health care. On the other hand, the inferential and descriptive statistics are also used to estimate the supply of health care in Bangladesh by using time series data from 1992 to 2005.

6.2 Result and Discussion of Demand for Health Care

We discuss the empirical finding of demand for health care, which is shown in Table 6.1. In Bogra the price of healthcare is significant at 5 percent level of significant The estimated coefficient of price variable is negative, suggesting that price of healthcare increases, demand for healthcare decreases if other things being equal. The estimated coefficient of price of healthcare is -0.114, which indicates that demand for healthcare of a patient decrease 0.114 with one-unit increase in price of healthcare.

The cost of drug variable is significant at 10% level of significance. Cost of drug affects demand for healthcare positively. The estimated coefficient cost of drug is 0.039, which indicates that if cost of drug rises by one-unit, the log-odds of demand for health care of a patient increase 0.039 times.

The estimate coefficient of education variable is insignificant but the coefficient of education variable has shown expected sign. So one percent increases of education of a patient with the demand for health care of a patient increase 1.020 percent.

Table: 6.1 The result of logistic regression of demand for health care in Bogra

Variable	Bogra					
	Coefficient	SE	Wald	d.f	p value	Odd ratio
Price	-0.114*	0.057	3.992	1	0.046	0.892
Cost of drug	0.039*	0.022	3.311	1	0.069	1.040
Level of education	1.020	1.109	.846	1	0.358	2.774
Age	-0.136	0.089	2.359	1	0.125	0.873
Income	0.325	0.713	0.208	1	0.649	1.384
Waiting time	0.657*	0.362	3.297	1	0.069	1.928
Distance	20.918*	12.198	2.941	1	0.086	1.22E+09
Quality of care	5.098*	2.250	5.133	1	0.023	163.730
Duration of illness	-0.134	0.101	1.768	1	0.184	0.874
Constant	-4.822	3.574	1.820	1	0.177	0.008
-2Log likelihood	18.664					
Cox&Snell R Square	0.555					
Nagelkerke R Square	0.950					
Omnibus test of model coefficient (χ^2)	223.503			9	0.000	

Source: Field survey, Bogra (2007)
* Significant at 5 %
**Significant at 10 %

The age variable is insignificant. The coefficient of age variable is –0.136, which suggests that, if the age of a patient rises by one-unit, the log-odds of demand for health care of a patient decrease 0.136 times. So age and demand for health care of a patient is negatively related.

The income variable is insignificant but it has positive sign. The coefficient of income variable is 0.325, which suggests that a unit increase in income, the log-odds in favor of demand for health care of a patient goes up by 0.325

The waiting time variable is significant at10 % level of significance. The coefficient of waiting time variable is 0.657, which indicates that a unit increases in waiting time; the log-odds ratio in favor of demand for health care goes up by 0.657.

The distance variable is significant at 10% level of significance. The coefficient of distance variable is 20.918, which suggests that for a unit increase in distance, the log-odds ratio in favor of demand for health care goes up by 20.918. Here positive relation between distance variable and demand for health care so patients would like to avail long distance for better quality of treatment.

The quality of care variable is significant at 5%level of significance. The coefficient of quality of care variable is 5.098, which suggests that for a unit increase in quality of care, the log-odds ratio in favor of demand for health care goes up by 5.098.Besides it has shown expected sign.

The duration of illness variable is significant at 5% level of significance but it has shown expected sign. This is because, patients who have been suffering from any disease for long time or more than 4 weeks they did not take health care. The coefficient of duration of illness is –0.134, which indicates that for a unit increase in duration of illness, the log-odds ratio in favor of demand for health care goes down by 0.134.

In our logistic regression model analysis we obtained that R square of Cox and Snell is 0.555 and Nagelkerke R Square is 0.950, which suggests that the data of Bogra is fitted the model well.

Table: 6.2 The result of logistic regression of demand for health care in Rajshahi

Variable	Rajshahi					
	Coefficient	SE	Wald	d.f	p value	Odd ratio
Price	-0.606	5.759	0.011	1	0.916	0.545
Cost of drug	0.026*	0.010	6.372	1	0.012	1.027
Level of education	0.794	0.685	1.342	1	0.247	2.212
Age	-0.013	0.032	0.155	1	0.694	0.987
Income	0.304	0.801	0.144	1	0.704	1.355
Waiting time	5.216	56.684	0.008	1	0.927	184.139
Distance	6.567*	2.928	5.032	1	0.025	711.517
Quality of care	42.280	578.363	0.005	1	0.942	2.30E+18
Duration of illness	-0.109**	0.064	2.912	1	0.088	0.897
Constant	-3.050	2.026	2.268	1	0.132	0.047
-2Log likelihood	24.800					
Cox&Snell R Square	0.545					
Nagelkerke R Square	0.917					
Omnibus test of model coefficient (χ^2)	169.476			9	0.000	

Source: Field survey, Rajshahi (2007)
* Significant at 5 %
**Significant at 10 %

Table 6.2 shows that price of health care is insignificant at 5 and 10 percent level of significant. The estimated coefficient of price variable is negative, suggesting that price of healthcare increases, demand for healthcare decreases if other things being

equal. The estimated coefficient of price of healthcare is -0.606, which indicates that demand for healthcare of a patient decrease 0.606with one-unit increase in price of healthcare

The cost of drug variable is significant at 5% level of significance. The coefficient of cost of drug price is 0.026, which indicates that one- unit increase in cost of drug, the log-odds ratio in favor of demand for health care increases 0.026times.

The education variable is insignificant but the coefficient of education variable has shown expected sign. So, one percent increases the level of education of a patient, the log-odds in favor of demand for health care of a patient increase 7.94 percent.

The age variable is insignificant. The coefficient of age variable is –0.013, which suggests that, age and demand for health care of a patient is negatively related.

The income variable is insignificant but it has expected sign. The coefficient of income variable is 0.304, which suggests that a unit increase in income, the log-odds in favor of demand for health care of a patient goes up by 0.304.

The waiting time variable is insignificant. The coefficient of waiting time variable is 5.216, which indicates that a unit increases in waiting time, the log-odds ratio in favor of demand for health care increase by 5.216.

The distance variable is significant at 5% level of significance. The coefficient of distance variable is 6.567, which suggests that for a unit increase in distance, the log-odds ratio in favor of demand for health care goes up by 6.567. Here positive relation between distance variable and demand for health care so patients would like to avail long distance for better quality of treatment.

The quality of care variable is insignificant at 5%level of significance. The coefficient of quality of care variable is 42.280, which suggests that for a unit increase in quality of care, the log-odds ratio in favor of demand for health care goes up by 42.280. Besides it has shown expected sign.

The duration of illness variable is significant at 10% level of significance but it has shown expected sign. Patients did not take health care patients who have been suffering from any disease for long time or more than 4 weeks. Generally patient believes that this disease will not be cure at all. For this reason, patient did not take health care. The coefficient of duration of illness is –0.109, which indicates that for

a unit increase in duration of illness, the log-odds ratio in favor of demand for health care goes down by 0.109

In our logistic regression model analysis we obtained that R square of Cox and Snell is 0.545 and Nagelkerke R square is 0.917, which suggests that the data of Rajshahi is fitted the model well.

6.3 Result and Discussion of Supply for Health Care

We also discuss the empirical finding of supply of health care which is shown in Table 6.2. The result shows that supply of health care is positively related to average price of physician visit and the estimated coefficient of price of physician visit is statistically significant at 5 % level on the basis of a two tail t test.

Table 6.3 The result of supply of health care in Bangladesh

Variable	Coefficient	S.E	t Statistic	p value
Average price of physician	0.301**	0.130	2.309	0.044
Average price of other health care expenses	-0.004	0.206	-0.018	0.986
Gross Domestic product (GDP)	0.70**	0.229	3.051	0.012
Constant	4.184	0.872	4.800	0.001
R square	0.976			

Source: Bangladesh Bureau of Statistics 1994,1995,1998,2001 & 2006 and Bangladesh Economic Review 2002 & 2007
*Significant at 1 %
**Significant at 5 %

The result also shows that as average price of physician visit increases by, say, 1 taka the supply of health care increases by about 30.10 percent.

Supply of health care is negatively related to the average price of other health care expenses and the estimated coefficient of average price of other health care expenses is not statistically significant, as its p value is 98.6 percent.

Supply of health care is positively related to gross domestic product and the estimated coefficient of gross domestic product is statistically significant at 5% level. The result shows that gross domestic product increases by, say, 1 unit the supply of health care increases by about 70 percent.

The R^2 value 0.976 means that about 97.60 percent of variation in supply of health care is explained by average price of physician visit, average price of other health care expenses and gross domestic product (GDP).

Table 6.4 Descriptive statistics of demand for health care in Bogra

Variable	Maximum	Minimum	Mean	Standard deviation
Price of healthcare (Tk.)	350	0	45.75	92.12
Cost of drug (Tk.)	2500	0	252.46	349.07
Age (year)	95	.17	32.58	19.86
Level of education (year of schooling)	16	0	6.90	4.58
Income (Tk.)	20000	1000	9114.88	4298.69
Waiting time (in minute)	210	0	34.44	51.75
Distance (km)	6	0	1.96	2.01
Quality of care	2	0	0.7581	0.73
Duration of illness (day)	30	2	19.50	10.88

Source: Field survey, Bogra (2007)

From the above Table 6.3 we found that the mean education level of the respondent is 6.90 years and standard deviation of the education level of the respondent is 4.58 years. Average waiting time is 34.44 minute. The mean age of respondent is 32.58 years and standard deviation of the respondent is 19.86years.The highest monthly household income is Tk. 20000 and lowest monthly household income is Tk.1000.

Table 6.5 Descriptive statistics of demand for health care in Rajshahi

Variable	Maximum	Minimum	Mean	Standard deviation
Price of healthcare (Tk.)	500	0	80.86	109.62
Cost of drug (Tk.)	3000	0	366.14	567.76
Level of education (year of schooling)	16	0	1.49	1.36
Age (year)	90	.13	36.17	18.22
Income (Tk.)	30000	1000	8863.7681	5670.47
Waiting time (in minute	210	0	50.99	61.02
Distance (km)	4	0	1.20	1.13
Quality of care	2	0	1.15	0.726
Duration of illness (day)	30	1	21.62	10.94

Source: Field survey, Rajshahi (2007)

From the above Table 6.4 we found that the mean age of respondent is 36.17 years and standard deviation of the respondent is 18.22years. Mean year of education of respondent is 1.49 years and standard deviation of the level of education is 1.36years. The highest monthly household income is Tk.30000 and lowest monthly household income is Tk.1000.

6.4 Description of variables

Table 6.5 Description of variables of demand for and supply of health care in Bangladesh.

Name of the variable	Description
Demand for health care Qdx	Whether patient consults doctor and takes medicine or not Qdx = 1, demand for health care and 0 = otherwise.
Price of health care P	Price of health care (measured in taka)
Price of other consumer goods Po	Price of other consumer goods
Patients coinsurance rate r	Patients coinsurance rate
Income Y	Income of the family
Distance T	Distance to the provider
Waiting time W	Waiting time (measured in minutes)
Quality of care K	Quality of care
Age	Age of the respondent (measured in year)
Education Ed	Patients education level (measured in year of schooling)
Duration of illness S	Duration of illness (measured in day physically and mentally disordered)
Taste and preference T_1	Taste and preference
Supply of Health care Qs	Total number of doctor, nurse and midwife
Price of physician Ph	Average price of physician measured in Tk.
Price of other health care expenses Po	Average price of other health care expenses measured in Tk.
Gross domestic product GDP	Gross domestic product measured in million Tk.

Chapter Seven

Conclusion and Policy Suggestion

7.1 Summary and Conclusion

In this study we have discussed about conceptual and empirical framework of demand for health care and supply of health care in Bangladesh. In the empirical analysis of the demand for health care reveals that price of healthcare has negative effects on the demand for healthcare in both study area but elasticity of demand for healthcare is low. The level of education and income has positive effect on demand for healthcare in the both study areas. Age of the patient has negative effect on demand for health care in the both study areas. So, demand for health care decreases with increases the age of the patient in the study area. This result suggests that elder persons are more likely to seek health care than young people. Though elder persons typically have higher health care needs. Waiting time may influence the demand for health care in Bangladesh. The result shows that there is a positive relation between waiting time and demand for health care. This result suggests that patients would like to wait for better quality of treatment. Distance is the important impediments to using health service in Bangladesh. But in the both study areas there is positive relationship between distance variable and demand for health care. This is because, patients would like to avail long distance for better quality of treatment. Duration of illness has a negative effect on demand for health care in both study areas. In both areas there is no remarkable health insurance because concept of health insurance is not popular. While, the empirical analysis of supply of health care shows that price of physician visit is positively related to supply of health care and it is statistically significant. Gross domestic product and supply of health care positively related. So, if gross domestic product of Bangladesh increases then supply of health care also increases.

In this study, demand for health care is dominated by economic variables and demographic variables in both areas. About 68.78 percent of the respondents are literate in Bogra whereas about 78.60 percent of the respondents are literate in

Rajshahi. About 35.51 percent of the respondents are housewife in Bogra whereas about 30.20 percent of the respondents are housewife in Rajshahi. Most of the respondents are housewife in both study areas.

In Bogra most of the patients receive health care from public hospitals. In case of Rajshahi, it is found that most of the patients receive health care from pharmacy or medical shop due to long distance as well as long waiting time. The results indicate that the choice of health care facility is relatively sensitive to change in price. In Bogra and Rajshahi, 53.99 and 53.95 percent of the respondents are female respectively. So, we can say that in the both study areas most of the patients are female. Female are more likely to take health care from modern providers than male in Bogra but male are more likely to take health care from modern providers than female in Rajshahi. This findings show that the female respondents are relatively more responsive to quality than to price in Bogra. The descriptive part of the study shows that in both areas private doctors have higher price than government employed doctors. Besides inpatient visit charge of medical college hospital is different in both areas. In Bogra, average waiting time is 34.44 minute whereas 50.99 minute in Rajshahi. The descriptive statistics also show that the maximum monthly household income of Rajshahi and Bogra are Tk. 20000 and Tk. 30000 respectively. The both of the study areas the lowest monthly household income is Tk.1000. In Rajshahi the patient needs to go maximum 6 km. a way for healthcare services but in Bogra it needs to go maximum 4 km. a way for healthcare services. So, we can conclude that the people of Bogra can easily receive health care services rather than Rajshahi due to least distance. In the both study areas, some patients do not always select the closest facility for getting health care due to quality of care and are willing to trade off waiting time, distance, quality of care and price of health care. Doctor nurse ratio is very poor in the both study areas. The study also shows that government medical college hospitals are over utilized in the both study areas.

7.2 Policy Suggestion

In view of the above findings, this study suggests the following policy measures.

1) In this study we found that there is negative relation between user fee and demand for healthcare. So user fees would be reduced so that patient gets health services.

Though free service provision is not a sufficient condition to lead people to demand for health care

2) In this study education and income are positively related to the demand for health care. So the campaign for health care as a proxy of education may increase the demand for health services. Since per capita income of the people is very low in our country even lower in both of the study areas. The government of Bangladesh should expand health service delivery free of cost to those who are unable to pay for health care service.

3) Since the public hospitals are over utilized in the both urban areas. So the government of Bangladesh has to expand bed facilities/health care facilities or to establish new hospitals.

4) Number of registered nurses should be increased for providing better quality of health care to the patient. Because the situation of doctor nurse ratio is very poor in Bangladesh.

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Appendix-1

(It will be used only for research purpose)

Date: Location:

ID No.

Personal and Family Information

1. Name:
2. Age:
3. Marital Status: a) Married, b) Unmarried, c) Divorce and d) Widow
4. Occupation: a) Business, b) Government, c) Private Service, d) Day Laborer,
   e) Agricultural, f) Unemployment, g) Housewife, h) Student & i) Others
5. Year of Schooling: a) Illiterate, b) Primary, c) Secondary, d) Higher Secondary,
   e) Graduate and f) Post graduate
6. Mothers year of schooling: a) Illiterate, b) Primary, c) Secondary, d) Higher Secondary, e) Graduate & f) Post Graduate
7. Fathers year of schooling: a) Illiterate, b) Primary, c) Secondary, d) Higher Secondary, e) Graduate & f) Post Graduate
8. Monthly family income:
9. Size of the family:

Health Care and Sanitation Information

10. Have you suffered from any disease during the last month? a) Yes, b) No
11. What type of disease have you suffered from during the last month?
12. What was the duration of that type of disease?
13. Have you taken any healthcare for this particular type of disease? a) Yes, b) No
14. If yes, from what type of provider you have taken health care facility? a) Public hospital, b) Private hospital or clinic, c) NGO hospital or clinic,

d) Pharmacy or Medical shop and e) Others

15. What is the service fee of the provider that you have taken health care?
16. Do you think, the fee of health care service is very high? a) Yes, b) No
17. How much money you have spent for that particular disease during the last month?
18. How long you wait for to get health care service?

    a) Less than 10 minutes, b) 10 – 30 minutes, c) 31- 59 minutes, d) 1- 2 hours, e) 2-3 hours and f) more than 3 hours
19. Are you not interested to take health care service for the waiting time?

    a) Yes, b) No
20. What is the probable distance of health care provider from your residence?

    a) less than 1 km, b) 1-2 km, c) 2-3, d) 3- 4 km, e) 4 – 5 km and f) more than 5 km
21. Do you feel troublesome for that distance? a) Yes, b) No
22. What is transportation cost for taking health care?
23. Does transportation cost affect your health care? a) Yes, b) No
24. Do you have any health insurance facility? a) Yes, b) No
25. If not, do you agree to take health insurance? a) Yes, b) No
26. If yes, which of the following health insurance premium per month you want to like?

    a) Less than 30, b) 30-60, c) 61- 90 and d) 90 above
27. How the provider treats you from whom you have taken health care service?

    a) Yes, b) No
28. Does the doctor give much time to listen the history of disease that you are suffering from? a) Yes, b) No
29. What is the quality of care of the provider that you have taken health care?

    a) Good, b) Moderate or Average and c) Bad
30. Who has encouraged you to take health care service from the particular provider? a) Self, b) Head of the family, c) Both and d) Others

31. Have you taken health care service from various providers for same type of disease? a) Yes, b) No
32. Are you interested to take health care service from modern private hospital than from public hospital, if your income increases? a) Yes, b) No
33. If yes, why do you prefer modern private hospital to public hospital? a) Quality of care and b) Other reason
34. What is the source of drinking water? a) Tube well, b) Piped water, c) Both and d) Others
35. What type of toilet you use for? a) Paka, b) Semi paka and c) Kacha
36. Why do not you receive health care for public hospital? a) Quality of care, b) No assurance of providing medicine, c) long waiting time, d) long distance and e) other reasons.

Thank you

Appendix-2

Maximum Likelihood Estimation

The estimators of α and β can also be obtained through maximum likelihood estimation method. We define maximum likelihood estimator of a parameter β as the value of β which would most likely generate the observed sample observation of variables i,e. Y_1, Y_2, Y_3,.....Y_n. If Yi is normally distributed and each of the Y's is drawn independently, then likelihood function will be

$P(Y_1)\ P(Y_3)$.....$P(Y_n)$

And maximum likelihood estimate will maximize it where each P represents a probability associated with the normal distribution.

If we want to find out the maximum likelihood estimators of the parameters of our model Yi = α + βXi + ui and we know that Yi is normally distributed with mean α + βX and variance σ2u then the probability distribution my be written as

$$P(Yi) = \frac{1}{\sqrt{2\pi\pi^2}} e^{\left[-\frac{1}{2\sigma^2}(Yi-\alpha-\beta Xi)^2\right]}$$

the likelihood function is

$L\ (Y_1, Y_2,.....Y_n, \alpha, \beta, \sigma^2) = P(Y_1)P(Y_2),.....P(Y_n) =$

$$\prod_{i=1}^{n} \left(\frac{1}{\sqrt{2\pi\pi^2}}\right) e^{\left[-\frac{1}{2\sigma^2}(Yi-\alpha-\beta iXi)^2\right]}$$

Where, $\prod$ is the product of n factors

Now this likelihood function is to be maximized with respect to parameters α, β, σ^2. The partial differentiations when equated with zero given following equation.

$$\frac{\partial(\log L)}{\partial\alpha} = \frac{1}{\sigma^2}\sum(Yi - \alpha - \beta Xi) = 0$$

$$\frac{\partial(\log L)}{\partial\beta} = \frac{1}{\sigma^2}\sum[Xi(Yi - \alpha - \beta Xi)] = 0$$

$$\frac{\partial(\log L)}{\partial\alpha} = \frac{n}{2\sigma^2} + \frac{1}{2\sigma^4}\sum(Yi - \alpha - \beta Xi)^2 = 0$$

on solving we get

$$\hat{\alpha} = \overline{Y} - \hat{\beta}\overline{X}$$

$$\hat{\beta} = \frac{\sum(Xi - \overline{X})(Yi - \overline{Y})}{\sum(Xi - \overline{X})^2}$$

$$\sigma^2 = \frac{\sum(Xi - \hat{\alpha} - \hat{\beta}Xi)^2}{n}$$

Therefore both least squares estimators and maximum likelihood estimators of α and β are same. Also like OLS estimator's maximum likelihood estimators of $\hat{\alpha}$ and $\hat{\beta}$ are best linear unbiased estimator.