UNIVERSITY OF CAPE COAST

DETERMINANTS OF DEMAND FOR ANTENATAL CARE IN GHANA

BY

MOSES KWAKU FOSTER SABLAH

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's signature …… Date 18th March, 2011

Name: Moses Foster Kwaku Sablah

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal supervisor's signature …… Date ……..

Name: Prof K. N. Afful

Co-supervisor's signature ……. Date ……..

Name: Dr. Peter B. Aglobitse

ABSTRACT

The Ghana Health Service adopted a number of policies and strategies which were aimed at improving antenatal care attendance in the country. In addition, there were relative improvement in facilities and professionals at these facilities. Inspite of these improvements, the national antenatal care coverage continued to be irregular, though some regions made some remarkable improvements. Antenatal care was thought to have an impact on the reduction of maternal and perinatal mortality, if women have access to services and the quality of these services are sufficient to control the identified risks. If antenatal care is beneficial then what could influence a pregnant woman to attend or not to attend antenatal care? This study therefore tried to investigate factors determining demand for antenatal care in Ghana.

The data for the study was obtained from Ghana Demographic and Health Survey (GDHS) 2003. Multinomial logistic regression was used and estimated with the maximum likelihood estimation technique. A sample of 2777 women who had a baby at least five years before the survey were included in the data. Out of this number, 2766 visited either public facility, private facility or other facilities (maternity homes and TBAs) for antenatal care.

The results showed that income, education and distance to health facility, among others, were statistically significant in determining antenatal care demand. A major policy recommendation was that health care facilities should be provided in rural areas to make health care more accessible.

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LIST OF ACRONYMS

CEDPA	Centre for Development and Population Activities
CHAG	Christian Health Association of Ghana
CHPS	Community-based Health Planning and Services
DHS	Demographic and Health Survey
GFATM.	Global Fund to fight AIDS, Tuberculosis and Malaria
GHS	Ghana Health Service
GLSS	Ghana Living Standard Survey
GPRS	Growth and Poverty Reduction Strategies
HASS	Health Administration and Support Service
ICD	Institutional Care Directorate
ICPD	International Conference on Population and Development
IFLS	Indonesian Family Life Study
IMF	International Monetary Fund
IPTp	Intermittent Preventive Treatment for Malaria during Pregnancy
MDBS	Multi-Donor Budgetary Support
MoH	Ministry of Health
NGOs	Non-Governmental Organisations
OLS	Ordinary Least Square
PHD	Public Health Directorate
PMTCT	Prevention of Mother to Child Transmission of HIV
PPMED	Policy, Planning, Monitoring and Evaluation
RCH	Reproduction and Child Health

RTI	Reproductive Tract Infections
SAP	Structural Adjustment Programme
SSDM	Supplier, Stores and Drugs Management
SSNIT Fund	Social Security and National Insurance Trust Fund
STIs	Sexually Transmitted Infections
SWAp	Sector-Wide Approach
TBAs	Traditional Birth Attendants
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WFP	World Food Programme
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

Background to the Study

Women in general and most especially in developing countries are faced with serious pregnancy related health risks, a situation which is a major concern to many governments in developing countries as well as international organisations. In Africa, pregnancy related health risks caused about a quarter of the burden of diseases in 1990 for women in the age group of 15 to 44 years (Overbosch, G.B., Nsowah-Nuamah., N.N.N, Van den Boom, G.J.M. & Damnyag, L; 2003). It is a fact that adult health condition is mostly the result of good care from infancy. It is a process that should start from the early stages of life because healthy children become healthy adults. To ensure good health for mother and baby there is the need for good care during pregnancy. This can be achieved through antenatal care.

Antenatal care can be defined as the systemic medical supervision of women during pregnancy (Haldipur Sheila, 2006). Its main aim is to preserve the physiological aspect of pregnancy and labour and to prevent or detect, as early as possible, all that is pathological. Antenatal care coverage is an indicator of access and use of health care during pregnancy. It is defined as percentage of women who used antenatal care provided by skilled health personnel for reasons related to pregnancy at least once during pregnancy, as a percentage of live births in a given time period (World Health Organization, WHO, 2008).

The World Health Organisation (WHO) made the effort to take antenatal care guideline to the evidence-based medicine level. Inspite of the fact that evidence regarding some specific aspects of antenatal care have not been completely developed, antenatal care as a whole has proved to be of key importance in reducing maternal and child mortality (Ortiz, 2007).

Preventing problems for mothers and babies depend on an operational continuum of care with accessible, high quality care before and during pregnancy, childbirth and postnatal period. Of course, the support in terms of facilities at the reach of pregnant women, particularly when complications occur is also important. However, an important element in this continuum of care is effective antenatal care (Ornella, L., Seipati, M.A., Gomez, P., & Munjaja, S., n.d). The goal of antenatal care package is to prepare for birth and parenthood as well as prevent, detect, alleviate or manage problems that affect mothers and babies during pregnancy.

According to World Health Organisation (WHO) essential interventions can be provided over four visits at specified intervals for women with no underlying medical problems. This had led to defining a new model of antenatal care based on four goal-oriented visits, what is now called focused antenatal care. The first visit should be made immediately signs of pregnancy are detected or between 8-12 weeks of pregnancy. On this visit, the pregnancy will be confirmed and the woman is classified for basic antenatal care (i.e., four visits or more) depending on whether the pregnancy is classified as complicated or not. In addition, the woman is screened, treated and given preventive measures. Advice and counseling are also given and birth and emergency plan developed for her. The second

visit is scheduled between 24-26 weeks. At this visit, maternal and foetal well-being is assessed and the birth and emergency plan reviewed or modified. The third and the fourth visits come in 32 weeks and between 36-38 weeks respectively, where maternal and foetal well-being is assessed and birth and emergency plan reviewed.

The Ghana Health Service however, has recommended a number of antenatal visits for a pregnant woman. That is, monthly visit up to the 28th week of pregnancy followed by bi-weekly visits up to the 36th week of pregnancy. Then after, weekly visits follow until delivery. For women to enjoy the full benefit of the package of services delivered under antenatal care, it is essential that services are initiated early in pregnancy and adequate number of visits made.

Antenatal care is commonly understood to have beneficial impact on pregnancy and birth outcomes through early diagnosis and treatment of complications as well as promoting the health of the pregnant woman through nutrition. Antenatal care services also create the opportunity for service providers to establish contact with the woman to identify and manage current and potential risks and problems during pregnancy. It also creates the opportunity for the woman and her care providers to establish a delivery plan based on her needs, resources and circumstances. In Africa, about 25 percent of maternal deaths occur during pregnancy. Though this could be as a result of prevalence of unsafe abortion, violence and disease in the area (i.e., specific country), between a third and half of maternal deaths are due to causes such as hypertension and antepartum haemorrhage, which are directly related to inadequate care during pregnancy (Ornella et al). Other essential interventions in antenatal care include identification and management of obstetric

complications such as pre-eclampsia, tetanus identification and management of infections such as HIV, syphilis and other sexually transmitted infections (STIs), and now included intermittent preventive treatment for malaria during pregnancy (IPTp). Antenatal care also gives the opportunity to promote the use of skilled attendance at birth and healthy behaviour such as breastfeeding, early postnatal care, and planning for optimal pregnancy spacing.

Studies have shown positive relationship between antenatal care and pregnancy outcome (Bhardwaj, Hasan and Zaheer1994; Ekwempu, 1988; Marcela, 2007; Yousif & Hafeez, 2006). For example, the mortality rate for unbooked women (i.e. those women not registered for antenatal care) was found to be 24 per 1000 live-births whilst it was only 1 per 1000 live-births for booked women. In a study conducted by World Health Organisation in South –East Asia (Burma, Indonesia, Thailand and India) it was found that with no antenatal care, perinatal and neonatal mortality rate was 97 per 1000 live-births whereas it was only 5 per 1000 live-birth after full antenatal care (Ekwempu, 1988). Bhardwaj et al, (1994) also found that perinatal mortality rate was zero per 1000 live-births for women with high maternal care receptivity as compared to 90.9 per 1000 live-births for women with poor maternal care receptivity. Yousif et al (2006) concluded that adequacy of antenatal care is strongly and consistently associated with birth outcome. However, its effect differs by mother's risk category. Stillbirths increase as antenatal care, education and income decline.

Literature has shown that a number of variables influence the demand for antenatal care. Grossman (1972) identified education, age and income as factors that influence

demand for health care. Other factors which were considered to have influence on demand for health care, and for that matter antenatal care are cost of antenatal care, occupation, number of children the woman already has, number of household members and access to information, that is, frequency of listening to radio and watching television.

The global coverage of antenatal care was 71 percent. For women in industrialised countries, coverage was more than 95 percent whilst in Sub-Saharan Africa 69 percent of pregnant women had at least one antenatal care visit (Ornella et al). According to Ghana Health Service report 2005, the national antenatal coverage fell from about 97 percent in 2000 to 89 percent in 2004 whilst that of supervisory delivery increased from 50 percent in 2000 to 53 percent in 2004. Also, Ghana Health Service 2006 annual report of Reproductive and Child Health Unit showed that average number of antenatal visits was 3.4 in 2005 and 3.3 in 2006. In addition, there was a fall in the number of women who attended at least four visits from 62 percent in 2005 to about 59 percent in 2006 (GHS, 2006).

Over the years, Ghana has implemented a number of policies and strategies, aimed at achieving improved maternal health. In 1987, the Ghana Safe Motherhood Programme was introduced on pilot basis which later expanded to cover the whole country. The main aim of the programme was to improve women's health in general and especially, to reduce maternal morbidity and to contribute to reducing infant morbidity and mortality. Also, in November 1997, the Ministry of Health completed its Comprehensive National Reproductive Health Service Policy and Standards. The main components of this policy were prevention and management of reproductive tract infection, post abortion care, family

planning and safe motherhood and specific policies about antenatal care (Overbosch et al, 2003).

According to the Ghana National Reproductive Service Protocol (MoH, 1999), the objectives of antenatal care include:

- To promote and maintain the physical, mental and social health of mother and baby by providing information and education on nutrition, rest, sleep and personal hygiene.
- To detect and treat high-risk health conditions arising during pregnancy, whether medical, surgical or obstetric.
- To help prepare the mother to breastfeed successfully, experience a normal recovery after delivery and take good care of the child, psychologically and socially.

The policy document spells out clearly, the routine management of pregnancy and the number of visits to antenatal care services.

Early detection of problems in pregnancy leads to more timely referrals in case of complications. This is particularly important in some remote regions of Ghana, especially Northern, Upper East, Upper West, Central and Volta regions where basic health services are few and present a challenge to the health care delivery system. Women who do not receive antenatal care during pregnancy are at a higher risk of obstetric emergencies and adverse outcomes. However, in an attempt to bring health care close to families in these remote areas, the District Health Management Teams have been empowered to train

traditional birth attendants (TBAs) so that they can recognise danger signs during pregnancy and refer women to health centres. As to whether this system has been effective is a matter of debate.

On the supply side, government, mission and private providers are the main sources of health care in Ghana. According to the Ghana Demographic and Health Survey Report (2003), the majority of women (88 percent) seek antenatal care from a public source. The most preferred sources are government hospitals and clinics which provide 62 percent of women antenatal care. This is followed by government health centres, 25 percent. Only 12 percent of the women received antenatal care from private facilities. However, according to Ghana Health Service Report (2004), there were only three teaching hospitals, nine regional hospitals, ten polyclinics and seventy districts hospitals in 2004. In addition, there were a total of six hundred and ninety-five government and quasi-government health centres and a total of six hundred and ninety-four government and quasi-government clinics and maternity homes. This number of facilities was augmented by mission and private providers. There were twenty-two mission district hospitals, thirty-five mission and private hospitals which were mainly located in the cities and big towns. In addition, there were fifty-seven mission and six private health centres as well as one hundred and sixty-three mission and eight hundred and five private clinics and maternity homes.

In the same year (2004), there were only 1,168 medical officers, 8,141 professional nurses, 401 medical assistants and 5,830 auxiliary nurses. This situation resulted in a relatively high doctor population and nurse population ratios in Ghana. For example, doctor population ratio was 1:20,036 in 2001. This improved to 1:18,274 in 2002, 1:16,751 in

2003 but fell to 1:17, 732 in 2004. That of nurse population ratio was 1:1,728 in 2001, 1:1,675 in 2002, 1:1,649 in 2003 and 1:1,510 in 2004.

Problem Statement

Inspite of the policies and strategies put in place to improve antenatal care coverage and also relative improvement in facilities and health professionals at these facilities, the national coverage of antenatal care continued to be irregular since the year 2000. According to Ghana Health Service Report (2005 & 2009), whilst antenatal coverage had increased for some regions, others recorded irregular coverage as shown in Table 1. For example, Volta, Eastern and Ashanti regions recorded reduction in coverage from the year 2000 to 2005 and 2006. The remaining regions recorded some remarkable increase in coverage. Tables 1 and 2 show antenatal coverage and supervised delivery from 2000 to 2008. However, according to Ghana Health Service Annual Report 2009, there has been significant improvement in national coverage from 88.4 percent in 2006 to 97.4 percent in 2008.

Table 1: Antenatal Coverage by Region.

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Western	99.6	77.0	96.8	93.5	94.7	91.0	93.0	91.7	98.8
Central	101.7	97.9	103.0	102.8	107.7	105	105.5	108.8	115.5
Greater Accra	86.5	85.4	88.9	81.0	77.7	84.0	70.0	77.2	85.2
Volta	90.2	92.3	89.4	86.3	86.1	84.0	84.0	87.4	93.4
Eastern	120.7	118.7	107.8	94.6	81.4	82.0	85.0	87.2	98.2
Ashanti	90.0	86.9	81.3	83.6	79.0	77.0	75.2	76.1	86.1
Brong Ahafo	96.3	99.9	99.7	97.1	90.0	90.0	98.0	101.8	102.1
Northern	96.2	98.4	97.2	102.7	110.4	117.0	107.0	116.8	127.7
Upper E	96.0	101.0	98.6	100.2	102.0	96.0	103.5	111.7	102.1
Upper W	93.2	87.5	87.5	88.7	94.7	85.0	90.0	96.3	93.5
National	96.5	93.6	93.7	91.2	89.2	88.9	88.0	91.1	97.8

Source: RCH/PHD-GHS, Annual Report 2005, Page 30 Table 8.1; 2007, Page 40, Figure 14; 2006, Page 60, Annexes Table 24.

Table 2: Supervised Delivery by Region.

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Western	49.0	48.5	46.6	47.6	46.2	26.0	35.0	17.6	39.1
Central	37.3	36.0	66.6	67.1	76.3	54.0	74.0	22.3	56.3
Greater Accra	50.2	51.0	54.6	49.4	46.2	45.0	62.0	43.1	50.3
Volta	38.5	40.1	40.1	49.0	39.7	36.3	36.2	33.3	37.3
Eastern	54.3	57.1	55.0	50.6	47.2	39.0	40.0	43.1	48.0
Ashanti	56.6	54.1	55.7	56.2	56.2	43.0	40.2	26.7	35.0
Brong Ahafo	62.6	55.5	58.2	56.0	57.8	50.3	46.0	34.5	49.8
Northern	41.9	40.8	41.3	39.2	48.2	30.0	26.0	27.7	26.0
Upper East	42.0	42.2	42.5	44.9	71.2	40.5	39.9	40.4	43.5
Upper West	67.7	64.0	67.5	67.4	71.2	28.0	27.5	32.9	40.6
National	50.2	49.3	52.6	52.1	53.4	40.0	45.0	32.1	42.2

Source: RCH/PHD-GHS, Annual Report 2005, Page 30 Table 8.2; 2007, Page 43, Figure 17; 2009, Page 60 Annexes Table 24

Healthy adulthood is a process starting from childhood and therefore, there is the need to achieve safe motherhood to ensure good health of mother and baby. Despite the education on the importance of prenatal care, there has been a fall in antenatal coverage from 97 percent in 2000 to 88 percent in 2006. However, there has been a fall in institutional maternal mortality ratio from 197 per 100,000 live births in 2005 to 187 per 100,000 live births in 2006 (GHS, 2006). Some women may consider pregnancy as a

natural process and women with some experience might consider antenatal care less necessary. Empirical evidence shows that a higher number of previous pregnancies are associated with less use of antenatal care (Overbosch et al, 2003).

But antenatal care is thought to have an impact on the reduction of maternal and perinatal mortality, if women have access to services and the quality of these services are sufficient to control the identified risks (Costa, A. M., Guilhem, D. & Water, M. I. M. T., 2005).

If antenatal care is thought to have a positive impact on perinatal mortality and therefore saves lives of mother and child then antenatal coverage should have been seen to be rising and not falling as shown in the Table 1. What then could influence a pregnant woman to attend or not to attend antenatal visit? How can the multiple programmes that rely on antenatal care, that is, malaria, HIV/AIDS, tetanus elimination and control of other sexually transmitted infections be integrated into antenatal care and be strengthened to ensure quality of life? This is what this study aims at investigating.

Objectives

The main objective of the study is to find the determinants of demand for antenatal care in Ghana. Specific objectives are to

- estimate determinants of demand for antenatal care in Ghana.
- estimate factors that influences the choice of health care facility by pregnant women.
- recommend policy implications to the appropriate authorities.

Hypotheses

The following hypotheses will be tested:

- Demand for antenatal care is not determined by the wealth of household.
- Demand for antenatal care is not determined by distance covered to the nearest health centre.
- Demand for antenatal care is not determined by the level of education of the woman.
- Demand for antenatal care is not determined by the area of residence (urban/rural) of the woman.

Scope of the Study

This study whose objective is to estimate determinants of demand for antenatal care in Ghana is a large scale study. The study will use data from Ghana Demographic and Household Survey (GDHS), 2003. The study covers a sample of about 2777 women who have admitted attending antenatal care within the last five years preceding the survey. The sample is also representative of rural and urban areas of Ghana and covers all the ten regions. It captures women from varied social, cultural and economic backgrounds. In addition, the study will review relevant theoretical and empirical literature relating to the topic, as well as literature on demand and supply side of the health care system in Ghana, particularly, those pertaining to maternal or antenatal care. Finally, the study will be conducted within the context of neo-classical utility maximisation theory and multinomial logistic regression will be employed for data analysis.

Significance of the Study

This study will add to existing literature on this subject matter, demand for antenatal care in Ghana, since little literature on this subject matter exists. Also, a related literature (Overbosch et al 2003), used Ghana Living Standard Survey (GLSS) data and concentrated on economic variables. This study will use Demographic and Health Survey (DHS) data and will include variables on economic, social and personal characteristics.

Not only will this study add to literature but also it will be useful in policy-making in the area of maternal and child health care in Ghana. To this effect, the Ministry of Health (MOH) and Ghana Health Service (GHS) will find this study useful in evaluating and enhancing the various maternal and child health policies in Ghana.

This study will also serve as a useful guide for planning and more efficient allocation of health care resources and personnel across the country by the MOH and GHS. That is, the result of this study can guide the government to assess the health needs of pregnant women living at different geographical locations in Ghana. This will help distribute scarce resources efficiently to serve the need of pregnant women in Ghana.

Organisation of the Study

Chapter one of this study is the background or introduction to the study. Chapter two discussed related literature whilst chapter three is devoted to the methodology. Chapter four was devoted to their estimation and discussion of the results. The summary and conclusion are contained in chapter five.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter is divided into four main sections. Section one discusses the supply side of health care and antenatal care in Ghana. Section two discusses the demand side whilst section three reviewed the theoretical literature on demand for health. Section four is devoted to reviewing of some empirical literature.

Ghana Health Care System

In Ghana, the Ministry of Health leads the health sector. It is responsible for the policy development, planning, donor coordination and resource mobilisation. There are public, private (i.e. private-for-profit providers, a coalition of non-governmental (NGOs) providers and the Christian Health Association of Ghana (CHAG) and informal sector health care providers. The Ghana Health Service (GHS), the largest agency of the ministry, is responsible for service delivery and is organised at five levels: national, regional, district, sub-district and community. Under the current decentralised system, there are also three autonomous teaching hospitals. These are Korle–Bu Teaching Hospital, Komfo Anokye Teaching Hospital and 37 Military Hospital.

The Ghana health system is partnered by a number of multilateral agencies. Among them are the World Bank, which supports the Ghana AIDS Response Project and water and

sanitation initiatives, the African Development Bank which also supports infrastructure development and capacity building, the Global Fund to fight AIDS, Tuberculosis and malaria (GFATM).

United Nations Agencies such as UNAIDS, United Nations Development Programme (UNDP),United Nation's Population Fund (UNFPA), United Nation's Children Fund (UNICEF), World Food Programme (WFP) and World Health Organisation (WHO) also provide technical assistance for programmes implementation. Not only these, but also, Ghana enjoys bilateral partnership with other countries, resulting in immense support for the health system in the areas of information management, safe motherhood, reproductive health, sexually transmitted infections (STIs) and HIV/AIDS control, strengthening blood transfusion service, polio eradication and capacity building. Some of the countries involved are Canada, Denmark, the European Union, France, Germany, Japan, the United Kingdom, the United States of America and the Northern Ireland.

Public Sector Providers

At the national level, the Ministry of Health is headed by the Minister and directors responsible for policy development and monitoring. They deal with human resource, planning, monitoring and evaluation, and technical advisory services.

There are eight directorates at the national level. These include:

- Public Health Directorate (PHD);
- Institutional Care Directorate (ICD);
- Policy, Planning, Monitoring and Evaluation (PPMED);

- Health Administration and Support Service (HASS);
- Supplier, Stores and Drugs Management (SSDM);
- Human Resource Development (HRD);
- Finance Directorate (FD);
- Internal Audit (IA).

The Reproduction and Child Health Division is directly under the Public health Directorate. The Public Health Directorate also has six divisions, namely: Reproduction and Child Health, Expanded Programme on Immunisation, Nutrition, Health Information, Health Promotion and Epidemiology Surveillance. Figure 1 is an organogram which shows how Reproduction and Child Health (RCH) Department fits into the Ghana Health Care System. Under the RCH, we have the Family Planning Unit, Maternal Health Unit which includes Antenatal Care and Child Health Unit. Figure 1 is only part of the complex organogram of Ministry of Health.

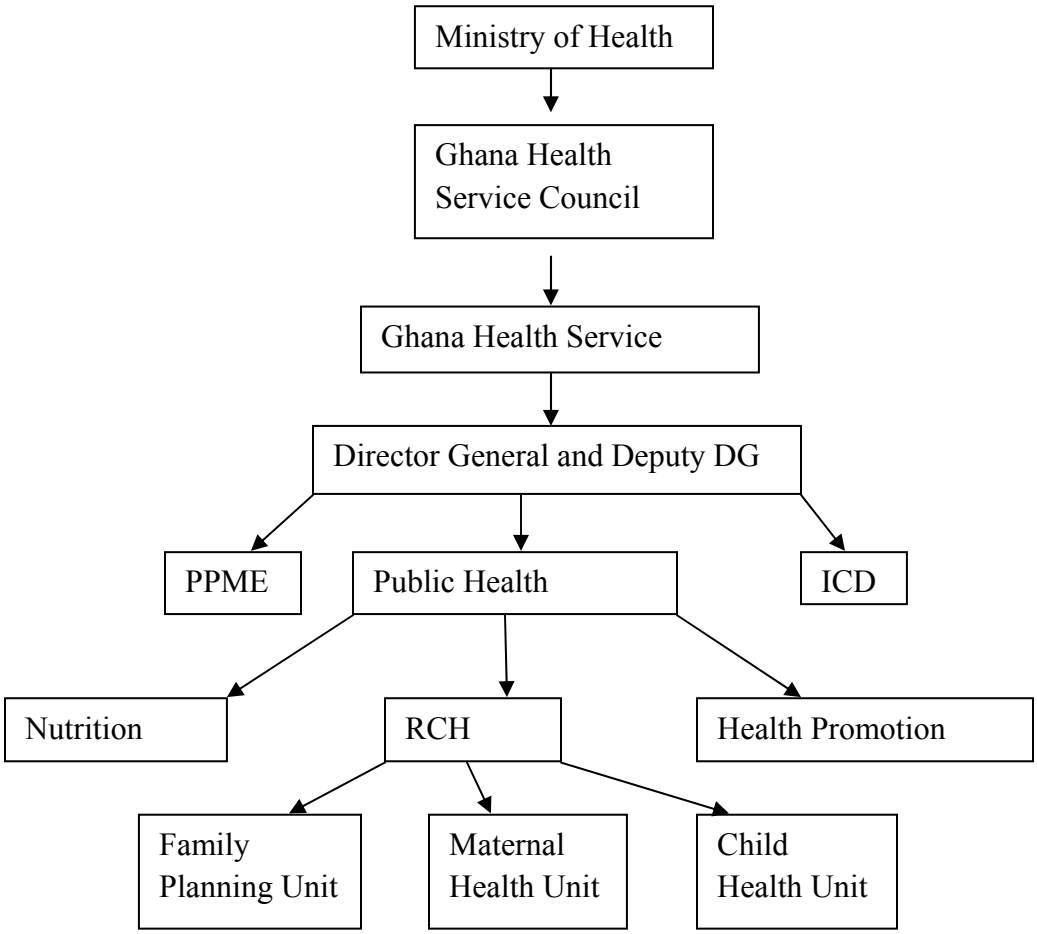

Figure 1: Organogram Relating RCH to the Ghana Health Care System

In the pubic sector, the recruitment and employment of health workers takes place at the national level. That is, the central office assigns staff to the other levels, that is, regional and district levels. The regional level consists of:

1. A regional health administration, responsible for management and provision of logistical support to the entire political/administrative region;

2. The regional hospital which serves as a referral centre for district hospitals and provides clinical specialist services.

3. The regional public health services which include epidemic response units, reference laboratories and various other services.

There are a number of government health facilities located in various regions and districts. At least there is one Regional Referral Hospital in each region. Also there are at least one other hospital in each region except Brong-Ahafo, Upper West and Upper East. Whereas there are seven polyclinics in Greater Accra, two in the Western Region and one in the Volta Region, the other regions have none. However, each region has a number of health centres and clinics/maternity homes. In total, there are about 1,444 government health facilities by 2004. The distribution of government health facilities in the country is shown on Table 3.

Table 3: Government Health Facilities

Region	Teaching Hosp.	Regional Hospital	Other Hosp.	District Hosp.	Poly-Clinics	Health Centres	Clinics/Mat Homes	Total
Western	0	1	1	9	2	54	69	136
Central	0	1	1	8	0	44	56	110
Gt/Accra	2	1	6	2	7	35	20	73
Volta	0	1	1	10	1	199	65	277
Eastern	0	1	3	9	0	58	158	229
Ashanti	1	0	7	15	0	96	53	172
B.A	0	1	0	5	0	36	96	138
Northern	0	1	2	5	0	95	31	134
Upper/E	0	1	0	4	0	25	74	104
Upper/W	0	1	0	3	0	50	18	72
Total	3	9	21	70	10	692	640	1,445

Source: CHIM/PPME - GHS Annual Report, 2005, Page 12, Table 4.1

Over the period between 2001 and 2008, the doctor-population ratio remained irregular in some regions. For example, the doctor-population ratio for Northern Region in 2001 was 1:58,493. This declined continually to 1:81,338 in 2004, though it improved in 2006 to 1:67,154, it worsened again to 1: 68,817 in 2008. Apart from Ashanti Region which recorded consistent improvement in doctor-population ratio between 2001 and 2008, the rest of the regions recorded irregular figures over the period. However, the national figure improved consistently from 1:20,036 in 2001 to 1: 12, 713 in 2008. The situation is shown in Table 4.

On nurse to population ratio, even though the national figures improved over the period, regional figures fluctuated between 2001 and 2004. For example, the nurse to population ratio for Eastern Region improved from 1:1,211 in 2001 to 1:1,148 in 2002 and to 1:1,203 in 2004. Though it worsened in 2006, it improved significantly in 2008 to 1:759. There has been improvement in national figures since 2001. Though the ratio worsened in 2006 as compared with 2004, it improved remarkably from 1:1537 in 2006 to 1:1,079 in 2008. The regional distribution is shown in Table 5.

Table 4: Doctor to Population Ratio, Between 2001 and 2008

Region	2001	2002	2004	2006	2008
Western	31,526	33,060	37,638	32,746	31,745
Central	34,623	37,761	35,347	31,675	26,140
Gt./Accra	8,288	7,469	6,530	5,624	4,959
Volta	37,875	30,876	35,986	25,430	27,959
Eastern	25,132	24,068	29,305	22,019	17,571
Ashanti	15,501	13,698	13,237	11,681	9,537
B.A	37,216	28,467	35,783	25,365	21,475
Northern	58,493	68,721	81,338	67,154	68,817
Upper/E	32,076	13,348	33,146	28,897	33,475
Upper/W	45,107	54,214	68,534	45,568	43,988
National	20,036	18,274	17,733	14,732	12,713

Source: CHIM/HRD - GHS Annual Report, (2005/2009, Page 19/37, Table 4.4/13)

Table 5: Nurse to Population Ratio between 2001 and 2008

Region	2001	2002	2004	2006	2008
Western	2,180	2,153	2,241	2,368	1,413
Central	1,655	1,743	1,573	1,577	895
Gt/Accra	1,280	1,049	969	993	881
Volta	1,500	1,530	1,232	1,302	892
Eastern	1,211	1,148	1,203	1,251	759
Ashanti	2,242	2,767	2,121	2,136	1,336
B.A	3,149	2,375	2,034	2,036	1,140
Northern	2,509	2,293	2,079	2,126	1,534
Upper/E	1,427	1,888	1,395	1,298	956
UpperW	1,303	1,277	1,368	1,315	870
National	1,728	1,675	1,510	1,537	1,079

Source: CHIM/HRD - GHS Annual Report,(2005/2009, Page 19/37 Table 4.5/14)

Sexual and Reproductive Health

One of the important units under Ghana Health Service whose role should be acknowledged, as far as this study is concerned is the Reproductive and Child Health Unit. This unit is responsible for reproductive and child health care in Ghana. The vision of the unit is to contribute to improvement in the health and quality of life of persons of reproductive age as well as children by providing high quality reproductive and child health services.

Ghana was among the first African countries to formulate a comprehensive population and family planning policy. This was adopted in 1994 at International Conference on Population and Development (ICPD) Programme of Action in Cairo, Egypt.

In the late 1980s government and donors showed much commitment to improving safe motherhood services. The maternal and child health programme was expanded. In 1994, United Nations Children Fund (UNICEF) supported development of the clinical management protocol on safe motherhood (MoH, 1999).

A Comprehensive Reproductive Health Policy and Standards document was finalised and implemented in 2003. It covers the entire spectrum of reproductive health, including maternal death audits, screening for reproductive cancers, and prevention and management of unsafe abortion, and acknowledges the need to address gender-based violence and female genital mutilation (MoH, 2006).

Reproductive and Child Health Care is a constellation of preventive, curative, promotional and rehabilitative services for improving the health and well-being of the population, especially women and children (GHS, 2006).

The components of the Reproductive Health Programme include:

- Safe Motherhood, including antenatal care, safe delivery and postnatal care especially breastfeeding, prevention of mother to child transmission of HIV (PMTCT), infant health and women's health;
- Family planning/ Gender based violence and reproductive health.

- Prevention and management of unsafe abortion and post-abortion care, Reproductive Tract Infections (RTI), including Sexually Transmitted Infections (STI), HIV/AIDS.
- Prevention and management of infertility/ Responding to concerns about menopause;
- Management of cancer of the reproductive system, including cervical, breast, testicular and prostatic cancers;
- Prevention and management of harmful traditional practices that affect the reproductive health of men and women such as female genital mutilation;
- Information and counselling on human sexuality, responsible sexual behaviour, responsible parenthood, pre-conceptional care and sexual health;

However, HIV/AIDS has been a threat to quality health care delivery in Ghana as far as reproductive health is concerned. The National AIDS Policy has remained in the draft since 1996. Whilst HIV surveillance sites are functioning, that of other sexually transmitted infections (STIs) is not. Reproductive and Child Health Unit of Ministry of Health and National AIDS Control Programme fail to report STIs. However, in the late 1990s family planning and antenatal staff were trained in what is termed "Syndromic Management" of STIs. This captures only diagnosis and treatment based on observable symptoms, but not laboratory tests. Nevertheless, a high-profile commitment has been made to provide voluntary counselling and testing (VCT) and antiretroviral drugs (ARVs). The year 2001 saw the establishment of National AIDS Commission (i.e., Ghana AIDS

Commission). In December 2003, the government received money from the Global Fund to Fight AIDS, Tuberculosis and Malaria to provide ARVs in the three major cities of Accra, Kumasi and Sekondi-Takoradi.

Another challenge facing reproductive health delivery in Ghana is the problem of unsafe abortion and adolescent use of contraceptives. Ghana generally remains a relatively conservative country where discussion of sexual issues, abortion and adolescent use of contraceptives are still regarded as taboo. There is an adolescent reproductive health policy in place but many organizations emphasize abstinence until marriage. Though about 22 percent to 27 percent of young people want to use family planning they do not have access to contraceptive services. Also, the number of teen-friendly clinics providing these services is limited, especially outside the main cities. Research conducted by USAID- Ghana in 2001 linked unsafe abortion to high maternal mortality rates.

Abortion is legal only for certain clearly defined conditions such as rape and risk of mother's life, when it is performed at registered clinic by qualified practitioners. The law on abortion, however, has been misconstrued to be prohibitive. This makes the availability of safe abortion limited to the public. Unsafe abortion therefore remains widespread, particularly among the adolescent.

Bringing Health Care Closer to the People

In order to make health care services more accessible, the Ghana Health Service (GHS) initiated the Community-based Health Planning and Services (CHPS) programme. This initiative is a programme designed to translate innovations from an experimental study

of the Navrongo Health Research Centre (NHRS) into a national programme for improving accessibility, efficiency and quality of health and family planning services. With the introduction of CHPS, the Navrongo experiment became the operational model for health care development in Ghana (Nyonator, F. K., Awoonor-Williams, J. K., Jones, T. C., Phillips, J. F. & Miller, R. A., 2003).

The Navrongo experiment co-ordinated health-service delivery with traditional leaders, enabling health professionals to recruit, train and deploy community-accountable volunteers and enabling traditional leaders to monitor and support all community health service operations (Nyonator et al, 2003). This was based on the fact that the health service system in Ghana ignored the important role of the traditional social institution in organising village life. The Navrongo experiment was therefore based on the hypothesis that mobilising the traditional system of leadership, communication and governance can develop health care service accessibility and accountability and reduce mortality and fertility.

The experiment had made an impact on health care delivery in villages. It was observed that a single nurse well equipped with motorbike and relocated to a village health centre could outperform an entire sub-district health centre, increasing immunisation and antenatal and family planning coverage.

In 1998, the Ghana Health Service (GHS) convened a national managers' conference to deliberate on the implications of the Navrongo model for national policy and action and also to review a draft statement declaring the Navrongo system as the national model for community-based health care. In 1999, the Ghana Health Service National

Health Forum was convened to discuss a draft policy statement intended to legitimise the change process and sustain CHPS activity over time.

Ghana Community–based Health Planning and Services initiative cancelled out various vertical programmes and established mechanisms for the decentralised administration of health care. In order to ensure ease of transition from facility-focused and component-focused health care to integrated community-based health services, the CHPS initiative was divided into three arms:

- A research arm that provides evidence for guiding the process;
- An arm that provides, resource and mechanisms for communicating the process and priority for operational change; and
- An arm comprising information mechanism for spreading innovation and change between and within districts.

The implementation of CHPS involves six stages of organizational change (Nyonator et al, 2003):

- Preliminary planning: This involves delineating zone boundaries, assessing manpower requirements and capacities, equipment and training requirements and scheduling nurses' visits to each household in every zone.
- Community entry: This also involves developing leadership and initial participation in the programme through dialogue with community leaders and residents.

- Creating community health compounds: That is facility that provides a room for the community health officer's living area and another for clinic.

- Procuring essential equipment: CHPS requires clinical equipment for primary-health-care service delivery and transportation equipment such as bicycles and motorbikes.

- Posting community health officers to the compounds: This is the most crucial stage of the CHPS process. The officer's services include providing clinical sessions at the compound, making household visits to provide family planning services, health education and ambulatory care. He/she also implements outreach clinics for childhood immunisation.

- Deploying volunteers: Depending on community needs, volunteers are recruited, trained for six weeks in community health mobilisation, especially promoting family planning and reproductive health.

Some progress has been made in implementation of CHPS as various districts and zones are at the various stages of implementation but have not yet achieved 100% coverage. CHPS has been implemented in all regions, except Upper West Region. In addition, the number of functional CHPS zones increased to 409 in 2008 (GHS, 2009).

In view of this, national guideline has been put in place for implementation of the CHPS programme in two lead districts in each region. Each region in turn initiates the programme in two sub-districts that in turn, have two implementation zones. This approach, termed as "2 by 2 by 2" approach was intended to focus the attention on

regional teams on capacity building for training, management, monitoring and implementation before large-scale programme is undertaken.

However, CHPS is faced with resource constraints and leadership problems that often prevent the spread of the programme from lead districts to other districts. There is also the problem of high turnover of community health officers.

Some Reforms in the Health Sector

Health sector reform can be described as sustained purposeful change to improve the performance of the health sector. It is an inherently political process, initiated by public or political action, motivated by dissatisfaction caused by the failure to deliver outcomes deemed important by society and implemented on a sector wide level (Krasovec, K. & Shaw, P. K., 2000).

Among the most common reasons for undertaking health sector reform are to address the problems of:

- Poor quality of health care;
- Inequities and limited access to health service:
- Insufficient funding for health ;
- Inefficiencies in delivery of services;
- Lack of accountability; and
- Insufficient responsiveness to client needs.

One of the major reforms in the Ghana health sector was the introduction of the user fees or what was popularly known as "cash and carry". The "cash and carry" system was initiated in 1985 in response to the Structural Adjustment Programme (SAP) laid out by the International Monetary Fund (IMF). In the early 1980s Ghana's economy faced the most difficult time. All major economic indicators recorded downward trend (Modern Ghana.com). In an attempt to salvage the situation, the government agreed to the conditions mandated for loan from the IMF. Structural Adjustment Progammes are specific guidelines which developing nations were required to follow in exchange for loans (Singleton, 2006). Since Ghana's economic situation worsened by day, the then government had to apply for the IMF loans and subsequently adhere to the conditionality (Modern Ghana.com).

The key components of SAPs were deregulation of markets and the reduction of government costs by way of decreasing government employment and cutting social programmes such as health care. The result in terms of health care was the infamous "cash and carry" which made patients to pay for health care upfront. Later when the consequences became clear, certain exemptions were made. Parts of the exemption policy implemented in 1997 included waiver on services for children under five years of age, women seeking antenatal care, the elderly over 75 years old and victims of snakebites.

The user fees or the "cash and carry" system although increases health care prices may not reduce the total demand for health care. The price increase may have an income-depressing effect, reducing the consumption of other goods through the

diversion of resources. The proponents of the user fees cited cost recovery as an argument for its introduction. But difficulties in predicting health care needs, coupled with the irregular and seasonal character of rural incomes are strong arguments against continuation of user fees in low-income countries like Ghana (Arhin-Tenkorang, 2001).

In the early 1990s Ghana took a number of steps to restructure its health sector. These included developing a basic minimum package of services, refocusing the emphasis on primary health care including reproductive health, decentralising greater management and financial responsibility to districts, de-linking of health service delivery from the civil service and reviewing the Ministry of Health's organisational structure to reflect a shift from vertical system to a more functional horizontal system (Dovlo).

In 1995, Ghana's Vision 2020 policy document was unveiled. This was aimed at taking Ghana into a middle income status by the year 2020. Within this document, the health sector produced a five year medium term health policy and strategies. The main objectives outlined in this document include:

- Efficient utilisation of all resources allocated to health;
- Access and equity in health care delivery;
- Improve the standards and quality of services and personnel who deliver them;
- Increasing the empowerment of people and their communities;

- Development of new and improved organisational and institutional arrangements including increased decentralised authority for health service delivery to an executing agency outside the civil service.

A detailed programme of work was produced in 1996. This was aimed at implementing the medium term health strategy. An important component of this strategic framework and programme of work was the development of human resource management strategies. The medium term programme of work has proposed a shift in the proportion of non-wage recurrent budget in favour of district level services, from 23 percent in 1996 to 42 percent in 2001.

In October 1996, the Ghana Health Service and Teaching Hospital Act (Act No.525) was passed by parliament. This Act has given greater autonomy to the teaching hospitals with independent decision making boards. Ghana Health Service, however, was to perform services at primary and basic referral levels. The Act also removed public sector employees from the civil service and offers new conditions of employment (Dovlo, 2005).

Growth and Poverty Reduction Strategies I and II (GPRS I & II)

The GPRS is a comprehensive development policy framework aimed at poverty reduction and growth. The policy framework cut across all sectors of the economy. Under the health sector, programmes were outlined to ensure a balance in health care provision. The aim was to reduce under-five and maternal mortality and child malnutrition. The GPRS highlighted three priority interventions that were to be planned for 2002 – 2006

Programme of work of the Ministry of Health. This was entitled "Partnership for Health – Bridging the Inequality Gap" (GPRS I Document, 2003). The three priority areas are

- Bridging equity gaps in access to quality health service. Under this resource allocation and facility distribution were to target the poor group and geographical areas. It also included redistribution of health workers in favour of deprived areas as well as provision of outreach services and clinics in deprived rural and peri-urban areas, especially in the northern Ghana.

- Ensuring sustainable financing arrangements that protect the poor. Under this priority area, cash and carry system was to be replaced with a more humane and effective system of financing health care. As a measure of protecting the poor, there was to be improvement of the exemption policy to ensure coverage of obstetric emergencies and life-threatening pregnancy related conditions, mortality due to childhood diseases and reaching the poor elderly citizens. Government was also to increase its share budget to providers of basic services for the poor at the district and community levels. In addition, government was to formulate institutional, legal and financial framework for effective partnership with not-for-profit and private providers. To further protect the poor in deprived areas, a low fee was to be fixed for out-patient and in-patients at the sub-district and district levels in the Central and the three Northern regions.

- Enhancing efficiency in service delivery. GPRS I was to standardise quality of basic health care to ensure that one has access to good quality health care, no matter one's location in the country. Strategies to be implemented to achieve this include

provision of financial incentives, accommodation, opportunities for career development for health workers as well as expanding enrolment in training institutions in deprived regions (GPRS I, 2003).

GPRS I contained policy framework that was directed primarily towards attainment of anti-poverty objectives of the UN's Millennium Development Goals (MDGs). GPRS II (2006 – 2009) was intended to shift strategic focus; though programmes under GPRS I would be implemented. The main goal of GPRS II was to accelerate the growth of the economy to achieve middle-income status within a measurable planning period (GPRS II Document, 2005)

Health Care Financing and Donor Assistance

Following from the problems that emanated from the cash and carry system, it became necessary to find a better means of financing health care in Ghana. In the 1990s mutual health insurance scheme was started on pilot bases in some districts. In 2003, the National Health Insurance Bill was passed into law by parliament and started operation in March 2005. The main aim of the insurance scheme is to provide basic health care coverage for all Ghanaians, regardless of their ability to pay (Singleton, 2006).

The scheme gave rise to three types of health insurance schemes of which every Ghanaian citizen is required to join any one of them. There are district mutual health insurance schemes, private commercial health insurance schemes and private mutual health insurance schemes. Each of these schemes is required to provide basic health care benefits as determined by the National Health Insurance Council.

The initial focal points of the insurance bill are the district mutual health insurance schemes. Currently, all the 138 districts and the newly created ones are covered. The National Health Insurance Council oversees regulation of the health insurance schemes. It is responsible for registering, licensing and supervision of the schemes and management of the funds. However, each scheme has its own governing body which is responsible for the management of everyday operations and is answerable to the Council.

A minimum premium of between GHc 7.00 and GHc 18.00 per year is set for those in the informal sector. However, people below 18 years and above 70 years who are citizens are exempted from premium payment. The entire household must enrol. The benefit package covers 95% of disease burden in Ghana.

The schemes also receive subsidies from the National Health Insurance Fund, funded by 2.5 percent value added tax (VAT) and 2.5 percent of every formal sector worker's contribution to the Social Security and National Insurance Trust Fund (SSNIT Fund). Other sources are money allocated to the fund, as approved by parliament, money accrued from investments and grants, donations, gifts and other voluntary contributions (Singleton, 2006).

Although the national health insurance is aimed at making adequate resources available to the health care system, the health sector still relies on donor sources to complement domestic resources. Data have indicated that 48 percent of Ministry of Health income is from donors. Local NGOs working in sexual and reproductive health receive virtually all their funds from international donors. USAID and UNFPA have supported

family planning and related activities since 1970s, while UNICEF has supported safe motherhood.

Ghana's dependence on donors and NGOs cannot be over emphasised since officials consider donors as providing "sustainability" to health programmes through their funding. It should be noted that donor assistance in Ghana has changed greatly over the past decade following the introduction of the sector-wide approach (SWAp). The SWAp was introduced in the 1990s to direct all donor funds into a common basket for the government or the Ministry of Health to decide on how these funds will be allocated in order to achieve equity and accessibility by all health programmes. A further possibility is full budget support, in which donor monies go directly to the treasury for disbursement to different sector ministries. Prior to the introduction of the SWAp, donor funds were channelled to specific or earmarked programmes. This resulted in some health care programmes receiving more funding than the others.

However, sexual and reproductive health donors are reluctant to pool their funding under the SWAp because the SWAp eliminates specialised programmes, such as sexual and reproductive health, that require technical knowledge (e.g. capacity to monitor the quality of services such as emergency obstetric care, sterilisation or safe abortion). This threatens the delivery of quality services. Also, there was no assurance that funds that are allocated to a particular sector would be distributed evenly. In addition, some donors preferred to make direct or earmark contributions to ensure that their programmes of interest are well funded (Akitobi Esther, Leahy Elizabeth & Nerquaye-Tetteh Joan, 2009). After ten years of the

SWAp, it is being replaced by Multi-Donor Budgetary Support (MDBS) though the donors are the same that supported the health sector.

MDBS system transfers all donor-funding into a single pool under the Ministry of Finance, from which allocations to all sectors are determined based on national prioritisation. With the shift to MDBS, all links between donors and individual sectors are diminishing. The main underlying principle for the switch to MDBS is to consolidate funding to support the Growth and Poverty Reduction Strategy (GPRS). With donors contributing to the same pool, government would be in a better position to manage these funds and improve on coordination among donors to ensure the implementation of GPRS (Akitobi et al, 2009).

The Private Sector Providers

The private sector health providers are composed of non-governmental organisations (NGOs), faith-based providers, that is Christian Health Association of Ghana (CHAG) and private for-profit providers. It is noted that more and more local and foreign NGOs are being established and virtually all are completely funded by international agencies, to partner the government in health care delivery.

Local NGOs and Christian Health Association of Ghana (CHAG) provide key sexual and reproductive health services, the largest partners with government and are incorporated into the Ministry of Health's own statistics. For example, the Christian Health Association of Ghana, an umbrella group for church-managed facilities, has a formal Memorandum of Understanding with government to provide health services where

government facilities are limited. It employs about 20 percent to 25 percent of health workers who are paid by government subsidy at the same levels as state employees (Dovlo, 2005). They also provide 30 percent of health care delivery in Ghana. Members of CHAG predominantly focus on the poorest and vulnerable groups and are therefore often located in the most remote areas of the country. According to Ghana Health Service Report (2004), CHAG had 22 district hospitals, 35 other hospitals, 57 health centres and 163 clinics and maternity homes.

Though it is an independent health organisation, Ghana Health Service (GHS) and CHAG institutions are closely linked in rural health provision and are de facto fully integrated in the national health system. For example, the Ghana Health Service's Health Sector Five Year Programme of Work (2002-2006) policies and priorities gave attention to improving partnership and collaboration with other sectors within the health system. These included setting up a desk in the GHS for inter-sectoral collaboration and expansion of the district level planning process to include other health providers. There is no explicit competition between CHAG and GHS. Either a district or sub-district has a CHAG health facility and is substituting for GHS facility (Heyen-Perschon, 2005). CHAG has a number of health facilities spread all over the country and supplement government facilities. Table 6 shows the distribution of mission health facilities. From Table 6, we observe that there are 163 mission clinics and maternity homes throughout the country with Ashanti Region benefiting from 47 clinics and maternity homes and 11 hospitals, followed by Western with 29 clinics and maternity homes.

Private For-Profit Providers

The private for- profit sector has a few sizeable hospitals, mostly located in the urban areas. For example, according to GHS (2005), there were 127 private hospitals of which 58 were located in Greater Accra Region and 41 in Ashanti Region. However, there are a sizeable number (802) of these private clinics and maternity homes operating country-wide. They mainly comprise of individual general practitioners. The distribution of private health facilities in the country is indicated in Table 7.

Table 6: Mission Health Facilities

Region	District Hospital	Other Hospital	Health Centres	Clinics/Mat. Homes	Regional Total
Western	2	3	0	29	34
Central	3	1	0	23	27
Gt./Accra	0	1	2	2	5
Volta	1	7	6	11	25
Eastern	2	3	14	7	26
Ashanti	3	11	2	47	63
Brong-Ahafo	6	4	0	9	19
Northern	3	1	17	19	40
Upper/East	1	0	5	12	18
Upper/West	1	3	12	4	20
Total	22	35	57	163	277

Source: CHIM/PPME - GHS Annual Report, 2005, Page 15 Table 4.1

Table 7: Private Health Facilities

Region	Hospital	Health Centres	Clinics/Maternity Homes	Regional Total
Western	0	0	108	108
Central	7	0	118	125
Gt./Accra	58	0	159	217
Volta	5	0	31	36
Eastern	6	0	119	125
Ashanti	41	0	164	205
Brong-Ahafo	8	0	78	86
Northern	1	1	11	13
Upper East	0	0	10	10
Upper West	1	5	4	10
Total	127	6	802	935

Source: CHIM/PPME - GHS Annual Report, 2005, Page 15 Table 4.1

However, these facilities tend to employ few professionals, that is, between five to ten staff, perhaps to avoid paying huge salaries. A characteristic of some of these providers is that they would rather hire state-employed professionals on a part-time basis, resulting in a significant amount of dual practice between private and public sectors. This situation may eventually have possible effects on performance in the public sector as the public sector workers spend more time moonlighting in the private clinics (Dovlo, 2005).

The role of the private sector in complementing health care delivery in Ghana cannot be over-emphasised as they help in bringing health care services closer to the people.

Examples are the NGOs and CHAG which operate in remote areas of Ghana where government facilities are either non-existing or limited.

The Informal Sector

In addition to the western or formal government sector, the traditional health care sector which includes herbalist and spiritual healers remain an important source of health care for many Ghanaians. The informal sector provides an alternative for the formal sector. This gives opportunity to people to move between different health care sectors in addressing their health problems. Factors such as type of problem, availability of services, beliefs about the aetiology and appropriate management of diseases and the success of treatment determine how and why people resort to care in different sectors (Smith, 2002).

In line with this, Centre for Scientific Research into Herbal Medicine has been established. This is an attempt to modernise and incorporate traditional herbal knowledge and treatment into the formal health sector. Today, there are a number of herbal clinics that are providing general health services to people. They rely solely on herbal medicines for prescriptions to their clients.

Some Challenges Facing Ghana's Health Care System

The Ghana health care system is faced with numerous challenges. Among these are:

- Inadequate health financing and management;
- Lack of planning and management skills of staff at district/ sub-district levels, high attrition/brain drain;

- Insufficient capacity for scaling up priority interventions;
- Strengthening surveillance and laboratory capacity;
- Insufficient access to referral maternity services, inadequately staffed and equipped referral centres and inability to pay referral services;
- Poor distribution, high cost, poor quality and irrational use of medicines by health care providers and consumers;
- Lack of adequate regulation and quality control of traditional medicine practitioners.

Demand for Antenatal Care in Ghana

Safe Motherhood Programme

Safe motherhood is defined as "creating the circumstances within which a woman is enabled to choose whether to become pregnant, and if she does, ensuring that she receives care for prevention and treatment of pregnancy complications, has access to trained birth attendants, has access to emergency obstetric care if she needs it and care after birth, so that she can avoid death or disability from complications of pregnancy and childbirth" (Reproductive and Child Health (RCH) Unit/ Ghana Health Service (GHS), 2006).

The main goal of the safe motherhood programme is to improve upon women's health in general and especially to reduce maternal morbidity and mortality and to contribute to reducing infant morbidity and mortality.

The Ghana Health Service has spelt out clearly, some specific objectives to be achieved under the safe motherhood programme. These include:

- To make child bearing safe for all mothers and to contribute to the improvement in infant health,
- To promote and maintain the physical, mental and social health of mother and baby by providing education on nutrition, family planning, sexually transmitted infections (STIs) prevention, including HIV/AIDS, the danger signs of pregnancy, rest/sleep and personal hygiene,
- To help pregnant mothers to develop birth preparedness and complication readiness plans,
- To detect and treat all complications arising from pregnancy, whether surgical, medical or obstetric,
- To ensure delivery of full term healthy baby with minimal stress or injury to mother and baby,
- To help prepare the mother to breastfeed successfully, experience normal puerperium and take good care of her child physically, psychologically and socially,
- To prevent mother-to-child transmission of HIV/AIDS,
- Prevent and manage unsafe abortion and provide post abortion care services.

Antenatal Care

A key element of the Safe Motherhood Programme is antenatal care. Antenatal care services create a link between service providers and the pregnant mother. This helps to identify and manage existing and potential risks and pregnancy related problems. Antenatal

care is thought to have positive impact on pregnancy outcomes through early diagnosis and treatment of complications and health promotion. For it to be effective antenatal care should be initiated early in the pregnancy and adequate number of visits made for the woman to enjoy the full benefit of antenatal care service packages. According to GHS/RCH, 2006, the current package of services provided include malaria prevention through chemoprophylaxis or Intermittent Preventive Treatment and the use of insecticide treated mosquito bed nets, nutrition education, iron foliate supplement, tetanus immunisation, clinical examination, laboratory investigations, VCT and PMTCT, family planning education, education on breastfeeding and care of the newborn.

Focused Antenatal Care

Under the focused antenatal care, all pregnant women are considered to be at risk and therefore are encouraged to seek early detection and treatment of all complications arising during pregnancy. It also under scores the need for birth preparedness and complication readiness and prevention of malaria in pregnancy and mother- to- child transmission of HIV/AIDS.

In the previous guideline, pregnant women were expected to make thirteen (13) antenatal care visits during pregnancy, but focused antenatal care does not actually specify any number of visits. However, a minimum of four (4) visits has been recommended by the World Health Organisation (WHO) and this prevails in all facilities. The focused antenatal care package has been well accepted by both clients and providers and has been described as comprehensive and individualised (Nyarko, P., Birungi, H., Armar-Klemesu, M., Arhinful, D., Deganus, S., Odoi-Agyarko, H. & Brew, G., 2006).

Antenatal Care Coverage in Ghana, Demand Characteristic of Registrants

The 2003 Ghana Demography and Health Survey (GDHS) indicates that a relatively high percentage of pregnant women received their antenatal care from trained and qualified health professionals. That is doctors, nurses, midwifes and auxiliary midwifes. The report showed that 21 percent of the pregnant mothers received antenatal care from doctors whilst 71 percent received it from nurses and midwifes. Only 1 percent of the pregnant mothers received their antenatal care from traditional birth attendants. However, 6 percent of the women did not receive antenatal care. This is an indication that pregnant mothers have access to professional care givers.

In addition, antenatal care attendance by trained health professionals indicated that older women and women with birth order six and above are less likely to receive antenatal care from trained health professionals. It was also revealed that 98 percent of pregnant mothers in urban areas received antenatal care from trained health professionals whilst 89 percent of their rural counterpart received care from trained health professionals. Similarly, the 2003 GDHS report showed that 34 percent of the pregnant women in the urban areas received antenatal care from doctors but only 14 percent of their rural counterparts received antenatal care from a doctor. This also means that women in urban areas are more likely to attend antenatal care than women in the rural areas. The level of education of the mother and the availability of health care facilities as well as health professionals in the urban areas could be possible explanation to this behaviour. This is because; most of the women living in the urban areas of Ghana are more educated than those in the rural areas. Women in the urban areas may show more understanding of the benefits of antenatal care and will be willing to visit antenatal care facilities during pregnancy than their rural counterparts. In

addition, most of the pregnant mothers in the urban areas might also come from wealthy or relatively high income households and therefore can afford the cost of better antenatal care from health professionals. This may sharply contrast with the situation in the rural areas where mothers are likely to come from relatively poor households and may not be able to afford better antenatal care, especially from qualified health professionals. Notwithstanding this, rural areas lack better health care facilities as well as trained health professionals. This may not motivate pregnant mothers to attend antenatal care.

Regional variations in the use of antenatal care from health professionals were also revealed. For example, whilst about 45percent of pregnant mothers in Greater Accra Region, 28 percent in Ashanti Region, 23 percent in the Volta Region and 20 percent in the Eastern Region received antenatal care from doctors, only about 4 percent of pregnant mothers in the Upper West Region, about 3 percent in the Upper East Region and 8 percent in the Northern Region received antenatal care from doctors. This implies that less than 10 percent of the pregnant mothers in the three Northern Regions received antenatal care from a doctor. However, antenatal care received from a nurse/midwife is relatively higher in these three regions (i.e. 74 percent for Northern Region, 83 percent for Upper East and 87 percent for Upper West) as compared with 51 percent in the Greater Accra Region and 66 percent in the Ashanti Region.

The national coverage of antenatal care continually declined from 97 percent of 2000 target to 89 percent in 2006 (RCH/GHS, 2005/2006). There have been variations in regional coverage. Whereas some regions have occasionally exceeded the national target, others fall short of the targets. For example, Central Region exceeded the national targets and recorded 102 percent, 103 percent, 103 percent and 108 percent in 2000, 2002, 2003

and 2004 respectively. Eastern Region also exceeded the national target from 2000 to 2002 and recorded 121, percent 119 percent and 108 percent respectively. Also, Upper East Region recorded 101 percent in 2001, 100 percent in 2003 and 102 percent in 2004. The Northern Region recorded a continued improvement from 96 percent in 2000 to 110 percent in 2004.

However, some of the regions recorded a falling trend in their coverage. For example, the coverage in Greater Accra Region fell from 87 percent in 2000 to 78 percent in 2004, though the figure went up to 89 percent in 2002. Volta Region also recorded a falling coverage from 92 percent in 2001 to 86 percent in 2004. Ashanti Region also recorded 90 percent in 2000 but fell continually to 79 percent in 2004. The coverage in the Upper East Region recorded a high rate of 121 percent in 2000 but fell to 81 percent in 2004. The figure for Upper West Region fell from 93 percent in 2000 to 88 percent in 2001 and 2002 and rose to 89 percent in 2003 and 2004. The coverage for Western and Brong Ahafo Regions were irregular (GHS, 2005).

Nevertheless, comparing the 2003 GDHS data with those of 1988, 1993 and 1998 showed that there was an 11 percent improvement in the utilisation of antenatal care services in the past 15 years. The number of women receiving antenatal care increased from 82 percent in 1988 to 92 percent in 2003. This figure represents only mothers who received antenatal care for their most recent births in the five-year period preceding the surveys.

The GDHS (2003) has also reported a positive association between women's level of education and the choice of health professional. As the level of education increases, the likelihood of receiving antenatal care from a health professional increases. For example,

whilst 54 percent of pregnant mothers with secondary education and higher received antenatal care from a doctor only 11 percent of women with no education seek antenatal care from a doctor. However, 75 percent of women with no education seek antenatal care from a nurse/midwife as compared with 47 percent of women with secondary or higher education. This suggests that the more educated a woman is the more likely she will seek antenatal care from a qualified health professional. This finding was confirmed by Overbosch et al (2003) in their study of determinants of antenatal care use in Ghana. This study found that the level of education of the mother is positively associated with demand for antenatal care use in Ghana. This implies that the higher the level of education of the mother, the more the shifts of demand for antenatal care use from a nurse to a doctor and midwife.

In addition to educational attainment of the mother, a positive association was also found between income/cost and the choice of health care professional. The GDHS data does not capture the income of the mother and therefore the wealth index has been used as proxy to household income. The respondents were categorised into five wealth categories, which are poorest, poorer, middle, richer and richest (or lowest, second, middle, higher and highest wealth quintile). The cost of antenatal care has also been measured as distance covered to the nearest health care facility.

Distance is also used to determine accessibility to health care. The closer the health care facility to the woman, the more accessible is health care. It was also revealed that the richer the household from which a pregnant mother comes, the more likely she will attend antenatal care. A study by Overbosch et al (2003) revealed that in some rural areas, especially in the three northern regions pregnant mothers have to travel a distance of about

five kilometers before getting to the nearest health care facility. In some cases pregnant mothers find it difficult to get transport to the health care facilities. This situation imposes cost on the mother in terms of time spent to travel to the facilities and waiting to be served. The benefit and quality of care received should outweigh this cost to attract pregnant mothers to attend antenatal care.

According to the GDHS (2003), 51 percent of women in the highest wealth quintile and 24 percent of those in the fourth quintile seek antenatal care from a doctor as compared with 9 percent of those in the lowest quintile and 11 percent of those in the second quintile. On the other hand, 75 percent of the women in lowest quintile and 81 percent in the second quintile seek antenatal care from a nurse/midwife as compared with 48 percent of those in the highest wealth quintile.

Poverty alleviation programmes and provision of more health facilities especially in the rural areas can result in increased demand for antenatal care services for rural mothers in particular. This is because of the view that rural areas lack adequate health facilities and professionals. Also, rural mothers are more likely to come from poor households.

It was also revealed that the number of household members and the number of children a woman already has have a decreasing effect on the attendance to antenatal care. This implies that the more the household members the less likely a pregnant mother will attend antenatal care. Ching (1992) indicated that the effect of family size on the use of health services is unpredictable. Though a large family may have more potential patients and therefore has a higher frequency of illness, a large family may have enough people at home to care for a sick member. This may substitute for additional days of hospital care. However, this cannot be said of antenatal care since no member of a family may be capable

of giving the needed care to the pregnant mother and her unborn baby. The presence of the pregnant mother at the health facility ensures appropriate and better health care. Ching (1992) acknowledged that a large family may have less income per capita than a small family of the same income level. This may reduce a large family's actual use of health services because of lower purchasing power.

Apart from the number of children, the age of the mother also has a positive and significant impact on antenatal care attendance. The higher the age of the mother the greater the probabilities of seeking care during pregnancy. Demographic studies suggest that a woman's age at pregnancy is significant in determining pregnancy risks. It is therefore, asserted that the higher the age of the mother at pregnancy the higher the associated pregnancy risk. This assertion has been confirmed by Reproductive and Child Health (RCH) Unit as it recognises that the age of a mother during pregnancy is important risk factor which influences pregnancy and birth outcomes. It exerts its influence anthropometrically, medically and socio-economically (RCH/GHS, 2006). The RCH Report, 2006 indicated that pregnancy in women 19 years and below and those who are 35 years and above carry greater risks. However, those between the ages of 20 and 35 years normally carry lower risks. Adolescent pregnancy, however, declined from 14.6 percent in 2003 to 13.2 percent in 2006. With the exception of Upper East, Upper West and Brong-Ahafo Regions all other regions recorded decreases in the proportion of adolescent pregnancies. This should suggest that age related pregnancy risks should fall.

Timing and Number of Antenatal Care Visits

Antenatal care will be more beneficial if initiated early in the pregnancy. Timing of the first visit within the first trimester is recommended by obstetricians. The World Health Organisation (WHO) recommended a minimum of four (4) visits for a normal pregnancy. However, due to uncertainty and eminent risk that a pregnant mother might be exposed to monthly antenatal care visits have been recommended up to the seventh month of pregnancy. This is followed by bi-weekly visits up to the eighth month and then weekly visit up to delivery. This implies that if antenatal care visit is initiated in the first trimester, then a pregnant mother would have an optimum scheduled visit up to a total of at least 12 to 13 visits during the duration of her pregnancy (GDHS Report, 2003).

It was found that majority of pregnant mothers attended 4+ visits. However, rural-urban disparities were revealed in the number of visits. About 84 percent of pregnant mothers in urban areas attended 4+ visits whilst 61 percent of pregnant mothers in rural areas attended 4+ visits. The relatively high number of 4+ visits recorded in the rural areas has been attributed to the training given to traditional birth attendants (TBAs), to recognise the danger signs during pregnancy and refer pregnant mothers early to health centers.

To motivate pregnant mothers to attend antenatal care, the Ministry of Health has exempted payment of fees for four visits per woman attending antenatal care. This initiative was first introduced in the four poorest regions of Ghana that is, Northern, Upper East, Upper West and Central Regions in 2003. This was later extended to other regions of Ghana in 2004 (RCH Annual Report, 2003 and 2004).

Cost of Antenatal Care

Costs of antenatal care in general are not available but a study conducted (Ann, L., Mark, M., Vito, T., Gerry, V. D. & Sekyere, B. N., 1999) on costs of maternal health care services in South Kwahu District of Ghana found that provider cost of antenatal care varied across facilities in the district. The unit total costs of antenatal care services at four facilities range from $3.17 to $4.03 in health centres and from $2.97 to $5.45 in hospitals. However, costs for obstetrical complications, especially treatment of postpartum haemorrhage were higher at public hospitals (i.e. $92.94) than at mission hospitals ($37.57).

The study also revealed that client costs were higher at the mission hospital than public hospitals. Despite the higher costs at mission hospitals, they had the heaviest service volume, suggesting that clients were more satisfied with the quality of service at mission hospitals, and therefore willing to pay.

The result of this study also showed that direct costs of routine antenatal care were highest at public hospitals. The total cost was $3.39, comprising labour cost of $0.77 and material cost of $2.59. The lowest cost of $2.46 was at public health centres, comprising of $0.52 labour cost and $1.94 material cost. At the mission hospitals, labour cost was quite low (i.e. $0.40) but material cost was $2.09, totaling $2.49. The costs of drugs and supplies were relatively similar for antenatal care (i.e. $1.94 to $2.59) in all the facilities (Ann et al, 1999). Perhaps this might have reflected in antenatal care coverage in the district as utilisation of antenatal care indicated that antenatal care coverage declined from 92 percent in 1994 to 84 percent in 1997.

Though the study was conducted in only one district, out of 110 at that time and therefore cannot be representative of the entire country, it gives an idea of cost of antenatal care pertaining in Ghana before the introduction of the National Health Insurance Scheme (NHIS) and free maternal care policy.

Some Challenges of Maternal Health Care Delivery in Ghana

Maternal health care delivery in Ghana is faced with a number of challenges. Among these challenges include poverty, inadequate/ill-equipped health facilities, especially in the rural areas, problem of accessibility, illiteracy and some cultural practices, among others.

A study in three rural communities in the Northern Region revealed that poverty, bad roads, long distance to referral facilities, ill-equipped health facilities and unskilled providers to manage obstetrical complications contributed to antenatal and delivery problems and high mortality. Also, husbands who culturally should announce their wives' pregnancy did not do so until after the performance of a rite when the woman is five months or more into her pregnancy. Pregnant women in these communities therefore did not attend antenatal clinics until the late second or early third trimesters due to waiting for the pregnancy announcement ceremony (CEDPA, 2003).

Also, a baseline study in three rural communities in the Northern Region revealed that 9 out of 10 residents were illiterate. This, coupled with some cultural beliefs has negative effects on nutrition which affect the health of a pregnant mother. For example, pregnant women are prohibited from eating eggs, chicken, and other good sources of

protein (CEDPA, 2003). These food items are important source of nutrient to a pregnant mother and can prevent pregnancy related anemia, a major risk factor in pregnancy.

These challenges have also reflected in the regional differences in antenatal care attendance. It was found that pregnant mothers in the Northern, Upper East and Upper West regions are less likely to attend antenatal care. This is not surprising because these three regions are considered as poorer regions in Ghana. Apart from these regions, pregnant mothers in other regions such as Western, Greater Accra and Volta Regions are also less likely to attend antenatal care as compared to mothers in the Eastern Region, Ashanti and Brong-Ahafo Regions. These regional variations can be attributed to variations in availability of trained health professionals and health care facilities. These factors could limit access to antenatal care services.

Finally, illiteracy has also been found to be a challenge to effective maternal care delivery in Ghana. Mothers, who cannot read and write, lack the ability to understand useful information that may affect their health.

Theoretical Literature Review

Some Characteristics of Health Care Demand

Unlike the demand for normal goods and services which are demanded for direct utility or satisfaction, the demand for health care is a derived demand, demanded for the fundamental commodity, health. Health is demanded for two reasons. As a consumption commodity, it directly enters the preference functions of the consumer and as an investment commodity; it determines the total amount of time available for market and nonmarket activities. In other words, an increase in the stock of health reduces the amount

of time loss to these activities, and the monetary value of this reduction is an index of the return to an investment in health (Grossman, 2000).

One other characteristic of health care demand that was given much attention to is the effect of increasing uncertainty on demand for medical care. Arrow (1963) identified two types of uncertainties, namely uncertainty surrounding the effectiveness of medical treatment and the uncertainty surrounding the evidence of illness. For a risk-averse individual, the uncertainty surrounding demand for health care could lead to increased demand for health insurance and consequently increase demand for health care due to moral hazards. This may arise due to demand for preventive care which is common in modern societies. The same could not be said of a risk-lover.

Health care is also characterised by information asymmetry. Information asymmetry exists if one party to a transaction has more information than the other partner. Consumers (patients) lack or have little knowledge and information as to what is wrong with them at a particular time in order to demand the appropriate health care to restore their health. On the other hand, health care professionals have the expertise to know what is wrong with the patient and direct the patient as to what health care services he can consume to restore his health. The situation leads to lose of consumer sovereignty and market failure, creating an agency relationship. This gives considerable power to the providers which they can use to exploit patients. Evans (1974), as in Richardson, J. & Peacock, S. (2006, pp 9), mentioned that "the type and amount of care provided is not solely a function of patient need but also relates to the physician's desire to achieve a target income". Hence demand for health care is often described as supplier-induced demand due to information asymmetries.

These characteristics of health care as a commodity are not individually unique to health care, because each can be found in other commodities. However, their prevalence in the health care sector and their combined effect makes health care "different" from other commodities.

The Basic Model of Demand for Health Care

In economics literature, the standard model for the demand for health and health care is the Grossman model (Grossman 1972). In this model, health is considered as a capital stock which may be increased due to investment in health (i.e. buying health services or spending time on health activities) while it will be depreciated due to age (Kverndokk, 2000). According to Grossman (1972), health is demanded as a consumption commodity and as an investment commodity. As a consumption commodity it makes one feel good and as an investment commodity it makes healthy time available for market and non-market activities.

An approach to analysing health care choice is to use an intertemporal model of consumption decisions and to treat health as a stock variable within a human capital framework. This approach was originally pioneered by Grossman (1972) in a model in which individuals consume health care not because they value health per se, but because it improves their stock of health, which is used as a productive resource.

Grossman (1972) viewed health demand different from traditional demand theory in the following ways:

- Medical care is a derived demand for an input to produce health. Consumers do not want medical care per se, but health itself.

- The consumer does not purchase health from market but rather produces it, spending time upon health improving activities as well as purchasing medical inputs.
- Health is a capital good which lasts for more than one period. It depreciates but not instantly. Thus

  $H_t=H_{t-1}+I-\delta$ where H is stock of health, I is investment in health and δ is health depreciation.
- Health is both a consumption and investment good. As a consumption good, it is valued because it makes people feel better. As an investment good, it enhances earning capacity.

Folland, S., Goodman, A. C. & Stano, M. (1997) on Grossman's (1972) model mentioned the effects of aging on health capital stock. They pointed out that at a certain stage of life health stock depreciates more rapidly. This is to imply that the health of older people is likely to deteriorate faster than the younger people no matter what investment might go into it. It was therefore concluded that elderly people purchase more medical care even as their health deteriorate.

The model also considered wage rate as a factor that determines the level of health stock. An individual who works and earns wages will be able to purchase health goods in order to improve upon his stock of health. We would therefore expect that people would reduce their health stock upon retirement. But this prediction needs further research.

Folland et al (1997) also recognised the role of education as a factor that helps improve investment in health. The model suggested that an educated person experiences a higher rate of return to a given stock of health. Educated people are likely to recognise the

benefits of improved health. They may enjoy eating nutritious food or doing physical exercise. They may recognise the dangers of lifestyles like smoking, drug use and alcoholism. All other things being equal, they would have a greater taste for health relative to other goods (Folland et al, 1997).

However, from the literature, modern health care demand is exploring the neo-classical paradigm of rational consumer and constrained utility maximisation theories. The idea is that, an individual who faces options of various health care providers is assumed to be maximising utility from health as well as consumption of a set of goods subject to income and health production constraints. An individual as a first decision maker, decides whether to seek medical care and from which provider, depending on price and non-price factors and the perceived quality of provider.

Empirical Literature Review

Many works have been done within the frameworks described above. However, depending on the variables and econometric method used different approaches have been adopted. Some of these works have been reviewed. Though there is a wide range of empirical work on demand for health care, particularly demand for health insurance, there is scanty but restricted literature on demand for antenatal care. Much of the empirical literature in this study is based on demand for health care in general.

Two important factors – price and quality of care are likely to affect demand for health care services. These factors are correlated and have many effects on utilisation as well as health outcomes. High quality care is more effective and improves health directly

since practitioners with the right tools are enabled to apply their skills. However, this quality can be eroded by higher price tag (Manley, 2007).

Manley (2007) used Indonesian Family Life Study (IFLS), a panel data set for thirteen provinces in his study of the demand for quality and utilisation of pre-natal care. A two-stage estimation procedure was used. The first stage described quality of care as a function of number of local full clinics, number of local sub-clinics, inpatient facilities, local development, and region/time and rural. The second stage described pre-natal care as a function of maternal age, education, parity, care quality, costs of visit, wealth, rural, region/time and local development. Cost of visit was a measure of clinic accessibility which includes estimated travel time to the nearest public clinic, the number of clinics in the sub-district of residence and the actual monetary cost of care at the clinic. Local development was used as proxy for transportation infrastructure or other measures of convenience (i.e. proximity of the clinic to other potential destinations). Region and time period of observation were used to control for factors common to a larger area, all regions, all rural areas in a given period. Clinic staffing, especially number of doctors per public clinic was used as proxy for quality of care.

The result of the study showed a positive relationship between having doctors in clinics and pre-natal care utilisation suggesting that the more the number of doctors in a clinic the more the increase in pre-natal care utilization. With coefficient of 0.14, it implies that increasing the ratio of doctors per clinic by one will result in a 14 percent increase in women coming in for pre-natal care. However, higher pregnancy parity has a decreasing effect on care seeking. The implication of this is that women who have had enough

pregnancy experience assumed to be familiar with the process enough so much that they do not need care from a physician or midwife.

In addition, education, high level of consumption expenditure and larger number of facilities in the vicinity were found to be significant in determining pre-natal care utilisation. Similarly, women living in urban areas are more likely to utilise pre-natal care than those in rural areas.

It was concluded that the presence of doctors at facilities which is a measure of quality is robustly associated with increased pre-natal care utilisation, though it is questionable as whether this translates into improved birth outcome.

Sahn, D. E., Younger, S.D. & Genicot, G. (2002) adopted the model of Gertler, Locay and Sanderson (1987). Their model was based on selection of a health care provider, given that a person was sick. It was concluded that quality is an important determinant of health demand in rural Tanzania. In particular, quality of doctors/nurses, drug and the hospital/clinic environment induced demand for health care. In other words, they consented that demand for health care would increase if people had the option to see a qualified doctor/nurse, got access to pharmaceutical facilities and attended a clinic or dispensary which has a cleaner environment. It was also found that health care consumers in Tanzania were highly responsive to the price of health care, especially among the lower income bracket.

Havemann, R. & Servaas, B. (2002) used a multinomial logit model in studying determinants of demand for health care in South Africa. They acknowledged that a sick individual has the option to choose from various care providers but the rational individual will choose that form of care that will maximise his or her utility. However, after

normalising for quality of care at the margin the individual should be indifferent between health care providers. Havemann et al, (2002) further argued that a multinomial logit model is used to empirically isolate those characteristics that determine which health care provider an individual will choose.

Like Overbosch et al (2003), Havemann et al (2002) also used South African Living Standard and Development Survey (LSDS) data since they thought DHS data concentrated heavily on health indicators and diseases and often pay little attention to socio-economic indicators. Consequently, factors such as income, area of residence, access, cost and quality were considered in the model.

The result of this study showed that income was a significant determinant of health care demand from any provider. Demand increased as income increased but demand for primary health care fell completely for the higher income group, suggesting that to them primary health care is an inferior good. The study also revealed that those in metropolitan areas are more likely to seek care from private providers than those in rural areas. It was also revealed that those with some form of medical aid or health insurance are more likely to choose private health care.

Other variables such as access to health care facilities and amount charged were significant in determining the choice of health care in South Africa. Distance to the facility was used as a proxy for access. Quality of care provided was also an important determinant of health care choice. Though it was difficult to quantify quality, time taken to get treatment was used as a proxy for quality. This implies that the shorter it takes a patient to get treatment the higher the quality of care. This could be misleading since quality of care

should not be measured just in terms of time taken to get care but entire satisfaction derived by the patient.

They concluded that health care choices do differ significantly between South Africans, with characteristics of the respondents (such as household income, race and location) factors related to the care received- both monetary and non-monetary and the nature of the illness all playing a role.

Hallman (1999) found positive relationship between child health and education of the mother, especially in the use of private care. He also indicated that additional infants, particularly males, in the household who are younger than the index child could decrease the chances that the index child has a visit to the two more expensive provider types (private and traditional) in Philippines. This was thought to be possible because additional children may tighten household income constraints and reduce the number of visits to more expensive providers for the children in the household.

Lindelow (2002), on health care demand in rural Mozambique concluded that higher age was associated with an increase in the probability of seeking care from Traditional Medical Practitioners (TMPs) but not from hospitals or health posts. In the same way, the marginal effect at mean of acquiring "more education" was higher for seeking health care at hospital or health center than TMPs. On the effects of income level on demand for health care, Lindelow (2002) did not find any significant difference between the poor and non-poor segments of the sample. This finding was contrary to the finding in Columbia where Ortiz (2007) indicated that antenatal care visits were low in regions considered to be poor. It was also found that the elasticity of demand for health at a health centre was higher for households with lower income. This implies that an increase in price

is likely to reduce access to care particularly for poorer households. However, the own-price elasticity of demand for hospital care increased with income. This implies that the response to price increase would be stronger among richer households.

Overbosch et al (2003) believed that the use of Demographic and Health Survey (DHS) data does not reveal enough information on household living standard. To avoid the problems of approximations for the household living standard, as was thought of, they used the Ghana Living Standard Survey (GLSS) data which they believed is on large scale and captures enough information on income, household standard of living and cost of health care. They used a three level nested multinomial logit model and included more economic explanatory variables on income, cost of consultation and in particular, travel distance to the health facility. Other variables such as age, parity of the recent pregnancy, years of schooling and religion were included in the model along side the economic variables.

The result from this study showed that economic factors such as the distance to providers and the consumption levels were significantly associated with the choice between antenatal care alternatives. This implies that the longer the distant to the provider and the higher the financial cost of accessing care the lower the utilisation of antenatal care. For the other variables, education was found to have a positive effect on antenatal care utilisation. However, parity of pregnancy was found to be correlated with antenatal care visit to a nurse or medical assistant, but with insufficient visits. This may imply that women with more pregnancy experience were less likely to attend more antenatal visit to a nurse or medical assistant. On the other hand, no significant correlation between women's age and antenatal care utilisation was found, likewise the religious affiliation of the women. They therefore concluded that the demand for antenatal care was significantly determined by

economic factors such as household living standard, costs, in terms of distant to providers and actual monetary cost of antenatal care services. Therefore, improving on the access to care will significantly affect the choice of antenatal care by rural women in Ghana.

Some studies have found a positive relationship between antenatal care and pregnancy outcome (Bhardwaj et al 1994; Yousif and Hafeez 2006; Marcela 2007 and Ekwempu 1998). Bhardwaj et al (1994) recognised the importance of access to health care in utilisation of health services. In order to ascertain the effects of other factors determining antenatal care use, antenatal care services were brought to the door steps of pregnant mothers. This, they thought was to overcome the challenges imposed by access (i.e. transportation, long waiting hours and socio-economic factors). This was thought to be an innovative approach to finding out how receptive the pregnant mothers were to antenatal services. Four factors, that is, timing of first antenatal visit, frequency of home visit, tetanus toxoid immunisation and delivery attendance were scored. It was found that those women with high score (11-8) of maternal care receptivity recorded no perinatal and neonatal deaths. However, women with poor maternal care receptivity (3-0) recorded very high perinatal and neonatal mortality rates.

Yousif et al, (2006) on their part expressed antenatal care in a ranking order, that is, most adequate service, moderate or inadequate service and least (no service). The categorisation was done in such a way that could be considered biased. Those in strata 1 (adequate service) were those from household with high family income, well educated, married and live with their husbands and also classified as having good health. They were put under close supervision of doctors in their private clinics. The second category or strata 2 was composed of women who stood midway between women of good health and bad

health. The third category or strata 3 was made up of housewives who were engaged in varied menial jobs and received no antenatal care. They found that the odds of having a live-birth among women who had good health and received antenatal care was 11.807 greater than those women who had bad health and never went for antenatal care. In addition, out of a sample of 106 women, 26 cases of stillbirths were recorded. 16 (54 percent) of these stillbirths were recorded in strata 3 which was characterised by illiteracy and low family income. On the other hand, only 2 (2 percent) women in strata 1 had still-born babies. They concluded that adequacy of antenatal care was "strongly and consistently" associated with birth outcome. Nevertheless, its effect differs by mother risk category.

Analysing the extent to which antenatal care has significant impact on infant health in India, Marcela (2007), used Indian National Family Health Survey (NFHS) data and the Z-scores of weight and height of 0-6 months-old babies. Health production functions were estimated. The result indicated that, those women who completed the antenatal programme, attended three or more antenatal care visits, received two or more tetanus vaccination and three-month iron folic tablets supply led to increase in weight and height of Indian babies. The study also revealed that, education of the parents has a direct effect on children's health.

Provision of health facilities or infrastructure is a necessary condition but may not be sufficient condition for improving health status of patients or consumers. Access to antenatal care and quality as well as qualified health personnel tend to motivate women to start their antenatal care earlier (Deb, P. & Sosa-Rubi, S. G., 2005). However, working women are likely to delay the use of antenatal care. Also, availability of hospital beds

without health resources was found to delay the use of health services by pregnant women. Deb et al (2005) also found a positive relationship between women's level of education as well as antenatal complication and the use of antenatal services. It was also revealed that married women with previous experience of child birth tended to receive more health interventions. Moreover, the age of the pregnant woman was found to be negatively related to the number of health components provided during the pregnancy period.

Ortiz (2007) studied the determinants of demand for antenatal care using a two-part model. He included environmental, health insurance, financing, personal information and gynaecological history variables in his model. The first part of his model was run as logit regressions where variables concerning first antenatal care visit were used. The second part of the model explained the determinants of further visits in function of number of absence. This part was run as an ordinary least square (OLS) regression. The dependent variable was modeled as the number of absence to antenatal care.

The result of this study showed that women living in poorest regions of Columbia were less likely to attend first visit as compared with women living in richer regions. Another environmental variable, that is, number of people living in the household showed a decreasing effect on the probability to attend first visit. However, area of residence (i.e., urban or rural) was not an important determinant of antenatal care in Columbia. Wealth was considered an important determinant of both first and further visits. It was also found that mothers who were married or had a stable unmarried union were more likely to attend first visit than single mothers. Whilst mother's years of education had a strong positive effect on both first and further visits, literacy was not a determinant of demand for antenatal care. In addition, age of delivery was important in determining the first visit. This

implies that older mothers have a higher probability of attending first visit than younger mothers. Number of children the woman already had was strongly related to both first and further visits. The study also found that some familiar and personal conditions such as willingness to have the last children were an important determinant of demand for antenatal care in Colombia. Finally, the study also showed that though health insurance induced demand for first visit, it did not achieve a significant difference on number of consultations when compared with uninsured women.

Odwee, J., Okurut, F. & Nathan, N., (2006) reported that the rate of reporting sickness to health care center tended to be higher for those with higher level of education. This implies that educated households have a higher level of awareness of various symptoms of diseases and therefore demand more health care. On the other hand, the less educated households may have more sickness prevalence but do not report or demand health care due to lack of knowledge on various symptoms of diseases. This was revealed in a study conducted in Uganda on the determinants of health care demand in Lira District. The study also showed a positive relationship between socioeconomic characteristics of households and demand for health care, that is, between income and education. It was reported that households that demanded more health care were those with higher mean income and were headed by educated people. In addition larger households demanded more health care than smaller households.

Furuta, M. & Salway, S., (2006) reported that the proportion of urban women receiving antenatal care was greater than that of rural women (i.e., 79 percent as against 36 percent). There was also significant difference at regional levels. It was also reported that the proportion of women using antenatal care was higher for women with higher level of

education (i.e., secondary education or higher) than those with no education. However, contrary to the findings of Ortiz (2007), they found positive relationship between husband's education and antenatal care use of the woman. As reported by Odwee et al (2006), they also found a positive relationship between socioeconomic status of a woman in the household and antenatal care use. They also included the household position on decision-making by the woman and found that working women who had influence over how their earnings were used were significantly more likely to receive antenatal care than were those who worked but had no influence over their earnings.

Ssewanyana, S., Nabyonga, O. J., Kasiry, I. & David L. (2004) reported that outpatients' attendance had increased from 40 percent in 1999/2000 to 60 percent in 2001/2002 in Uganda when cost sharing was abolished. It was also revealed that the percentage of incidence of reporting illness was higher among rural dwellers than urban dwellers. However, the proportion of those who actually sought health care was significantly higher for the urban dwellers than rural dwellers. This revelation implies that health care utilisation is negatively related to cost of seeking health care. The study also showed a positive relationship between incomes of household and health care seeking. However, women in both richest and poorest households received disproportionately less treatment when sick as compared to men. But for both men and women, demand for health care increased as income increased. In addition, they found that physical access, in terms of distance to health care facility had a significant influence on health care utilisation. This was evident in a fall in utilisation of hospital services as compared to health centres and clinics which were upgraded and closer to the people.

Hadi, M., Naeem, M., Taufigur, R. & Jalaluddin, A., (2007) captured variables such as age, education of the woman, poverty level, participation in economic activities and region of residence in their work and found that the utilisation of antenatal care was lower among women who were involved in economic activities than among those not economically active. This might be due to extra burden on them that reduced their time available to attend antenatal care services. This finding also implies for women in rural areas. Rural women who were economically active were much less likely to access antenatal care services as compared with non-economically active women. This relationship was rather the reverse in urban areas where economically active women were more likely to access antenatal care services. To this effect, the combination of low income, low level of education, rural residence and need to work meant that these women were much less likely to use antenatal care services than those who were not economically active. They also found a negative relationship between age of a woman and antenatal care utilisation. Antenatal care utilisation reduced as women aged. It was concluded that inaccessibility to health facility, illiteracy, poverty and involvement of pregnant women in economic activities were the major set-backs in antenatal care utilisation in Afghanistan.

Fabbri, D. & Monfardini, C., (2002) confirmed that there is a positive relationship between family income and level of schooling and health care utilisation. However, the study found that family income had a significant impact on the number of private consultation, with higher income families increasing their utilisation of private services than public services. It was also found that regional factors were relevant for public consultations (but not for private). This was shown to be relevant for contact decisions but

less for the frequency decision. This implies that regions of residence were significant in determining first consultation but did not have influence on number of consultations.

The standard utility maximisation framework can be used to model the demand for maternal health. In this instance, demand is determined by the preference of the family for the health of the mother and unborn /born child (Abusaleh, S. & Geeta, S., 2002). Following the Grossman model, they acknowledged that a family maximises household utility function subject to its budget constraint as well as the individual's health production function. Thus, the utility function is a function of household consumption of different commodities such as leisure and health, particularly that of the expectant mother and the unborn child. However, they added that these preferences are in turn determined by a host of factors; among them include age of the woman, education of the woman and her husband, number of children, number of adults in the household, wage and price of different goods consumed by the household.

Unlike much other literature (e.g. Ortiz, 2007 and Overbosch et al 2003) that used logit regression model, Abusaleh et al used probit model in their estimation. The two models can be used as alternatives since there is no vast difference between them.

Another interesting household level variables captured in this study was exposure to information. These were defined as binary variables that take the value of one if a woman listens to the radio, watches television or reads newspapers/magazine and 0 otherwise.

The result from this study showed that education of the woman was a significant determinant of maternal care, especially antenatal care and hospital delivery. The effect was greater for women with primary education and higher education than middle

education. It was also found that the number of children a woman already had, had a significant influence on demand for maternal care. That is, the higher the number of children, the lower the probability of prenatal and postnatal utilisation by the mother and the greater the chances of home delivery. The study also revealed that there was a 5 percent increase in the probability of the use of maternal care for a woman in a family where women frequently listened to the radio relative to a family where no woman did listen.

Many researchers have considered education as a crucial variable that has effect on demand for health care services. Elo (1992) examined the role of woman education on utilisation of maternal health care services. In this study, education was categorised into four, based on year and level of schooling attained. These categories include no education, 1-3 years of schooling, 4-5 years of schooling and 6+ years of schooling. Several other explanatory variables were also included in his model. Among these other variables were birth order of the index child (this captures pregnancy experience of the woman), and family-size effects associated with health service use, such as current child-care responsibilities which posse inconvenience of seeking health care services. 'Ordinary' logistic regression and the fixed-effects models were used in this estimation.

The result from this study showed a strong positive relationship between education and the use of maternal health care services. However, the effect was stronger for delivery assistance than prenatal care. It was also found that women who grew up in towns or the country-side (i.e., rural areas) are less likely to seek modern health care services during pregnancy and delivery than women who grew up in cities (i.e., urban areas). In addition, it was found that older women seem more likely to seek maternal health care and other services than younger women. However, when maternal age and other covariates were

controlled for, it was found that women were more likely to seek maternal health care services for first births than higher-order births. This could be interpreted to mean that women who had had more children tend to attach less importance to antenatal care and delivery than other women, particularly if they have not experienced difficulties with previous pregnancies.

Whereas other studies like Ortiz (2007) used wealth index as proxy for income, Elo (1992) used husband's occupation and education as proxies for household income. The effects of these proxies showed a positive effect on the modern health care service utilisation.

Yareh, M. & Asnaketch, M., (2002) used the 2000 Ethiopia Demographic and Health Survey data in their study of utilization of maternal health care service in Ethiopia. They captured maternal age, parity, number of children under five years, educational status of the mother, marital status, work status, religion and residence as independent variables. They used logistic regression for Bivariate and Multivariate analysis.

The result of Bivariate analysis showed that women in Addis Ababa in particular are more likely to receive care from professional health personnel, that is a doctor, nurse or midwife than women from other urban and rural areas. Only 22 percent of the women from other urban and rural areas received antenatal care as against 83 percent for Addis Ababa. However, 63 percent of women from other urban areas received antenatal care from health care professionals. It was also revealed that 28 percent of women under the age of 35 received antenatal care while only 21 percent of those over 35 year old received antenatal care.

Yareh et al (2002) also found that women's education was positively associated with antenatal care utilisation. 72 percent of women with at least secondary education received antenatal care from health professionals as compared with 45 percent of women with primary education and 21 percent of those with no education. They also found some association between religion and antenatal care utilisation. According to the study, between 25 percent and 28 percent of Orthodox/Catholic, Muslim and Protestant women received antenatal care from health professionals as compared with 11 percent of women who follow traditional beliefs.

The result of multivariate analysis for antenatal care utilisation confirmed that of Bivariate. The result showed that women's place of residence and level of education are the most important determinants of antenatal care utilisation. Women residing in Addis Ababa were ten times more likely to receive antenatal care and those in other urban areas were four times more likely to receive antenatal care than those in rural areas. Also, women with at least secondary education were four times more likely and women with primary education two and half times more likely to receive antenatal care from a health professional than women with no education. It was also found that married women were 40 percent more likely to receive antenatal care from health professionals than unmarried women. The multivariate analysis result also revealed that Muslim women were about 30 percent more likely, and women with traditional belief were 50 percent more likely to receive antenatal care from a health professional.

The study, however, did not find any statistical significance between lower parity and higher parity women in urban areas. Women with 2 to 4 children were twice as likely

to use antenatal care as compared with women with only one child. These trends were also found in rural sample but with weaker effects as compared with urban one.

Yareh et al, (2002) concluded that the major factors affecting maternal health care use in Ethiopia were more of demographic and socio-cultural. These factors include maternal education, marital status, place of residence, parity and religion. These are similar to those documented in many settings throughout Africa and other developing countries.

Conclusion

Public sector providers dominate the health care system in Ghana. However, private sector providers continue to play complementary roles in health care delivery. Though a number of policies and interventions have been adopted to improve health care delivery in general and maternal health care in particular, supply of quality health care remains inadequate. Antenatal care utilisation remains unevenly distributed across the country. The situation has been worsened by problems of accessibility, inadequate facilities and professionals.

From the literature reviewed, it was found that income, education of the woman, cost of antenatal care in terms of distance, occupation status of the woman, area of residence (urban/rural); access to information, especially listening to radio, marital status and the age of the woman tended to play a major role in the demand for health care in general and antenatal care in particular. There has been a departure from Grossman's human capital model to utility maximisation model in the context of binary, ordinal and categorical outcomes. Review of the literature showed that logistic, multinomial logit and probit models were mostly used due to the distribution of the dependent variables.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter takes an overview of the theoretical model and also discusses the binary and logit models. It is followed by multinomial logit model and the empirical model. This is followed by discussion of the data used for this study. It concludes by discussing how the variables are measured and the apriori expectations.

Theoretical Model

From the literature, it was found that modern health care demand is exploring the neo-classical paradigm of rational consumer and constrained utility maximisation theories. The idea is that, an individual who faces options of various health care providers is assumed to be maximising utility from health as well as consumption of a set of goods subject to income and health production constraints. An individual as a first decision maker, decides whether to seek medical care and from which provider, depending on price and non-price factors and the perceived quality of the provider.

Economic theory suggests that individuals are faced with making choice in light of scarcity of resources. The basic model that economists use to explain individuals' behavior is utility maximisation. The model assumes that individuals who are constrained by limited

income will behave as if they were using their purchasing power in such a way as to achieve the utility possible. That is, the individuals are assumed to behave as if they maximised utility subject to a budget constraint.

Now, assume the individual can afford to choose only combinations of goods X and Y. If the price of good X is P_x and the price of good Y is P_y, then the individual is constrained by $P_xX + P_yY = I$, given that his income is I cedis. With this, the individual's objective is to maximise utility U, from these goods:

$$U = (X, Y) \quad 1$$

subject to the budget constraint:

$$I = P_xX + P_yY \quad 2$$

To maximise the function in equation (1) subject to the constraint in equation (2), we set up the Lagrangian expression

$$L = U(X, Y) + \lambda (I - P_xX - P_yY) \quad 3$$

From equation (3), we set the partial derivatives of L (with respect to X, Y and λ) equal to 0. This gives the necessary condition for an interior maximum:

$$\frac{\partial L}{\partial X} = \frac{\partial U}{\partial X} - \lambda Px = 0 \quad 4$$

$$\frac{\partial L}{\partial Y} = \frac{\partial U}{\partial Y} - \lambda Py = 0$$

$$\frac{\partial L}{\partial \lambda} = I - Px - PyY = 0$$

Equations (4) can be solved for the optimal values of X, Y and λ. Equations (4) constitute a necessary condition for a maximum. A second-order conditions will be sufficient to ensure a maximum but this approach is complex. However, the assumption of strict quasi-concavity (a diminishing MRS in two-good case) is sufficient to ensure that points obeying equations (4) are in fact a true maximum (Nicholson, 2002).

Implication of First-Order Conditions

The first-order conditions in equations (4) can be rewritten in a variety of ways. For example, for any two goods, X and Y, we have

$$\frac{\partial U/\partial X}{\partial U/\partial Y} = \frac{P_x}{P_y} \qquad 5$$

But it can be shown that the ratio of the marginal utilities of two goods is equal to the marginal rate of substitution between them. Therefore, the conditions for an optimal allocation of income become

$$\text{MRS (X for Y)} = \frac{P_x}{P_y} \qquad 6$$

This implies that in order to maximise utility, the individual should equate the psychic rate of trade-off to the market trade-off rate.

Indirect Utility Function

As stated earlier, equation (4) can be manipulated for a constrained utility-maximisation problem to solve for the optimal values of X and Y.

These optimal values in general will depend on the prices of the two goods and on the individual's income. That is,

$$X^* = X\ (P_x, P_y, I) \qquad 7$$

$$Y^* = Y\ (P_x, P_y, I)$$

Substituting equations (7) into equation (1) gives

$$\text{Maximum utility} = U(X^*, Y^*) \qquad 8$$

$$= U[X^*(P_x, P_y, I), Y^*(P_x, P_y, I)]$$

$$= V\ (P_x, P_y, I)$$

From equation (8), to maximise utility, given a budget constraint, the optimal level of utility obtainable will depend indirectly on the prices of the goods being bought and on the individual's income. This is shown by the indirect utility function V. A change in either prices or income will induce a change in the utility obtainable.

The demand functions

In principle, it will be possible to solve the necessary conditions of a utility maximum for the optimal levels of X and Y as functions of prices and income. Mathematically, this can be expressed as demand functions of the form

$$X^* = d_1\ (P_x, P_y, I) \qquad 9$$

$$Y^* = d_2\ (P_x, P_y, I)$$

The functional notation *d* is used for the individual's "demand". If the function d_1 and d_2 and values of P_x, P_y and I are known, we can "predict" how much of each good the individual will buy. Although the specific applications of this model are varied, all of them are based on the same fundamental mathematical model, and all arrive at the same general conclusion.

Binary Response Model

From the literature, many empirical works on demand for health have treated the dependent variable, health care, as binary response variable. In quantitative response models, the variable to be explained, *y* is a random variable taking on a finite number of outcomes. The leading case occurs where *y* is a binary response, taking on the values zero and one, which indicate whether or not certain event has occurred. For example, y = 1 if an individual attends hospital, y = 0 otherwise.

As in the case of linear models, *y* is referred to as the explained or dependent variable; $X= (X_1, X_2, \ldots, X_K)$ is the vector of explanatory or independent variables.

In binary response models, interest lies primarily in the response probability,

$$P(X) = P(y=1|X) = P(y=1|X_1,X_2,\ldots,X_K) \qquad 10$$

for various values of X. For example, when y is hospital attendance indicator, X contains various individual characteristics such as age, income, cost and other factors that affect health care demand.

The linear probability model (LPM) for binary response y is specified as

$$P(y = 1|X) = \beta_0 + \beta_1 X_1 + \beta_2 X_2, + \ldots + \beta_K X_K \qquad 11$$

The X_1 can be functions of underlying explanatory variables which would simply change the interpretations of the β_j. Assuming that X_1 is not functionary related to the other explanatory variables, $\beta_j = \partial P(y = 1|X)/\partial X_i$. Therefore, β_1 is the change in the probability of success given a one-unit increase in X_1. If X_1 is a binary explanatory variable, β_1 is just the difference in the probability of success when $X_1 = 1$ and $X_1 = 0$, holding the other X_j fixed.

It should be noted that, unless the range of X is severely restricted, the LPM cannot be a good description of the population response probability $P(y = 1|X)$. For given values such that $\beta_0 + X\beta$ is outside the unit interval. Therefore, the LPM should be seen as a convenient approximation to the underlying response probability (Wooldridge, 2002). This seems to be an obvious weakness in the LPM. Also, since the form of the variance is determined by the model for $P(y = 1|X)$, an asymptotically more efficient method is weighted least squared (WLS). Let β be the OLS estimator and $\hat{y}_i$ denote the OLS fitted values. Then, provided $0<\hat{y}_i<1$ for all observations *i*, defined the estimated standard deviation as $\hat{\sigma}_i = [\hat{y}_i(1 - \hat{y}_i)]^{1/2}$. If some of the OLS fitted values are not between zero and one, WLS analysis is not possible without ad hoc adjustment to bring deviant fitted values into the unit interval. Furthermore, since the OLS fitted value y_i is an estimate of the conditional probability $P(y_i = 1|X_i)$, it is somewhat awkward if the predicted probability is negative or above unity.

Aside the problem of fitted values, the LPM implies that a ceteris paribus unit increase in X_j always change P(y = 1|X) by the same amount, regardless of the initial values of X_j. This implication cannot literally be true because continually increasing one of the X_j would eventually drive P(Y = 1|X) to be less than zero or greater than one. Due to the weaknesses in the LPM, the logit regression model is suitable for producing sound results, since it allows for the transformation of a dichotomous dependent variable to a continuous variable ranging from -∞ to + ∞. Therefore, the problem of out of range estimation is avoided.

Logistic regression (logit) analysis is a uni/multivariate technique which allows for estimating the probability that an event occurs or not, by predicting a binary dependent outcome from a set of independent variables. For example, for hospital attendance, the dependent variable is attend hospital or not, in relation to income, age and cost. The linear probability model depicted it as

$$P_i = E(Y = 1|X_i) = \beta_0 + \beta_1 X_i \qquad 12$$

Where X_i denote the set of explanatory variables and Y = 1 means attend hospital.

Now let us consider a representation of equation (12) as

$$P_i = E(Y = 1|X_i) = \frac{1}{1+\exp\left[-(\beta 0 + \beta 1 Xi)\right]} = \frac{1}{1+\exp(-Zi)} \qquad 13$$

where Z_i is defined as the endogenous variables. Equation (13) is known as the (cumulative) logistic distribution function. Here the Z_i range from -∞ to + ∞; P_i ranges

between 0 and 1; P_i is non-linearly related to Z_i (i.e. X_i) thus satisfying the two conditions required for a probability model.

In satisfying these requirements, an estimation problem has been created because P_i is non-linear not only in X_i but also in the β's.

This means that one cannot use OLS procedure to estimate the parameters. Here, P_i, the probability of attending hospital is given as 1/1 + exp (- Z_i). Then (1 – P_i), the probability of not attending hospital is (1 – P_i) = 1/1 + exp (Z_i). Therefore, we can write

$$Pi = \frac{P_i}{1-P_i} = \frac{1+\exp(Z_i)}{1+\exp(-Z_i)} = Z_i \qquad 14$$

From equation (14), $P_i/(1 – P_i)$ is the odds ratio in favour of hospital attendance, that is, the ratio of the probability that an individual attends hospital to the probability that he does not. Taking natural log of equation (14), we obtain

$$L_i = \ln[P_i/(1 – Pr) = Z_i = \beta_0 + \beta_1 X_i \qquad 15$$

From equation (15), the log of the odds ratio is not only linear in X_i but also linear in the parameters.

Two important features of the logit model are that, as P_i goes from 0 to 1, the logit, L_i goes from -∞ to + ∞. That is, although the probabilities lie between 0 and 1; the logits are not so bounded. Also, though the logit is linear in X_j, the probabilities themselves are not.

However, when the individual consumer is faced with alternative choices of health care providers, where he/she decides on which provider to visit, based on his/her personal

characteristics and facility related characteristics, logit model is no longer applicable. Logit model is only applicable when the consumer is faced with two alternatives. In a situation where the consumer is faced with three or more alternatives, multinomial logit model is suitable.

Multinomial Logit Model

Unordered-choice model can be motivated by a random utility model. For the *i*th consumer faced with *j* choices, supposed that the utility of choice *j* is

$$U_{ij} = z'_{ij}\beta + \varepsilon_i \qquad 16$$

If the consumer makes choice *j* in particular, then we assume that U_{ij} is maximum among the *j* utilities. Hence the statistical model is driven by the probability that choice *j* is made which is

$$\text{Prob}\,(U_{ij} > U_{ik}) \qquad \text{for all other } k \neq j \qquad 17$$

The model is made operational by a particular choice of distribution for the disturbances. The logit model has been widely used in many applications. Let Y_i be a random variable that indicates the choice made. According to McFadden (1973) if (and only if) the *j* disturbances are independent and identically distributed with type *j* extreme (Gunbel) disturbance

$$F(\varepsilon_{ij}) = \exp(-e^{\varepsilon_{ij}}), \qquad 18$$

Then

$$Prob(Y_i = j) = \frac{e^{Z_{ij}\beta}}{\sum_{j=1}^{j} e^{Z_{ij}\beta}} \qquad 19$$

This leads to what is called conditional logit model.

To set up the model that applies when data are individual specific, we specify a multinomial logit model in the form

$$Prob\ (Y_i = j) = \frac{e^{\beta^t j X_i}}{\sum_{k=1}^{J} e^{\beta^t k X_i}}, j = 0, 1, \ldots, J \qquad 20$$

The estimated equation provides a set of probabilities for the *j+1* choice for a decision maker with characteristics X_i. X_i is a vector of explanatory variables. The unknown parameters β are typically estimated by maximum likelihood.

The multinomial logit model assumes that data are case specific; that is, each independent variable has a single value for each case. It also assumes that the dependent variable cannot be perfectly predicted from independent variables for any case. Collinearity is assumed to be relatively low, as it becomes difficult to differentiate between the impacts of several variables if they are highly correlated. The independent of irrelevant alternatives must either be included in the error structure or assumed to exist. This is similar to multinomial logit model. This assumption states that odds do not depend on other alternatives that are not relevant.

The Empirical Model Specification

Health care demand depends on the price of that service, price of alternative services, household income, time costs associated with using the service and demographic characteristics of patients (for example, sex, education and age), which can be specified as a utility maximisation function.

The demand for antenatal care is modeled as a discrete choice model, in which the pregnant woman chooses between discrete care alternatives and selects the alternative that gives the highest utility. Let the antenatal care alternative for pregnant woman *i* be denoted *j*. For each antenatal care alternative the utility U_{ij} of a pregnant woman is assumed to depend on her health care H_{ij} and also on consumption C_{ij}, of goods and services besides antenatal care. This relationship can be represented by a utility function U as

$$U_i = U\ (H_{ij},\ C_{ij}) \qquad 21$$

The pregnant woman also faces a budget constraint;

$$Y_i = p_{Hj}H_{ij} + p_{Cj}C_{ij} \qquad 22$$

Where Y_i is the individual income, $p_{Hj}H_{ij}$ is quantity of antenatal care and $p_{Cj}C_{ij}$ is quantity of composite goods. The price of antenatal care comprises user fees and access costs such as travel time to the facility. The objective is to maximise utility from these goods, and most especially health which is derived from antenatal care.

To maximise utility (function in equation 21) subject to constraint, equation (22), we set up the Lagrangian expression

$$L = U\ (H_{ij},\ C_{ij}) + \lambda\ (Y_{ij} - p_{Hj}H_{ij} - p_{Cj}C_{ij}) \qquad 23$$

Setting the partial derivatives of L (with respect to H_{ij}, C_{ij} and λ) equal to 0, yields equations representing the necessary conditions for an interior maximum, similar to those in equations (4) page 75.

The interest here is to solve for the optimal values of H_{ij} and C_{ij}. Using the indirect utility function, it is possible to manipulate the first-order conditions for a constrained utility-maximisation problem to solve for the optimal values of H_{ij} and C_{ij}. These optimal values in general will depend on the prices of the goods and on the individual's income. That is,

$$H^*_{ij} = H_{ij}(p_{Hj}H_{ij}, p_{Cj}C_{ij}, Y_{ij}) \qquad 24$$

$$C^*_{ij} = C_{ij}(p_{Hj}H_{ij}, p_{Cj}C_{ij}, Y_{ij})$$

We then use the optimal values of H_{ij} and C_{ij} from equation (24) to substitute in the original utility function to yield

$$\text{Maximum utility} = U(H^*_{ij}, C^*_{ij}) \qquad 25$$

$$= U[H^*_{ij}(p_{Hj}H_{ij}, p_{Cj}C_{ij}, Y_{ij}), C^*_{ij}(p_{Hj}H_{ij}, p_{Cj}C_{ij}, Y_{ij})]$$

$$= V(p_{Hj}H_{ij}, p_{Cj}C_{ij}, Y_{ij})$$

From equations (25), because of the pregnant woman's desire to maximise utility, given a budget constraint, the optimal level of utility obtainable will depend indirectly on the prices of health care and other composite goods and on her income. This relation is shown by the indirect utility function V in equations (25).

Now, assume that the pregnant woman's demand for health $H_{ij,}$ (the optimal value shown in equation (24), H^*_{ij} which is a derived demand, derived from antenatal care depends on other factors apart from price $p_{Hj}H_{ij}$ and income Y_{ij}.

Grossman (1972) had identified three main factors that influence demand for health care. These include age, education, and income/wage. The literature has shown that cost of care, area of residence, household size, number of children the woman already had, occupation status and access to information have significant impact on antenatal care visit by a pregnant woman. We therefore, specify a functional relation of the indirect utility function in equations (25) for demand for antenatal care in the form;

$V_{ij}=f$(education, area of residence, age, cost, income, household size, number of children, occupation, access to information, ε). 26

Where education is the highest level of education attained by the woman, age is the age group of the woman, household size is the number of people in the household of the woman, number of children the woman already had, occupation is the employment status of the woman and area of residence (i.e., rural/urban) of the woman. These are a vector of observable socioeconomic attributes of individual woman *i* and denoted by X_i. Income is the annual household income of the woman *i* and denoted by $Y_{i.}$ Cost is the price of antenatal care received by woman *i* from health facility *j* denoted as P_{ij}. This includes distance to the facility, transportation cost and waiting time at the facility. Access to information is how frequent the woman *i* listens to radio and denoted by R*i* and ε is the error term which captures other factors that may influence demand for antenatal care. Thus adopting the model used by Odwee et al (2006) and using the variables described above we specify an indirect utility function;

$$V_{ij} = f(X_{ij}, Y_i, P_{ij}, R_i, \varepsilon_i) \quad 27$$

Econometric implementation of the model requires the standard assumption that the utility function in equation (27) is stochastic, and of the form:

$$V_{ij} = V_{ij}^* + \varepsilon_i \qquad 28$$

Where V_{ij}^* is the systematic component of utility and ε_i is an additive disturbance term.

In semi-log form, the systematic part of the utility may be expressed as:

$$V_{ij}^* = \beta_i X_{ij} \qquad 29$$

Where X_{ij} is a vector of characteristics (in log form) specific to woman *i*, for the choice of alternative *j*. Such characteristics include income, level of education, age, occupation and household size, β are vectors of parameters to be estimated.

Assuming that ε_i is normally distributed, equation (28) leads to a multinomial logit specification of the pregnant woman's choice of facility for antenatal care attendance. The probability that a pregnant woman *i* will seek antenatal care from health facility *j* can be expressed in the form:

$$P_{ij} = \frac{e^{\beta_j x_{ij}}}{\sum_0^n e^{\beta_j x_{ij}}} = \beta_0 + \beta_2 areares + \beta_3 hhmem + \beta_5 educ + \beta_7 occup + \beta_8 age + \beta_9 no.ofchn + \beta_{10} distance + \beta_{11} wealth + \beta_{12} frqradio + \varepsilon_{ij} \qquad 30$$

Estimation of equation (30) requires use of numerical method to find values of parameter vectors that maximise the likelihood (the log-likelihood) of observing the sample

data X. The log-likelihood function that needs to be maximised in order to estimate values of the parameter vectors β is:

$$L = \sum_i \sum_j G_{ij} \log P_{ij} \quad (31)$$

Where L is the logarithm of the likelihood function; $G_{ij} = 1$ if individual woman *i* chooses health facility *j*; otherwise G_{ij} takes a value zero. In estimating the parameters, we assume that each pregnant woman faces three health care provider alternatives: public facility, private facility and others such as maternity homes and traditional birth attendants.

Post Estimation Tests

The Wald Test of Parameters

This test is based on an estimator that is asymptotically normally distributed. It is also based on the distribution of the full rank quadratic form with the specification

$$If X \sim \mu_j [\mu, \Sigma], then (X - \mu)' \Sigma^{-1} (X - \mu) \sim chi - squared[j] \quad (32)$$

In the setting of hypothesis test, under the hypothesis that E(X) = μ, the quadratic form has the chi-squared distribution. If this hypothesis is false, then the quadratic form will, on average, be larger than it would be if the hypothesis were true (Greene, 2002).

Now, let θ be the vector of parameter estimates without restriction. We hypothesis a set of restrictions

$$H_0 = c(\theta) = q \quad (33)$$

If the restrictions are valid then at least approximately θ should satisfy them. If the hypothesis is erroneous then c (θ) = q should be further from 0 than would be explained by sampling variability alone.

The Wald statistics is given as

$$W = [c(\hat{\theta}) - q]' (Asy.Var[c(\hat{\theta}) - q])^{-1} [c(\hat{\theta}) - q] \quad (34)$$

Under H_0, in large samples, W has a chi-squared distribution with degrees of freedom equal to the number of restrictions (i.e. the number of equations in c ($\hat{\theta}$) – q = 0).

Independence from Irrelevant Alternatives

This assumption says that the disturbances are independent and homoscedastic. Hausman and McFadden (1984) suggest that if a subset of the choice set is truly irrelevant, omitting it from the model altogether will not change parameter estimates systematically. Exclusion of these choices will be inefficient but will not lead to inconsistency. But if the remaining odds ratios are not truly independent from these alternatives, then the parameter estimates obtained when these choices are included will be inconsistent. This observation is the usual basis for Hausman's specification test (Greene, 2003). The test statistic is

$$\chi^2 = (\beta_s - \beta_f)' [\hat{V}_s - \hat{V}_f]^{-1} (\beta_s - \beta_f), \quad (35)$$

where *s* is estimators based on the restricted subset, *f* is the estimator based on the full set of choices; $\hat{V}_s$ and $\hat{V}_f$ are respective estimates of the asymptotic covariance matrices. The statistic has a limiting chi-squared distribution with K degrees of freedom.

Test of Goodness of Fit

Pseudo R-squared is used to test for the goodness-of-fit of the model. McFadden (1974) suggests the measure $\mathbf{1-\ell_{ur}/\ell_o}$, where $\boldsymbol{\ell_{ur}}$ is the log-likelihood function for the estimated model and $\boldsymbol{\ell_o}$ is the log-likelihood in the model with only an intercept. The log-likelihood for a binary response model is always negative, $\mathbf{|\ell_{ur}| \leq |\ell_o|}$, and so the pseudo R-squared is always between zero and one (Wooldridge, 2002). In this case the smaller the absolute value of the Pseudo R-squared, the better the fit of the model.

Limitations of the model

Unlike the logistic regression model where there are many statistics for performing model diagnostics, diagnostic and model fit are not straightforward to do in multinomial logit regression model. In addition, multinomial regression also uses maximum likelihood estimation method and multiple equations. Therefore, it requires larger sample size than ordinal or binary logistic regression.

The Data

Data for this study is a secondary data, from the Ghana Demographic and Health Survey (DHS) 2003. This survey was conducted between July and November 2003. The survey covered all the ten regions of Ghana and included 5691 eligible women from all the ten regions of Ghana and therefore can be said to be representative of the entire country. Out of the 5691 women, 2777 of them have admitted attending at least one antenatal care visit within the last five years preceding the survey. The data also captures place of residence of the respondents (i.e. urban and rural). Therefore, it is also representative of

urban and rural population of Ghana. Though the data does not capture income level of respondents, it captures the wealth index and this is used as a proxy for income level. The wealth index was calculated by the Ghana Statistical Service (GSS), using the method of principal component analysis. The index was arrived at by using the ownership of household items such as toilet facility, electricity, radio, television set, refrigerator, bicycle, motor cycle/scooter and car/truck. Other items included are source of drinking water and housing structure (i.e., main floor material, main wall material and main roof material). Based on this the respondents were classified into five wealth quintiles as poorest, poor, middle, richer and richest.

According to the DHS 2003, a pregnant woman has the following antenatal care provider options available to her; traditional birth attendant's home, government hospital, government health centre, public mobile clinics, other public providers, private hospital/clinic, private mobile clinic, maternity homes and other private sources. However, the main providers of antenatal care services for pregnant women on which data is available include government hospitals, government health centres, public mobile clinics, private hospital/clinics, private mobile clinics maternity homes and traditional birth attendants. In addition, a pregnant woman can get antenatal care from a doctor, a nurse/midwife, auxiliary midwife and trained birth attendant.

The data does not capture variable on cost of antenatal care. However, the respondents were asked to describe how they got medical help, in terms of getting money needed to take transport and the distance covered to the nearest health facility. They were asked to describe whether these were problems or not. Values of 0, 1 and 2 were given to their responses (i.e. 0= no problem, 1= small problem and 2= big problem).

The cost of antenatal care or health care is not only measured in terms of the out-of-pocket payment that a pregnant woman or a patient must make to access care but also includes time cost and the distance to the care provider. Therefore, if a woman considers the distance covered to attend antenatal care and how to get there as big problem then it presupposes that cost of antenatal care is relatively high. On the other hand, if these are considered no problem or small problem, then cost could be considered relatively low or affordable. This implies that even if antenatal care services are cost free, there is an implicit cost associated with the utilisation of these services. This is the opportunity cost of time spent to travel to the facilities to obtain these services (Abusaleh et al, 2002). This opportunity cost is equal to the wage the woman would have earned if she were engaged in an economic activity. The rest of other relevant variables that are used in this study are described in Table 8.

Table 8: Design of Independent Variables

Variable	Description or question	Values
b)Area of residence	Does the mother live in an urban or rural area?	1= Urban, 0= Rural
c)Number of people in the household	How many people live in the household?	Number of people.
Personal Characteristics		
Marital status	Is the mother married?	1= Yes, 0= Otherwise
Mother's education	Highest level of education of the mother.	0= No education 1= Primary 2= Secondary 3= Tertiary
Occupation	Is the mother employed?	1= Yes, 0= Otherwise
Gynaecological History		
Age at delivery	How old is the mother?	Age limit < 20 20 - 35 36 +
Number of children	How many children has the Mother, excluding the current pregnancy?	Number of children already has.

Table 8: Continued

Economic Variables		
Cost of care	How does the mother describe cost of antenatal care?	0= No problem 1= Small problem 2= Big problem
Income	What is the income level of the mother?	Income as measured by welfare index
Access to information Radio	How often does the mother listen to radio?	0=not at all 1=less than once a week 2=at least once a week 3=almost everyday

Source: GDHS 2003

Hitherto, a pregnant woman has to pay for the cost of antenatal care. But with the introduction of the national health insurance, those who are covered by the insurance do not make any out-of-pocket payment at the point of use. However, the effects of this health insurance cannot be estimated since the current data does not capture it.

Measurement of Variables and Apriori Expectations

The main dependent variable in the model specified is Antenatal Care. This is a dichotomous variable measured by attendance to antenatal care by the respondent. The respondents were asked whether they attended antenatal care or not during pregnancy and the type of facility chosen. If the woman visited a public facility = 1; otherwise = 0, if a

woman chooses private facility =1; otherwise = 0 and if a woman chooses other facilities = 1; otherwise = 0.

The explanatory variables included in the model are level of education of the woman, area of residence, age, cost in terms of distance, household size, number of children the woman already has, occupational status, income in terms of wealth index and frequency of listening to radio.

Area of residence is measured as a dummy variable where the respondents were asked to indicate whether they lived in urban area or rural area. Value of 1 was assigned if the woman lived in urban area and 0 if otherwise (i.e. if she lived in rural area). A positive relationship between area of residence and demand for antenatal care is expected, that is, those living in urban areas are expected to attend antenatal care more than those in rural areas.

Another variable included in the model is the number of household members. This variable is measured as a discrete variable. Here, the respondents were asked to indicate the number of members of their household. A negative relationship is expected between number of household members and demand for antenatal care. This implies that as the number of household members increases, it puts family income under pressure and therefore limits the ability of the pregnant mother to attend antenatal care.

Two economic variables are of interest here; household income and cost of antenatal care. The GDHS 2003 did not contain data on household income and cost of antenatal care. Therefore, wealth index was used as proxy for income whilst distance to the nearest health

care center was used as proxy for cost. The Ghana Statistical Service (GSS) used a method of principal component analysis to arrive at the wealth index. The respondents were grouped into five wealth quintiles based on possession of household durables such as radio, television set, refrigerator, bicycle, motor cycle/scooter and car/truck and other facilities such as electricity, toilet facilities, source of drinking water and housing structure (i.e. main floor material, main wall material and main roof material). For the purpose of this study, the respondents were classified into three wealth tertiles such that those who are poorest and poorer, are considered poor, middle wealth, and also those who are richer and richest are grouped as rich. Values ranging from 1 to 3 were assigned to each wealth tertile, thus, poor =1, middle=2, rich =3. Respondents falling within poorest and poorer wealth tertiles could be considered to belong to low income households and those within richer and richest tertiles belong to high income households. Apriori, a positive relationship is expected between wealth and demand for antenatal care. This implies that the higher the household income the more antenatal care services a pregnant woman will demand.

Distance to the nearest health care facility was used as a proxy for cost of antenatal care. This is measured as a trichotomous variable and values of 0, 1 and 2 were assigned to the responses. The respondents were asked to describe how they got medical care, in terms of getting money needed to take transport and the distance to the nearest health care facility. They were to describe whether these were problems or not. If the response was “no problem”, value of 0 was assigned. If it was “small problem” 1 was assigned and if it was “big problem”, value of 2 was assigned. A negative relationship between distance and demand for antenatal care is expected, that is, the closer a pregnant woman is to a health

care facility, the more accessible health care services is and will increase the number of antenatal care attendance.

Other variables are level of education and occupation. The level of education of the woman was measured as a polychotomous variable where values were assigned to each level of education. Thus, 0 = no education, 1= primary education, 2= secondary education and 3= higher education. A positive relationship between level of education and demand for antenatal care is expected. That is, the higher the level of education the more a pregnant mother is likely to attend antenatal care. The occupational status of the woman was measured as dummy. If the woman was working or engaged in any kind of occupation, value of 1 was given but if the woman was not working, 0 was assigned. We expect a positive relationship between occupation and demand for antenatal care.

Two variables concerning gynaecological history of the woman were included. These are the age at delivery and number of children the mother already has or parity of the pregnancy. Age at delivery was measured as a ratio scale variable. The respondents were classified into three age groups and a value was assigned to each age group. The three age groups are thus, < 20 =1, 20 – 35 = 2, 36 + = 3. The relationship between age of the woman and demand for antenatal care is expected to be mixed. The number of children the woman already has is measured as a discrete variable. The respondents were asked to give the number of children they already have. The relationship between the number of children the mother already has and demand for antenatal care is expected to be negative just like number of household members. The mother may have enough pregnancy experience and therefore may not need to attend antenatal care. If the pregnant mother thinks she has

enough pregnancy experience and does not consider the current pregnancy as a risk factor demand for antenatal care may fall. Otherwise, she is more likely to attend antenatal care.

The last explanatory variable included in the model is household characteristics variable. This captures how the respondents process information. It includes the frequency at which the woman listens to radio. This variable is measured as polychotomous variable and values given to the response based on how frequent the respondent listens to radio. Values from 0 to 3 were assigned to the responses, thus, if the respondent did not listen to radio at all, value of 0 was assigned, if "less than once a week" 1 was assigned, if "at least once a week"=2 and "almost everyday"=3. A positive relationship between this variable and demand for antenatal care is expected. The more a pregnant woman listens to radio, the more informed she may become and will be more likely to attend antenatal care.

Conclusion

The choice of the multinomial logit model was based on nature of the dependent variable, antenatal care visit. This is measured as trichotomous where the pregnant woman is faced with between alternative care providers. The independent variables are extracted from the GDHS 2003. These variables have been manipulated to suit this model. Although the 2008 version of the GDHS has been released it could not be used in this study because this work had reached an advanced stage and also due to lack of easy accessibility.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter is divided into three sections. The first section looks at the summary statistics results, that is, the general characteristics of the respondents, the second section looks at the equation for estimation and the third section discusses the results.

General characteristics of the respondents

The data for this study is from the Ghana Demographic and Health Survey (GDHS) collected by Ghana Statistical Service (GSS) in 2003. The data contains information on the number of eligible women in each of the households included in the sample as well as region and area of residence. The dada also captures information on the level of education of the women, their age group, number of antenatal visits and the household wealth of the respondents. In addition, the survey captured information on marital status, occupation as well as the kind of health professionals and health facilities that the women visit for antenatal care.

The samples in the survey (GDHS, 2003) covered all the ten regions of Ghana and captured 5691 eligible women among which 2777 had a baby at least five years preceding the survey period. The regional distribution of the sample is shown on Table 9.

Table 9: Frequency of Region of Residence of Women.

Region	Frequency	Percentage
Western	237	8.53
Central	168	6.05
Greater Accra	264	9.51
Volta	202	7.27
Eastern	228	8.21
Ashanti	423	15.23
Brong Ahafo	337	12.14
Northern	429	15.45
Upper West	265	9.54
Upper East	224	8.07
Total	2777	100.00

Source: Researcher's Calculation based on GDHS 2003.

It can be observed from Table 9 that the largest number of the eligible women was from the Northern Region that is, 429 women, that is, 15.45 percent of the total respondents. This is followed by Ashanti Region which had 423, that is, 15.23 percent and Brong Ahafo Region 337 or 12.14 percent of the respondents. There were 265 women, that is, 9.54 percent of the respondents from the Upper West Region and 264 (9.51 percent) were from the Greater Accra Region. Eastern Region had 228 (8.21 percent), 237 women, that is, 8.53 percent of the respondents were from the Western Region and 202 (7.27 percent) were from the Volta Regions. The least sample was taken from the Central Region, that is, 168 or 6.05 percent of the women.

Table 10: Highest Educational Level of the Women

Highest Education	Frequency	Percentage
No. Education	1272	45.80
Primary	577	20.78
Secondary	897	32.30
Higher	31	1.12
Total	2777	100.00

Source: Researcher's Calculation based on GDHS 2003.

The GDHS 2003 data also contains information on the level of education of the women. The distribution of the educational attainment of the women is shown on Table 10. It can be observed from Table 10 that the highest level of education attained by most women is secondary education. That is, 897 women, or 32.30 percent of the total respondents attained secondary education whilst only 31 women, that is, 1.12 percent attained higher education. However, the largest proportion of the women, that is, 1272, that is, 45.80 percent had no education. It can also be observed that only 577 of the women, that is, 20.78 percent had primary education only.

Out of the 2777 respondents, the largest proportion of the women, that is, 1814, (65.32 percent) was between the ages of 20 - 35. The rest of the statistics are shown on Table 11. It can be observed that 840 women, that is, 30.25 percent were aged 36 and above whilst 123, that is, 4.43 percent were teenagers, under 20 years.

Table 11: Age Group of the Women

Age Group	Frequency	Percentage
< 20	123	4.43
20-35	1814	65.32
36 +	840	30.25
Total	2777	100.00

Source: Researcher's Calculation based on GDHS 2003.

The respondents were also classified into three wealth tertiles as poor, middle and rich. From Table 12 we can observe that a larger proportion of the respondents came from poor households.

Table 12: Frequency of Wealth of the Women

Wealth Index	Frequency	Percentage
Poor	1482	53.36
Middle	503	18.11
Rich	792	28.53
Total	2777	100.00

Source: Researcher's Calculation based on GDHS 2003.

It can be observed from Table 11 that 1482 women, that is, 53.36 percent came from poor households whilst 792 or 28.53 percent came from rich households. It can also be noted that 503 or 18.11 percent belonged to middle income household.

Table 13: Marital Status of the Women

Marital Status	Frequency	Percentage
Never Married	87	3.13
Married	2273	81.85
Living Together	236	8.50
Widowed	40	1.44
Divorced	48	1.73
Not Living Together	93	3.35
Total	2777	100.00

Source: Researcher's Calculation based on GDHS 2003.

The marital status of the women as indicated in Table 13 shows that the largest proportion of the women was married and lives together. It can be observed from Table 13 that 2273 women, that is, 81.85 percent were married and only 87 or 3.13 percent of them were not married. We can also observe that 236 or 8.50 percent were living together whilst 40 or 1.44 percent were widowed, 48 or 1.73 percent were divorced and 93 or 3.35 percent of them were not living together.

The employment status of the women showed that the majority of the women were working. Table 14 shows that 2422 of the women, that is, 87.22 percent were working whilst only 351 or 12.64 percent were not working. However, 4 or 0.14 percent of the responses were missing.

Table14: Frequency of Work Status of Women

Working	Frequency	Percentage
No	351	12.64
Yes	2422	87.22
Missing	4	0.14
Total	2777	100.00

Source: Researcher's Calculation based on GDHS 2003.

According to the World Health Organisation (WHO) standard, a pregnant woman is expected to make a minimum of four antenatal visits. From the survey data, out of 2777 eligible women, 2566 attended at least one antenatal visit. As indicated on Table 15 a larger proportion of the women attended 4+ antenatal visits. It can be observed from the table that 384 women, that is, 13.83 percent of the respondents attended four visits, 365 or 13.14 percent of the women attended five visits and 340 or 12.24 percent of the women made six visits. It can also be observed that whilst 126 or 4.54 percent of the women made ten visits 211 or 7.60 percent did not attend antenatal care and 103 of the respondents, that is, 3.70 percent did not know whether they attended antenatal care or not. It can also be observed that 11 or 0.40 percent of the responses were missing from the data.

Table 15: Antenatal Visit for Pregnant Women.

No. of Visits	Frequency	Percentage
No visit	211	7.60
1	115	4.14
2	155	5.58
3	301	10.84
4	384	13.83
5	365	13.14
6	340	12.24
7	206	7.42
8	215	7.74
9	121	4.36
10	126	4.54
11+	124	4.47
Don't know	103	3.70
Missing	11	0.40
Total	2777	100.00

Source: Researcher's Calculation based on GDHS, 2003

Table 16: Antenatal Care Attendance by Facility.

Facility	Frequency	Percentage
Government hospital	1504	54.16
Government health centre	707	25.46
Public mobile clinic	20	0.72
Private hospital/clinic	212	7.63
Private mobile clinic	10	0.36
Maternity homes	77	2.77
Traditional birth attendant	25	0.90
No visit	211	7.60
Missing	11	0.40
Total	2777	100.0

Source: Researcher's Calculation based on GDHS 2003

Antenatal care attendant at facilities indicate that about79.62 percent of mothers received antenatal care from public facilities. The remaining 20.38 percent received their antenatal care from private and other facilities. Table 16 shows the distribution of percentages of mothers who received antenatal care from various facilities. The statistics show that 1504, women, that is, 54.16 percent received antenatal care from government hospitals and 707 or 25.46 percent received antenatal care from government health centres. In addition, 212 mothers, that is, 7.63 percent received their antenatal care from private hospitals whilst 77 or 2.77 percent received antenatal care from maternity homes. Traditional birth attendants (TBAs) also provided care for 25 or 0.90 percent of the mothers with the remaining attending public and private mobile clinics for antenatal care. However,

211 women, that is, 7.60 percent did not attend any antenatal care whilst 11 or 0.40 percent responses were missing.

The Estimation Equation

The estimation equation for this study is a multinomial logistic specification in the form:

$$P_{ij} = \frac{e^{\beta_j x_{ij}}}{\sum_0^n e^{\beta_j x_{ij}}} = \beta_0 + \beta_2 areares + \beta_3 hhmem + \beta_5 educ + \beta_7 occup + \beta_8 age + \beta_9 no.ofchn + \beta_{10} distance + \beta_{11} wealthidx + \beta_{12} frqradio + \varepsilon_{ij}$$

Where *areares* is location of residence (urban/rural), *hhmem* is number of people living in the household, *educ* is level of education, *occup* is current occupation of the woman, *age* is current age (age groups), *no.of chn* is number of children the mother already has (parity), *distant* is cost of antenatal care in terms of distant to providers, *wealthidx* is wealth index (a measure of income) and *frqradio* is frequency of listening to radio.

Model Estimation

We employed the STATA software for the estimation of the model. To this effect, the coefficients of the multinomial logistic regression were reported. We also report the z-score which is used to test our hypotheses and also calculated the Exp(B). An advantage of the STATA software is that it is able to detect collinearity and drop variables that are causing correlation problems. Number of children the woman already had (No.ofchn) and number of household members (Hhmem) could cause collinearity but none of them was dropped. This is because, in multinomial logit model, collinearity is assumed to be relatively low, as

it becomes difficult to differentiate between the impact of several variables if they are highly correlated (Greene, 2003).

The output on Table 17 is the multinomial logistic regression result. The data captured 2777 women who admitted visiting antenatal care for the past five years preceding the survey. However, 11 responses were missing and therefore bring the number of observations to 2766. The dependent variable or the outcome measure is antenatal visit (ancvisit) to a health facility, that is, choice between public facility, private facility and others (i.e. maternity homes and traditional birth attendants). The base outcome is other facilities, since these are more accessible. The model converged at the sixth iteration with log likelihood of -975.69081 and pseudo R^2 of 0.6023. The two models that have been estimated are the choice of public facility relative to others and private facility relative to others. The result of the estimate is shown on Table 17.

Table 17: multinomial logistic estimation result

Number of observations			2766		
Log likelihood			-975.69081		
Pseudo R^2			0.6023		
Dependent Variable			Antenatal Visit		
Ancvisit	Coefficient	Std Error	Z – score	Exp(B)	P>/z/
Public facility					
Primary	.920301	.3280817	2.81	2.5	0.005**
Secondary	1.212091	.3761257	3.22	3.4	0.001*
Tertiary	-.9297732	1.302819	-0.71	0.4	0.475
Urban	-.6144523	.4574436	-1.34	0.5	0.179
Age	-.2821168	.1319446	2.14	1.3	0.033***
Distance	-.9794363	.2349009	4.17	0.4	0.000*
Hhmem	.1342549	.043951	3.05	1.1	0.002*
No.ofchn	-.0853594	.0843611	-1.01	0.9	0.312
Occupation	1.494419	.2940652	5.08	4.5	0.000*
Wealthidx	.6072524	.1477884	4.11	1.8	0.000*
Frqradio	.1514272	.1057054	1.43	1.2	0.152

Table 17 continued

Ancvisit	Coefficient	Std Error	z-score	Exp(B)	P>/z/
Private facility					
Primary	.4568813	.2194416	2.08	1.6	0.037***
Secondary	.9621091	.326415	2.95	2.6	0.003*
Tertiary	-1.409196	1.111406	-1.27	0.2	0.205
Urban	.6011328	.2540332	2.37	1.8	0.018***
Age	.2001617	.0888365	2.25	1.2	0.024***
Distance	-.1058759	.1506656	-0.70	0.9	0.482
Hhmem	.0271249	.0294413	0.92	1.0	0.357
No.ofchn	-.1449063	.0577845	-2.51	0.9	0.012***
Occupation	1.618908	.2454626	6.60	5.0	0.000*
Wealthidx	.7881429	.1289869	6.11	2.2	0.000*
Frqradio	.0456317	.0867706	0.53	1.0	0.599

Source: GDHS 2003.

Note: * denotes significant at 1% and ** denotes significant at 5%, *** denotes significant at 10%

Testing Hypothesis

In logistic/multinomial regression model, testing a null hypothesis H_0: $\beta_i = 0$ versus H_a: $\beta_i \neq 0$ is equivalent to testing the null hypothesis H_0: $e^{\beta}{}_i = 1$ versus H_a: $e^{\beta}{}_i \neq 1$. The test statistics for the co-efficient estimate is given as

$$\frac{\beta_i}{Se(\beta_i)} = Z$$

Where β_i is the co-efficient of the parameter estimated and Se (β_i) is the standard error of the parameter. The z-scores in Table 17 are compared with a critical value of 1.96. We accept the null hypothesis when the z-score is greater than 1.96 and reject the null hypothesis when the z-score is less than 1.96 at 5 percent significant level.

It was hypothesised that demand for antenatal care is not determined by the woman's wealth (i.e. income). The z-score for wealthidx as shown on Table 17 has a z-score greater than the critical value of 1.96 at 1 percent significance level and therefore we fail to accept the null hypothesis that the woman's wealth or income does not determine demand for antenatal care. This implies that income is statistically important in determining demand for antenatal care in Ghana.

It was also hypothesised that demand for antenatal care is not determined by distance (which is a proxy for cost). The z-score of 4.17 and 0.70 for the choice of public facility and private facility respectively, as shown on Table 17 implies that we reject the null hypothesis in favour of the alternative hypothesis for the choice of public facility. This implies that distance is a determinant of choice of public facility for antenatal care.

Another hypothesis is that area of residence of the woman does not determine demand for antenatal care. From Table 17, the absolute z-score for area of residence (urban) is 2.14 for the choice of public facility and 2.37 for private facility. This value exceeds the critical value and therefore we fail to accept the null hypothesis, that is, at 10 percent significance level, demand for antenatal care is determined by the area of residence. This implies that women in urban areas are more likely to visit public and private facilities for antenatal care than those in rural areas.

Again, it was hypothesised that demand for antenatal care is not determined by the level of education of the woman. It can be observed that at 5 percent significance level the z-score for educational dummies are above the critical value and therefore we fail to accept the null hypothesis. This implies that demand for antenatal care is determined by the level of education. However, the z-score for tertiary dummy shows that educational attainment above secondary level does not determine demand for antenatal care. This implies that women with primary and secondary education are more likely to attend antenatal care than those with tertiary education. The results for the Wald test for the independent variables are shown on Table 18. This is based on the hypothesis that;

H_0: All coefficients associated with the given variables are 0.

Table 18: Wald test for the independent variables

Ancvisit	Chi^2	Degree of freedom	$P> Chi^2$
Primary	8.32	2	0.0156
Secondary	10.76	2	0.0046
Tertiary	1.86	2	0.3940
Urban	5.65	2	0.0594
Age	22.24	2	0.0000
Distance	20.52	2	0.0000
Hhmem	19.42	2	0.0001
Noofchn	14.88	2	0.0006
Occup	43.56	2	0.0000
Rich	39.35	2	0.0000
Frqradio	2.59	2	0.2736

Source: Researcher's calculation based on GDHS, 2003

From Table 18, we compare the calculated P-values with critical or generally used criterion of 0.05 to reject or accept the null hypothesis. If the calculated P-value is less than the generally used criterion of 0.05, then the coefficients are simultaneously equal to zero. From Table 18, we fail to accept the null hypothesis, since P-values for tertiary, urban and frequency of listening to radio (freqradio) are greater than 0.05. This means that these variables are not statistically significant in determining demand for antenatal care at either public or private facilities.

Also, the Hausman's specification test shows that the assumption of independence of irrelevant alternatives has not been violated. Given the difference between the full model

and the restricted model and the chi-squared of 723.83, we can say that the model is consistent with the null hypothesis. The result of the test is shown on appendix A.

Discussion of Results

From Table 17, comparing the choice between public facility and other facilities, it can be observed that a woman with primary level of education is 2.5 times likely to visit public facility for antenatal care whereas a woman with secondary level of education is 3.4 times likely to visit public facility for antenatal care. However, a woman with tertiary level of education is 0.4 times less likely to visit public facility for antenatal care. It can be observed that as the woman's level of education improves from primary to secondary level, she is more likely to visit public facility for antenatal care.

Also, comparing the choice between private facility and other, a woman with primary level of education is 1.6 times likely to visit private facility for antenatal care. In the same vein, a woman with secondary level of education is 2.6 times likely to visit private facility for antenatal care but a woman with tertiary education is 0.2 times less likely to visit private facility for antenatal care. The implication of this is that a woman with tertiary education is more likely to visit TBAs and maternity homes for antenatal care (B = -.9297732 and -1.409196). This is a surprising result. However, it can be concluded that level of education of a woman is significant in determining demand for antenatal care at public and private facilities. This result confirmed an earlier study in Ghana by Overbosch et al (2003) and what was found in other countries (Ortiz, 2007) for Columbia; (Lindelow, 2002) for Mozambique; (Hallman, 1999) for Philippines; and (Elo, 1992) for Peru.

It can also be observed from Table 17 that income is statistically significant at 1 percent level, in determining demand for antenatal at both public and private facilities. As shown by wealthidx, a woman from rich household is 1.6 times likely to visit public facility for antenatal care. In the same vein, a woman from rich household is 2.2 times likely to visit private facility for antenatal care. This implies that as household income increases, a woman from rich household is more likely to visit public and private facility for antenatal care than others. This confirms a study done by Ssewanyana et al (2004) in Uganda.

Comparing choice between public facility and others, it can be observed that a unit increase in number of household members will result in increased in multinomial log-odds of visiting public facility for antenatal care by 0.13 holding all other variables constant. In the same way, comparing choice between private facility and others, a unit increase in the number of household members will increase the multinomial log-odds of choosing private facility by 0.03. Also, it can be observed from Table 17 that comparing choice between public facility and others, as the number of children a woman already has increases, she is 0.9 times likely to visit public facility for antenatal care. The same applies to the choice between private and other facilities. The implication of this is that as the household size increases the pregnant woman is more likely to visit a public and private facilities for antenatal care than others but when the number of children she already has is increased she is more likely to visit other facilities. This finding is contrary to that of Abusaleh et al (2002) in India. However, the implication of this is that an additional child or household member may impose further economic burden on the mother or the household, particularly, where the household faces increasing demand for other household consumption or non-health consumption goods in the face of scarce resources. This may induce the pregnant

woman to visit relatively low cost facility. Ching (1992) also acknowledged that a large family may have less income per capita than a small family of the same income level. This may reduce a large family's actual use of health services because of lower purchasing power.

Again, comparing the choice of public facility to others, we can deduce from the table that a unit increase in the age of the woman will reduce the log-odds of visiting a public facility by 0.28. In other words, as the woman grows older she is 1.3 times less likely to visit public facility for antenatal care. Also, when we compare the choice of private facility to others, we can observe that a unit increase in the age of the woman will also increase the log-odds of visiting other facilities by 0.20. In other words, older women are 1.2 times likely to visit private facility for antenatal care. The implication of this is that, as the woman gets older she is more likely to visit private facility for antenatal care than other facilities. In other words, the older the woman the more likely she will attend antenatal visit at private facility. The Reproductive and Child Health (RCH) Unit of Ghana Health Service (GHS) reported that the age of a mother during pregnancy is an important risk factor which influences pregnancy and birth outcome. It exerts its influence anthropometrically and socio-economically (RCH/GHS, 2006). The report indicated that pregnancy in women 19 years and below and those who are 35 years and above carry greater risks than those between the ages of 20 years to 34 years.

We can also infer from Table 17 that when we compare the choice of public facility to others, a unit increase in distance (cost) will reduce the choice of public facility by 0.98 holding all other variables constant. Also, a unit increase in distance (cost) will reduce the log-odds of visiting private facility relative to others by 0.12 holding all other variables

constant. In other words, as distance increases, a woman is 0.4 times less likely to visit public facility and 1.0 time likely to visit private facility for antenatal care. This implies that as cost of antenatal care (i.e. distance to the facility) increases, a pregnant woman is more likely to visit other facilities like traditional birth attendants and maternity homes for antenatal care. Distance has been used as a proxy for cost of care. It is also used to capture accessibility to health care. The closer the facility is to the mother the more accessible is health care. This may also imply relatively lower cost of antenatal care. It therefore, reasons, to imply that the closer a pregnant mother is to public and private health facilities, the more likely she will attend antenatal care. This finding confirms the earlier finding by Overbosch et al (2003). They found that in Ghana, access to health facilities is limited to women in the rural areas. For these women, they would have to walk for a distance of about five kilometers before getting to the nearest facility. This situation can cause delay in seeking antenatal care. Lack of access to health care facility also accounts for high level of maternal and infant mortalities.

Again, comparing choice between public facility and others, it can be observed that area of residence of the woman is not statistically significant in determining demand for antenatal care at public facility. From Table 17, comparing choice between public and other facilities, a woman in urban area is 0.5 times likely to visit public facility for antenatal care. However, comparing choice between private facility and others, a woman in urban area is 1.8 times likely to visit private facility for antenatal care than those in the rural areas. This finding is contrary to what was found in Columbia by Ortiz (2007) but confirms the finding by Elo (1992) in Peru and Yareh et al (2002) for Ethiopia. Women in the urban areas might be more educated and well informed about health issues and importance of antenatal care.

They may also have more say in decisions that affect their health and may take appropriate measures even before their husbands are aware, than those in rural areas.

Again, from Table 17, it can be observed that occupational status of a woman is statistically significant in determining demand for antenatal care at both public and private facilities. Comparing choice between public facility and other facilities, a working woman is 4.5 times likely to visit public facility for antenatal care. Also, comparing choice between private facility and other facilities, a working woman is 5.0 times likely to visit private facility for antenatal care than other facilities. This implies that women who are working are more likely to visit public and private facilities for antenatal care than women who are not working. This may be because these women might belong to labour unions and their collective bargaining agreements may provide such privileges and guarantee access to antenatal care services.

Finally, we can observe from Table 17 that frequency of listening to radio (access to information) is not statistically significant in determining demand for antenatal care at both public and private facilities. However, comparing choice between public facility and other facilities, a woman who listens to radio frequently is 1.2 times likely to visit public facility for antenatal care. In the same vein, comparing choice between private facility and other facilities, a woman who listens to radio regularly is 1.0 time likely to visit private facility for antenatal care.

Conclusion

From the result and discussions it can be concluded that in Ghana, level of education of a woman, household income (wealth index), occupational status, age and area of

residence of the woman are statistically significant and have positive impact on demand for antenatal care. However, the choice of facility is influenced by various factors. Variables that are significant in determining the choice of public facility are the level of education of the woman, age, distance (cost), number of household members, occupational status and household income (wealth index). Whereas level of education up to secondary level, age, number of household members, occupation and income (wealth index) have positive impact on the choice of public facility, distance (cost) has negative impact on the choice of public facility. Also, whereas level of education up to secondary level, area of residence, age, occupation and household income have positive influence on the choice of private facility, the number of children the woman already has, has negative impact on the choice of private facility.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summaries the study and discusses the findings and conclusions. It also discusses the policy implications of the study and made recommendations. Finally, the weaknesses in this study were discussed and suggestions for areas of further research were made.

Summary

The main objective of this study is to find the determinants of demand for antenatal care in Ghana. The national coverage of antenatal care has been irregular since the year 2000 even though there have been relative improvement in health care facilities and increase in the number of health professionals. In addition, the health care sector has adopted a number of policies and strategies aimed at improving on maternal and child health care in Ghana. Among these policies and strategies are the safe motherhood programme which aimed at improving upon women's health in general and especially to reduce maternal and infant morbidity and mortality and the focused antenatal care. Another strategy was the introduction of Community-based Health Planning and Services (CHPS) programme which also aimed at bringing health care closer to the people as well as free maternal care policy.

Many studies have found positive relationship between antenatal care and pregnancy outcome. That is to say that antenatal care is thought to have beneficial effect of reducing pregnancy related risks and saves lives of pregnant mothers and their unborn babies. If this is the case, then it might be seen to be reflecting on national antenatal care coverage; but this is not.

Most of the studies on demand for health and health care used the human capital model developed by Grossman (1972). In this model, health is considered as a stock of capital which may increase as a result of investment in health by way of buying health services or spending time on health activities. However, this model has seen several extensions and reformulations to suit the type of study and variables use. Recent studies in the field of demand for health care were based on the theory of utility maximisation model. Logistic, probit and multinomial logistic models were often used.

This study also reviewed Ghana health care system where the various health care providers and their contributions to health care delivery in Ghana were reviewed. These include public sector providers, private-for profit and NGO providers and the informal sector providers which include traditional herbal practitioners and spiritual healers. Demand characteristics of women in Ghana were also reviewed as well as cost of antenatal care.

Having carefully reviewed related literature, this study used a multinomial logistic regression model and considered variables concerning the environmental factors that could affect demand for antenatal care, personal characteristics variables, economic variables and variables on gynaecological history of the mother as well as household characteristics, that is, exposure to information, in the model.

The data for this study was a secondary data extracted from Ghana Demographic and Health Survey (GDHS) conducted in 2003. STATA software was employed to analyse the data in multinomial logistic regression, using the maximum likelihood estimation method. The coefficients were reported on Table 17.

Conclusions

From the results and the discussions that followed, we found that factors determining demand for antenatal care in Ghana are level of education, cost, in terms of distance to the nearest health facility, household income in terms of wealth index, occupational status, age and area of residence. Other variables such as household size and number of children the woman already has have also been found significant.

It can be concluded that in Ghana, level of education of a woman, household income (wealth index), occupational status, age and area of residence of the woman are statistically significant and have positive impact on demand for antenatal care. However, the choice of facility is influenced by various factors. Variables that are significant in determining the choice of public facility are the level of education of the woman, age, distance (cost), number of household members, occupational status and household income (wealth index). Whereas level of education up to secondary level, age, number of household members, occupation and income (wealth index) have positive impact on the choice of public facility, distance (cost) has negative impact on the choice of public facility. Also, whereas level of education up to secondary level, area of residence, age, occupation and household income have positive influence on the choice of private facility, the number of children the woman already has, has negative impact on the choice of private facility.

Access to health care facilities has been found to be the biggest challenge facing delivery of efficient health care in general and antenatal care services to pregnant mothers in particular, especially those living in rural communities. This has reflected in the long distances that these women have to travel before reaching the nearest health care facility. In absence of public and private health facilities the only choice is maternity homes and traditional birth attendants. There is therefore, the need to improve upon accessibility to health care facilities by putting up more health compounds in rural communities where facilities are limited or non-existent. Health education on radio in Ghanaian Languages must be intensified. In this vein, the current advertisement being run on the national radio station on the importance of antenatal care attendance should be intensified and also be aired on all private local FM stations. This advertisement, sponsored by Planned Parenthood Association of Ghana (PPAG) is on how a man took his pregnant wife to antenatal care, realising the importance of care during pregnancy. Also, government policy of free maternal care for all mothers is in the right direction and should be sustained. However, this policy can only achieve the desired goal only if there is improvement in accessibility to quality health care. Government should therefore, provide more health care facilities in the rural areas and equip them with equipment and health professionals.

Policy Recommendations

Given the limited facilities and access to health care, there is the need for Ministry of Health to provide more health care facilities, especially in the rural areas so that the problem of having to travel a long distance before getting to the nearest health care facility will be minimised. It is only by this that government's policy on free maternal care can

achieve its objectives and also help achieve the Millennium Development Goals (MDGs), especially, numbers four and five. That is, reducing child mortality and improvement in maternal and child health. Provision of health compounds in rural communities, man by qualified professional nurses will be a first step towards achieving this goal.

Ministry of Health should collaborate with Ministry of Education to incorporate maternal and child health as well as antenatal care studies into the curriculum of basic and senior high schools. Finally, government should create more job opportunities in addition to microfinance assistance to those engaged in small and medium scale businesses. Also government should undertake poverty reduction activities/policies that will enhance household incomes.

Weaknesses of the Study

One major weakness in this study is exclusion of National Health Insurance membership. This could have been a good measure of cost but the DHS 2003 data did not capture it. Data could have been collected on it and included in this study but this is beyond the scope of this study. Any further study on this subject matter should consider National Health Insurance membership as well as current free maternal care policy as important explanatory variables.

This study also excluded transportation cost to the nearest facility as well as influence of husband and educational level of husband. In addition, a more current GDHS data, that is, 2008 version could not be used for this study due to lack of access to it and also this study was almost complete before the release of the report. Also several health care policies and strategies implemented after 2004 were not adequately reviewed.

Areas for Further Research

This study concentrated more on variables pertaining to characteristics of individual consumer (i.e. the pregnant woman). Quality of care provided in terms of availability of health care facilities and attitude of care providers towards the pregnant women who visit antenatal care clinics was not captured. This should be considered as an area for further research.

Another area for further research is to investigate the effects of the national health insurance membership and the free maternal care policies on the utilisation of antenatal care in Ghana. Also, studies on demand for antenatal care in Ghana concentrated on the use of secondary data from Ghana Statistical Service, particularly Demographic and Health Survey (DHS) and Ghana Living Standard Survey (GLSS). Further studies in this area should consider primarily collected data.

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APPENDIX A

Hausman's Specification Test

Ancvisit	A	C	Difference	S.E
Primary	-1.125639	-.7791002	-.3465387	.1709593
Secondary	-1.500312	-1.391935	-.1083776	.1792021
Tertiary	.4607548	.7175242	-.2567694	.6934386
Urban	-.5132263	-1.344318	.831092	.1879165
Age	-.3565389	-.57173	.2151911	.0736395
Distance	-1.40512	-1.368239	-.0368828	.1209387
Hhmem	-.1424331	-.167171	.0247379	.0244531
Noofchn	.1298842	.2772408	-.1473566	.0467837
Occup	-1.532581	-1.659397	.1268158	.1587291
Wealthidx	-.0332045	.2611799	-.2943844	.1590936
Frqradio	-.2445196	-.1740063	-.0705133	.0608313
Constant	5.634379	4.128744	1.505635	.2741442

Source: Researcher's Calculation

H_0: Difference in coefficients not systematic

Chi^2 (12) = 723.83

Prob > chi^2 = 0.0000