Demographic and social correlates differentiating Ghanaian women receiving optimal versus sub-optimal antenatal care; the 2008 Measure DHS+ Project.

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Thesis submitted in partial fulfilment of the requirements for the degree
Master of Philosophy (Health Promotion)
University of Bergen, 2012

Acknowledgements

My first gratitude goes to the Lord God Almighty who makes all things beautiful in His time and makes even the impossible possible.

You gave me the opportunity that almost did not exist. Your guidance, advice, constructive criticism and support in diverse have been invaluable. Your wisdom and experience to overcome difficult technical and academic challenges has made this thesis complete. Without your excellent academic supervision, I could not have come this far. I will forever be grateful to you Maurice.

My next gratitude goes to you Torill. It all started with you in Ghana. Here in Norway, your support, encouragement and expertise have made this program easier than it would have been without you. Your advice and eagle eyes in my research has also been invaluable. I am grateful to you and your family for all you have done for me.

I wish to also express my sincere thanks to you Elizabeth, Marguerite, Ellen, Helga, Claudia, Annegreet and everyone at the HEMIL centre who in diverse ways have contributed to making this program a success. Your collective effort have modelled and shaped me and made my dream of achieving this master's degree a reality.

I also wish to thank all my colleagues in the international masters program for your mutual support, cooperation and inspiration which made the program fun. We really functioned and worked as a unit and a family and I'm grateful to you all.

A big thanks to the Norwegian Government through the State Educational Fund, Lånekassen, for all the financial support throughout the program. Without this support, it would have not been possible to go through this program.

Finally, but not the least, my sincere gratitude to my wife Portia and Jessica our daughter. Due to my travel abroad, you had to be a single mother raising our daughter alone. For the same reason, you missed daddy's presence and affection Jessica, I love you both. I am also grateful to my entire family and my wife's family for all your support especially during my absence.

Bergen, 21.05.2012

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Abstract

Introduction: This study explored the demographic and social correlates differentiating women receiving optimal antenatal care (ANC) from those receiving sub-optimal care in Ghana.

Methods: A national sample (n=1970) was studied. The sample consisted of women aged 15-49 years from all the ten regions, and from both urban and rural parts of Ghana. Data for the study were obtained from the Measure Demographic and Health Survey 2008 (Measure DHS+ 2008). The variable of optimal and sub-optimal antenatal care was composed by determining the number and timing of antenatal care visits to health facilities and the content of the service package given to women at ANC facilities. The influence of a wide array of variables on optimal antenatal care was tested through bivariate and logistic regression analyses performed using IBM's SPSS version 19.

Results: Only one classical social determinant of health, wealth, was statistically significantly associated with optimal antenatal care. The other variables that were not classical social determinants of health but also statistically significant were; health insurance coverage, participating in a literacy program, getting money for medical treatment and concern about the availability of drugs at medical facility after controlling for age. Wealth was by far the strongest predictor of optimal care after controlling for age. Compared to women living in households in the richest quintile as the reference group, women in the middle quintile were 1.7 times more likely to have received sub-optimal antenatal care. The odds of receiving sub-optimal care were 2.1 and 2.9 in the poorer and poorest quintiles, respectively compared to the reference category. Compared to the reference category which was women having health insurance, women without health insurance were 1.3 times more likely to have received sub-optimal antenatal care. With regards to participating in a literacy program, the odds of receiving sub-optimal care was twice for not participating in a literacy program compared to participating in a literacy program which was the reference category. In relation to getting money for medical treatment, women who had difficulty getting money for medical treatment were 1.2 times less likely to have received optimal care compared to the reference group which was having no problem getting money for medical treatment. Finally, regarding the concern for the availability of drugs at medical facilities, no risks were found associated with this variable. Despite the statistical significance of the associations, the fit of the logistic regression model was poor, with just between 4 and 11 percent of the variance in the antenatal care variable accounted for by variance in the predictor variances combined.

Discussion: With only one classical social determinant of health being a predictor of optimal antenatal care and other widely used measures such as education and occupation not being successful at predicting optimal care, the indication is that there are other factors such as structural and cultural factors that could help explain what factors differentiate women receiving optimal care from those receiving sub-optimal care which were not addressed by this survey. The results of this study however confirm findings in other studies on antenatal care especially in developing countries.

Conclusion: The outcome of this research makes it imperative for a follow-up qualitative study to study into the life situations of both women receiving optimal and sub-optimal care to determine what factors differentiate the two groups of women.

Table of Contents

1.0 INTRODUCTION

1.1 Study aim

The aim of this study was to identify the demographic and social factors that differentiate women receiving optimal antenatal care (ANC) from those who receive sub-optimal antenatal care. The approach of this study was explorative and sought to identify the demographic and social characteristics that determine optimal antenatal care in the context of the Ghanaian society.

1.2 Background

One hundred and eighty-nine (189) countries endorsed the Millennium Development Goals (MDGs) and signed up to meeting eight goals (1). The fifth MDG is to "improve maternal health". Maternal death was, however, chosen as the indicator with which to measure progress towards this goal, thus bringing renewed attention to what is a 21st century problem essentially only for the poor, and one virtually eliminated for people with the means and status to access health care (1). Such a marker of global inequity is shocking and is an indication of wider development issues targeted in some of the other MDGs, especially on poverty, education, and gender (1). The Millennium Declaration is, however, the first time that maternal mortality has featured so prominently in the high ranks of a global pronouncement, providing an opportunity to galvanise action and so help ensure that the risk of maternal death is minimised for all women. Such action needs to be informed by an understanding of who is dying, when, where, and why (1).

1.3 Maternal mortality

Pregnancy is one of the most important periods in the life of a woman, a family and a society (2). As a result of its importance, extraordinary attention is therefore given to antenatal care by the health care systems of most countries (2).

The fifth Millennium Development Goal (MDG) of the United Nations places the improvement of maternal health in the mainstream development agenda. In spite the importance of maternal health care services, the needed attention is yet to be given in some regions of the world. Maternal mortality or maternal death refers to the death of a pregnant woman as a result of the pregnancy or from any cause related to the pregnancy but not from accidental cause (3). Maternal mortality remains a major challenge to health systems

worldwide. Reliable information about the rates and trends in maternal mortality is essential for resource mobilisation, and for planning and assessment of progress towards Millennium Development Goal 5 (MDG 5), the target for which is a 75% reduction in the maternal mortality ratio (MMR) from 1990 to 2015 (4, pp. 1609). The maternal mortality ratio (MMR) refers to the number of women dying yearly per 100,000 live births in relation to pregnancy, birth and other related problems (3).

Globally, the United Nations estimates reveal that fewer women are dying of pregnancy-related causes, but about 1000 women die daily and more needs to be done to achieve set targets (5). There has been mixed performances across the world since the MDGs were set. Many parts of the world are making great progress towards achieving MDG 5. Between 1990 when the MDGs were set and 2008, the number of women dying as a result of complications during pregnancy and child birth has seen a decrease of 34 percent from an estimated 546,000 in 1990 to 358,000 in 2008 (6). Although the progress is notable, the current rate of decline is said to be less than half of what is needed to achieve the set target of reducing maternal mortality ratio by 75 percent by 2015 (5). Reducing maternal mortality rate, defined as the number of maternal deaths in a given period per 100,000 women of reproductive age during the same time-period, by 75 percent requires an annual decline of 5.5 percent, while the current 34 percent decline between 1990 and 2008 translates into an annual decline of 2.3 percent (5). At this current decline, it is obvious that the target of reducing maternal mortality ratio by 75 percent will not be achieved globally.

Just as the global picture gives mixed results, so is the actual situation from the different parts of the world. The table below gives indication of maternal mortality ratios across different regions between 1990 and 2008. Only the developed regions, Africa and Asia will be discussed due to the progress made in some of the regions and the lessons that can be learnt for improvements in Ghana. The data from WHO is used because it captures information about maternal mortality for all countries. The regions here refer to the WHO defined regions according to the MDGs.

Table A. Comparison of 1990 and 2008 maternal mortality by United Nations MDG regions.

Region	1990[a]		2008[a]		% change in MMR between 1990 and 2008	Annual % change in MMR between 1990 and 2008
	MMR	Maternal deaths	MMR	Maternal deaths		
WORLD TOTAL	400	546 000	260	358 000	–34	–2.3
Developed regions[b]	16	2000	14	1700	–13	–0.8
Countries of the Commonwealth of Independent States (CIS)[c]	68	3200	40	1500	–41	–3.0
Developing regions	450	540 000	290	355 000	–34	–2.3
Africa	780	208 000	590	207 000	–25	–1.6
Northern Africa[d]	230	8600	92	3400	–59	–5.0
Sub-Saharan Africa	870	199 000	640	204 000	–26	–1.7
Asia	390	315 000	190	139 000	–52	–4.0
Eastern Asia	110	29 000	41	7800	–63	–5.5
South Asia	590	234 000	280	109 000	–53	–4.2
South-Eastern Asia	380	46 000	160	18 000	–57	–4.7
Western Asia	140	6100	68	3300	–52	–4.0
Latin America and the Caribbean	140	17 000	85	9200	–41	–2.9
Oceania	290	540	230	550	–22	–1.4

1.3.1 Maternal mortality in the Developed regions

The countries in this region are located in Europe in addition to Australia, Canada, Japan, New Zealand and the United States of America. Maternal mortality in most European countries is reported to have declined steadily between approximately 1930 and the 1980s and has since reached a relative plateau (7, 8). The reduction in the number of maternal mortalities are said to be a result of scientific and technological developments (9).

a. The MMRs have been rounded according to the following scheme: <100, no rounding; 100–999, rounded to nearest 10; and >1000, rounded to nearest 100. The numbers of maternal deaths have been rounded as follows: <1000, rounded to nearest 10; 1000–9999, rounded to nearest 100; and >10 000, rounded to nearest 1000.

b. Includes Albania, Australia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, the United Kingdom, and the United States of America.

c. The CIS countries are Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, the Republic of Moldova, the Russian Federation, Ukraine, and Uzbekistan.

d. Excludes Sudan, which is included in sub-Saharan Africa.

As a result, almost all women in western countries receive prenatal care, give birth under the supervision of medically trained personnel and have prompt access to emergency treatment if complications arise (9). This package of services has contributed to the reduction of maternal

and neonatal morbidity and mortality coincident with the improvements seen in all sectors of life (9).

While the maternal mortality ratios (MMR) in European countries are low compared with those in developing countries, many of these deaths are preventable, and thus provide a key indicator of the quality of health services offered in each country (10).

Although the maternal mortality ratio in this region has not seen much decline since 1990, it is clear that even before the MDGs were set in 1990, MMR in most of these countries were very low (5). As expected, it is much easier to reduce maternal deaths in regions where mortalities are higher than in regions where mortalities are very high such as sub-Saharan Africa. The United States for example reduced its maternal mortality rate from 376 to 78 deaths per 100,000 live births from 1940 – 1992, leading many to believe that this public health problem had been conquered (11), and currently stands at 24 deaths per 100,000 live births (6). Although the maternal mortality rates existing in developing countries today may be up to 45 times greater than that occurring in developed countries, there is evidence that the magnitude of maternal mortality is seriously underestimated in developed countries (11).

1.3.2 Maternal mortality in Asia

Maternal mortality decline across Asia since the MDGs were set has been encouraging. Improvements across most of east Asia and south Asia, home to more than half the world's population, have been especially impressive (12). A number of countries have seen their maternal mortality rates decline over the past years. Afghanistan located in Asia has the highest maternal mortality ratio anywhere in the world with a current MMR of 1400 per 100,000 live births and a lifetime risk of maternal death being one in eleven women (6). This makes Afghanistan the most dangerous place to be a woman of child bearing age as the probability of dying during pregnancy or child birth is one in eleven women compared with one in 7,000 in northern Europe (13). In spite of this setback, Asia as a whole has seen a remarkable progress, halving its maternal mortality ratio since 1990 (6). Although there has been progress, there are huge disparities across the region. Maternal mortality ratios in South Asia and South-Eastern Asia are currently unacceptably high and much more is needed to achieve the 75 percent reduction in maternal deaths (6). Of the 1000 women who reportedly die each day through pregnancy and birth related complications, South Asia accounts for 30

percent of such deaths. Concerted effort by all stakeholders is needed to ensure that maternal mortalities are reduced to the barest minimum.

1.3.3 Maternal mortality in Africa

It is estimated that 358,000 maternal deaths occurred in 2008, 99% of which occurred in developing countries, with sub-Saharan Africa accounting for 57 % of all deaths (6). Africa as a region generally is regarded as a developing region (14). The risk of a woman dying as a result of pregnancy or childbirth during her lifetime is about one in six in the poorest parts of the world including many African countries compared with about one in 30 000 in Northern Europe. Such a discrepancy poses a huge challenge to meeting the fifth Millennium Development Goal to reduce maternal mortality by 75% between 1990 and 2015.

Ten out of 87 countries with maternal mortality ratios equal to or over 100 in 1990, are said to be on track with an annual rate of decline of 5.5 between 1990 and 2008 (5). Thirty other countries, most of which are in Africa are reported to have made insufficient or no progress since 1990 (5).

There has been some progress in sub-Saharan Africa where maternal mortality decreased by 26 % between 1990 and 2008 (5). Dr. Margaret Chan, the Director-General of the WHO has indicated that, the global reduction in maternal death rates is encouraging news (5). According to her, measures that prove effective are being taken in countries where women are facing a high risk of death during pregnancy or childbirth (5). She adds that no woman should die resulting from inadequate access to family planning and pregnancy and delivery care (5).

Whereas most parts of the world have managed to reduce the rates of maternal deaths, maternal mortality in sub-Saharan Africa is said to have increased between 1990 and 2000 in many countries. This is said to be largely due to health system collapse, increasing poverty among women, lack of access to skilled care for delivery, weak national resource management, and lack of political will and financial commitment (15). The disparity in sub-Saharan Africa is however widespread, with rising extreme poverty, unbelievably high child and maternal mortality (12). These indications lead to the unwelcome conclusion that many countries in sub-Saharan Africa and Asia are likely to fail to meet most of the MDGs and most especially, on the fifth MDG.

Since the MDGs were set, progress on reducing maternal mortality among African countries have not been generally bleak. Progress in most north African countries have been particularly impressive (6).

1.3.4 Maternal mortality in Ghana

Maternal mortality has been a major health problem confronting Ghana. Statistics on maternal mortality rates in Ghana vary greatly according to source and method of estimation. Apart from statistics from international organizations such as the WHO and the UNDP which are readily available, statistics on current MMR from official sources in Ghana are not readily accessible.

Estimates from the WHO, UNICEF, UNFPA (2006 & 2009, cited in 16) for Ghana indicated 740 maternal deaths in 1990, 590 in 1995, 540 in 2000 and 560 in 2005 per 100,000 live births. This contrast the lower estimates of 214 in 1992 and 378 MMR per 100,000 live births between 2000 and 2005 by the Ghana Statistical Service (17). Although the current MMR is less than half the average for sub-Saharan Africa, it is high enough to be worried about, in spite of the fact that progress is said to have been made (6). The WHO estimates that MMR for Ghana stood at 350/100,000 live births in 2008 (6). This current MMR follows a reduction from 630, 540, 500, 400 and 350/100,000 live births in the years 1990, 1995, 2000, 2005 and 2008 respectively.

The above statistics by the WHO are also contrasted by estimates by the United Nations Development Programme (UNDP), although the variation is not great (14). According to the UNDP, Maternal mortality rate as captured by both survey and institutional data has shown an improvement over the past 20 years (14). This improvement however has been at a slow pace. The report indicates that between 1990 and 2005, maternal mortality rate reduced from 740/100,000 live births to 503/100,000 live births and then to 451/100,000 live births in 2008 (14). This trend is also supported by institutional data which suggests that maternal deaths per 100,000 live births have declined from 224/100,000 in 2007 to 201/100,000 in 2008 (14). This reduction was after an increase from 187/100,000 in 2004 to 197/100,000 in 2006 (14). If the current trends continue, maternal mortality will only be reduced to 340/100,000 by 2015 instead of the MDG target of 185/100,000 by 2015 (14). The report further warns that unless extreme efforts are made by all stakeholders, Ghana is unlikely to meet the target (14).

The Ghana Maternal Health Survey of 2008 similarly shows a slow decline in maternal deaths from 503/100,000 live births in 2005 to 451/100,000 live births in 2008 (18).
In spite of the various interventions by the Ghanaian government and the health ministry aimed at reducing maternal deaths, and the treatment of maternal deaths as a national emergency in order to meet the 5th MDG, Ghana's maternal mortality ratio continues to be unacceptably high (16). Although there are discrepancies in estimating and reporting, the fact still remains that Ghana's MMR is unacceptably high. The high MMR is due to inadequate utilization of modern health care services of which ANC is a major factor because through ANC, it is possible to detect some complications during pregnancy which lead to maternal mortalities (19-21).

1.4 Antenatal care

Antenatal care has long been considered a basic component of any reproductive health care programme, and different models of it have been put into practice all over the world (9). These differences are said to result from contributing factors of socio-cultural, historical and traditional nature, others related to the economy of the country, to the human and financial resources of the specific health system involved, and at times to the economic convenience of the providers wherever private practice has stepped in to support the traditional health systems (9).

Antenatal care refers to all the care given by health professionals to pregnant women for the purposes related to fostering a normal pregnancy. It ranges from screening for conditions which may have adverse effects on the woman and the baby, to educating and planning for safe birth and emergencies during pregnancy and how to deal with them (3). Care measures are aimed at improving the outcome of pregnancy and are more effective when delivered early in pregnancy (21). Demographic and social correlates as used in this study refer to factors such as education, age, and household living standards etc., which are known to influence health status (17). Inadequate access and under-utilization of modern healthcare services including antenatal care are said to contribute to the poor health in developing countries, as ANC is an important determinant of safe delivery (19, 20).

Antenatal care is generally considered as a maternal health intervention with a positive health effect both for mother and baby (22, 23). There are variations in antenatal care guidelines and the number of visits also differs considerably across Western countries. Although there is no agreement on the ideal number of antenatal care visits, there is evidence that inadequate antenatal care could have dangerous repercussions for both mother and baby (24, 25). The World Health Organization WHO (23) recommends at least four antenatal visits for pregnant women.

1.4.1 Antenatal care in Europe and America

The current model of antenatal care in the various European countries is similar to the traditional model which existed in the late 20th century, and has been based on a large number of visits, starting as early in pregnancy as possible (9). This continues monthly until the last 2-3 months, when the rhythm of consultations increases to become weekly at the end of pregnancy, often accompanied by frequent blood and urine testing and, in more recent years, also by ultrasound evaluations (9).

The frequency of prenatal visits is variable and depends on multiple factors (26). Recommendations for uncomplicated pregnancies range from 3 to 4 visits in some European countries to 14 visits in the United States (26). A reduction in unnecessary antenatal care visits with no adverse effect on perinatal outcomes or maternal satisfaction would provide a significant cost savings for providers of maternity care (26). The US Public Health Service Expert Panel on Prenatal Care recommended in 1989 that the number of prenatal care visits be reduced to become more "goal oriented" for low-risk women (26). Other studies on this subject have been done to validate these recommendations measuring outcomes such as patient satisfaction, cost savings, and the rates of low birth weight infants, preterm deliveries, caesarean deliveries, and preeclampsia (26). Studies have demonstrated that there could be a reduction in prenatal care with no documented perinatal outcome or reduction in patient satisfaction (27, 28). Similar studies have demonstrated that the frequency of antenatal care could be reduced from 10.8 to 8.6 visits for pregnant women without effect on perinatal outcome but with less satisfaction with care by recipients of the service (29).
The concept of antenatal care in Western Europe has been in existence for just over 100 years, with the main aim being the reduction of the high rate of infant mortality (30).

The objective of antenatal care is to prevent health problems in both foetus and mother and to ensure that each newborn child has a good start (2). The care provided to women needs to be appropriate and not excessive. It is imperative that new technologies are implemented continually, while older services need to be reconsidered (2).The care given to each pregnant woman needs to be individualized based on her own needs and wishes (2). As to whether the wishes of pregnant women are respected and adhered to is another matter.

Antenatal care utilization is generally measured by the proportion of women not attending prenatal care, initiating prenatal care after the first trimester of pregnancy and the number of antenatal visits (31). It has been reported that, extremely poor prenatal care is associated with poor maternal and foetal outcomes (31). Utilization of antenatal care across European countries is generally considered as adequate because they offer universal access to prenatal care (32). The proportion of women having no antenatal care has however been reported to exceed one percent in several European countries, and many more women have been reported to attend antenatal care late or irregularly (31, 33). Although its effects may not be as detrimental as underutilization, overutilization of antenatal care services is also a potential problem as the average number of antenatal care attendance has been reported to exceed 12 times in Finland, the United Kingdom and Sweden (34-36).

Assessment of antenatal care utilization in countries across Europe found that the proportion of women who did not attend prenatal care was less than 0.5 percent for ten out of the thirteen countries studied for which information was available (32). The frequency of no care was 0.9 percent for women in Hungary and between 2 and 3 percent in Greece and Portugal respectively (32). In this study, frequencies of late prenatal care were lowest in Finland and Italy (32). The percentages ranged from 6.9 to 9.4 percent in Greece, Hungary, Ireland, Portugal and Scotland (32). When the percentages for late prenatal care are further stratified by parity, the picture is even worse than is thought. Late care varied from 3 percent in Finland to 17.2 percent in Portugal among women with parity 1 (32). Late care increased for women with parity 3, and among women with parity 4 or more, it varied from 7.7 percent in Finland to 41.5 in Hungary. Coverage for antenatal care services amongst European countries is much higher compared to developing countries. These revelations however point to the fact that there is room for improvement since coverage is not 100 percent yet.

According to the WHO, basic activities for antenatal care falls within three general areas; namely, screening for health and socioeconomic conditions likely to increase the possibility of specific adverse outcomes; providing therapeutic interventions known to be beneficial; and educating pregnant women about planning for safe birth, emergencies during pregnancy and how to deal with them should they occur. Several recent reviews deal with patterns of routine antenatal care for low-risk pregnancy. A review of available literature indicates that the scope and intensity of antenatal care can be reduced for women at low risk without any adverse health consequences (37). The dilemma however is that, "low risk" is not accurately defined, and that the diagnosis of "high risk" is not very precise and leads to a lot of unnecessary interventions during pregnancy (2).

A crucial debate today in the field of antenatal care is the extent of services that should be offered to women with low-risk pregnancies. It is well known that such women may generally have a good outcome for both themselves and their children without any interventions (2). The question that arises therefore is, how much monitoring and screening is enough?
The type of care received by women to a large extent will depend on who the care-giver is. It is still being debated in many countries as to whether every woman needs to be attended by a physician (or obstetrician) (2). In a number of countries, particularly those in Scandinavia and northern Europe, the midwife is an independent practitioner who has the legal right to practice midwifery without supervision by a physician, taking responsibility as main care giver for the pregnant woman (2).

The main problem with antenatal care in Europe is uneven access by women. In Western Europe, full coverage for antenatal care appears to exist in every country. In Eastern Europe however, the countries that have made a transition from the Soviet model of health care to social insurance seem to provide full coverage for antenatal care. In the other countries, anecdotal reports indicate problems of access due to incomplete coverage, geographic problems etc.

1.4.2 Antenatal care in Africa

The global picture of coverage for antenatal care is quite good from face value. UNICEF's latest estimates indicate that, 80 percent of women in the developing world receive antenatal care from a skilled health provider at least once during pregnancy (38). Average regional

coverage for west and central Africa stands at 71 percent, while eastern and southern Africa has an average coverage of 89 percent (38). The average coverage for sub-Saharan Africa according to UNICEF's latest estimates stand at 78 percent (38). Although antenatal coverage is high across the globe, just about half of women receive the minimum recommendation of at least four visits in the developing world including Africa (38).

Several factors have been identified as barriers to access to antenatal care services in Africa. Lack of physical access to health care facilities presents a fundamental challenge to receiving care in both rural and even in urban settings (39).Poor quality of care continues to be a major concern in most health systems, as high patient volume and limited resources combine to constrain service provision (40). Even in settings where health facilities and antenatal care services are available, a lot of women receive care late because they recognize pregnancy late (39). In spite of the availability of care services where they exist, a lot of women attend antenatal care services late in their pregnancies and also do not even meet the minimum recommended number of attendance, thereby limiting the quality of care received (41). This unfortunate phenomenon in Africa and mostly in sub-Saharan Africa hampers the delivery of effective antenatal screening and treatment programs, potentially contributing in turn to avoidable maternal and child morbidity and mortality (42, 43).

The traditional facility-based antenatal care across most African countries follows the western model and involves frequent antenatal visits up to a number of twelve visits (39). Although this schedule is supported by observational evidence suggesting that an increased number of antenatal care visits is associated with improved maternal and child health outcomes, this has often proved to be an unrealistic standard for antenatal care in the developing world which are mostly struggling with logistic and personnel shortages (44). The World Health Organization now recommends a shorter schedule of at least four antenatal visits which could achieve similar outcomes as the more rigorous schedule (45, 46).

1.4.3 Antenatal care in Ghana

Ghana has over the years implemented a number of policies and strategies aimed at improving reproductive health and reducing maternal mortalities (47). Antenatal care service usage in Ghana has seen an appreciable increase over the past two decades. According to the Ghana

Demographic and Health Survey (DHS) report for 2008, antenatal care usage from skilled health personnel currently stands at 95%, an increase from 82% in about two decades (17). The report further shows a decline in the number of mothers who do not receive antenatal care services and those receiving antenatal care from traditional midwifes, a positive development from the past (17). Though there are differences in the level of antenatal care service usage between and within regions and between urban and rural areas, the general picture looks quite good. Whereas 98% of mothers in urban areas receive antenatal care services from health professionals, 94% of their rural counterparts use antenatal care services from health professionals (17). These differences may be due to better proximity to health care facilities and better incomes in urban areas, as distance and cost have been mentioned by women as reasons for not attending antenatal care services in similar studies on determinants of antenatal care use (48, 49). Over the past fifteen years, the proportion of mothers making at least four antenatal care visits which is the minimum requirement of the WHO increased by about 31%, whiles the proportion seeking antenatal care during the first trimester of their pregnancy rose considerably over the same period (50). This empirical evidence shows that antenatal care usage in Ghana is substantially higher than many countries in sub-Saharan Africa. The fact that the coverage is not 100% also means that there is still a lot of work to be done in this area of maternal health.

1.4.4 What is antenatal care meant to do?

Antenatal care is commonly cited as one of the really successful areas of preventive medicine and the modern antenatal care is sometimes given credit for most of the improvements in pregnancy outcome that have been achieved during the past century (51). There however have been criticisms about the inability of antenatal care to enhance the general health status of pregnant women or to improve their social and economic circumstances (51). General health and socio-economic well-being have repeatedly been demonstrated as being of crucial importance for pregnancy outcome (51)..

The routine program for antenatal care consists of a number of scheduled visits aiming at detection of some of the symptoms that could lead to complications such as hypertension and deviation in foetal growth, as well as giving psychosocial support and health education (51).

The objective of antenatal care among others include planning for pregnancy and continues into the early neonatal and post-partum period (2). Antenatal care is intended to obtain detailed social, family and obstetric history of pregnant women, usually obtained during first antenatal visits (2). It also includes carrying out complete physical examinations, and making a risk assessment, usually requiring a broad range of laboratory test (2). Much simpler examinations such as measuring of blood pressure and temperature are at every visit (2). Other examinations are conducted much later in the development of pregnancies and are meant to focus on the status of the developing foetus and the preparation for a safe delivery (2). An increasing number of complex examinations and interventions are becoming part of modern antenatal care (2). Most of these examinations however are limited to western Europe, North America and other advanced countries (2). In addition to the examinations and the treatment of any adverse conditions that may be detected, pregnant women are also given health education and psychosocial and social support from health service providers (2).

Although certain obstetric emergencies cannot be predicted through antenatal screening during pregnancy, women can obtain educational information to recognise and act on symptoms leading to potentially serious or dangerous conditions (52).

1.4.5 Optimal antenatal care

Quality of antenatal care is an issue of great importance. While the technical quality of a health service can be assessed by evaluating the outcomes of the care provided, the subjective dimension of quality of care (interpersonal relationship with the provider and the system's responsiveness to the expectations of the population) can only be assessed through interviews that are strongly influenced by the cultural milieu and the circumstances under which they are conducted (53). Accepted indicators of quality prenatal care include early initiation, number of visits which at least should be four times, and the quality of the medical and educational content of the visit (54). Medical examinations are beneficial for early detection of risk factors (55). Giving of health advice to pregnant women (55, 56) and counselling including psycho-social support (57) are beneficial to promote the overall health and wellbeing of women and foetus.

Quality antenatal care is determined by an essential service package provided to pregnant women (23). The components of the package include prevention and management of malaria

and anaemia, which is achieved through screening and appropriate management (23). Other components of the package are micronutrient supplementation, tetanus immunisation, monitoring of certain vital signs such as blood pressure, analyses of functioning using blood and urine samples, weight and provision of education on pregnancy danger signs (23). A woman is said to have received optimal antenatal care if she made at least four antenatal care visits to a health institution for the purpose of her pregnancy with the first one occurring during the first trimester of the pregnancy in addition to receiving the entire essential service package (58). Antenatal attendance within the first twelve weeks (first trimester) is considered early (23). Women who make less than four antenatal visits to health institutions for the purposes of their pregnancies and do not receive the entire essential service package are said to have received sub-optimal antenatal care services (58). Obtaining at least four antenatal care services from health professionals is usually enough to detect common problems and to deal with most of the complications that could be dangerous to both mother and child as recommended by the WHO (23).

There is a lack of strong evidence that the content, frequency, and timing of visits in currently recommended "western" programmes for routine antenatal care are effective (59). Observational studies have consistently revealed that groups having more antenatal-care visits have lower maternal, foetal, and neonatal morbidity and mortality than those who have fewer antenatal-care visits (59).

Guidelines regarding the content of antenatal care vary across countries (60). Recommendations from Australia, the United States, Canada and Germany do not agree on the optimal clinical content of prenatal care (60). This is because each country has its own unique guidelines. Currently, there are two measures of adequacy of prenatal care utilization, namely, the trimester of prenatal care initiation method in use in most countries, especially in developing countries, and the Kessner/Institute of Medicine (IOM) Adequacy of Prenatal Care Index in use in the United States today (61). The data used for this study is based on the trimester of prenatal care initiation system because it is the system in use in Ghana.

Current Ghanaian recommendations suggest monthly visits up to 28 weeks of pregnancy, bi-weekly visits from 28^{th} through 36^{th} week and weekly from 36^{th} week to delivery. If for any reason, women are unable to adhere to these recommendations, then a minimum of four visits are recommended at the 10^{th}, 20^{th}, 30^{th} and 36^{th} week of pregnancy (49). According to Ghana's Reproductive Health Service Protocol (Ministry of health, Ghana 2005, cited in 49),

antenatal care has three objectives. Firstly, the promotion and maintenance of the physical, mental and social health of mother and baby by providing education on nutrition, rest, sleep and personal hygiene, secondly, the detection and treatment of high-risk conditions arising during pregnancy and helping prepare the mother to breast-feed successfully, and thirdly, ensuring that the mother experiences a normal recovery after delivery and takes good care of the child, both psychologically and socially.

While many routine antenatal care procedures have little effect on maternal mortality and morbidity, some of these have been ascertained as beneficial (58). Antenatal care among other benefits provides advice, reassurance, education, support for the woman on screening programs and detects some of the problems that make a pregnancy a high risk one (62).

In theory, antenatal care might reduce maternal morbidity and mortality directly through the detection and treatment of pregnancy-related or intercurrent illness, or indirectly through the detection of women at risk of complications of delivery and ensuring that they deliver in a suitably equipped medical facility (13). However, the realizable potential of antenatal care interventions to address these problems is unclear for several reasons. Most formal investigations of the effectiveness of antenatal care programmes, whether in developed or developing countries, have concentrated on the effect of care on infant outcomes, perinatal mortality, preterm delivery and low birth weight (13). These together with other factors make it difficult to determine what exactly antenatal care does.

1.4.6 Distribution of optimal antenatal care in Ghana

The distribution and proportion of women receiving antenatal care from health professionals (doctor, nurse, midwife or community health officer) has seen an appreciable improvement, with about 95 percent receiving antenatal care from health professionals (17). Almost no women receive antenatal care from a traditional midwife, and only 4 percent do not receive any antenatal care of any kind (17). Although the differences of antenatal care coverage by women's age at the time of birth are not large, differences exist by birth order (17). Whereas 99 percent of women are more likely to receive antenatal care from a health professional for the first birth, 96 percent of women are more likely to receive antenatal care from health professionals for births of order six or higher (17).

The proportion of women receiving at least four antenatal care visits from a health professional has increased quite substantially from 69 percent in 2003 to 78 percent in 2008 (17). Although women in urban areas are more likely than women in rural areas to make four or more antenatal care visits, the increase between 2003 and 2008 was much larger for women in rural areas than for women in urban areas, as rural areas saw an appreciation from 61 percent to 72 percent, compared to 84 percent to 88 percent for urban women (17). The proportion of women having their first antenatal care visit before the fourth month also increased from 46 percent in 2003 to 55 percent in 2008 (17). Sixty one percent of and 51 percent of urban and rural women respectively, had their first antenatal care visit before the fourth month in 2008, compared with 56 and 41 percent for urban and rural women respectively in 2003.

As quality antenatal care is determined to a large extent by the essential package provided to pregnant women, Ghanaian women irrespective of whether they attended antenatal clinics or not, 87 percent took iron supplement during pregnancy for their most recent birth (17). Substantial variations in use of iron supplements are noted by urban-rural residence, region, education, and wealth quintile (17). For example, 90 percent of women in urban areas took iron tablets or syrup during pregnancy, compared with 84 percent of women residing in rural areas (17). Women in the Greater Accra, Western and Ashanti regions, those who are better educated, and those living in wealthier households are much more likely than other women to have taken iron supplements during pregnancy (17). Women in the Northern and Upper West regions are the least likely to have taken iron supplements during pregnancy (17).

The proportion of Ghanaian women who undergo basic tests during pregnancy is nearly universal throughout Ghana (17). Almost all women who gave birth between 2003 and 2008 were reportedly weighed and had their blood pressure measured, while about 90 percent of mothers had a blood sample taken and had their urine tested (17). Regarding information about signs of pregnancy complications, only 68 percent of women were advised and was related to women's education, household wealth status and residence, whether rural or urban (17). Women with at least middle/JSS and secondary or higher education, women belonging to the highest wealth quintile, and women living in urban areas were more likely than rural women to have been informed about pregnancy complications and what to do should it occur (17). Receiving information about this vital topic increased with women's age, with women younger than 20 years being the least likely to have been informed about pregnancy complications (17). It was also marked with regional variations with 85 percent of women in

the Volta region being informed about it compared with 46 percent of women in the Northern region (17). It is obvious from the above statistics that giving information about pregnancy complications need to be strengthened especially in the Northern parts of the country. Another area that needs strengthening is access to basic laboratory services such as urine and blood testing in the Northern and Upper West regions (17). The GDHS report indicates that these two regions are disproportionately affected by limited access to these components of antenatal care. This is confirmed by the fact that, while at the national level access to urine and blood testing for pregnant women is 90 percent, only six in ten pregnant women in the Northern region have access to these components of care, and in the Upper West region, about two in three pregnant women have access to urine testing and three in four have access to blood testing (17).

Also included in the essential service package for antenatal care is the provision of tetanus toxoid (TT) immunization for protection against neonatal tetanus which is a leading cause of neonatal deaths in developing countries (17). The GDHS report shows that 56 percent of Ghanaian women had two or more TT injections between 2003 and 2008 and that 72 percent of births were protected against neonatal tetanus (17). Older women and those with six or more births are the least likely to receive two or more tetanus injections during the pregnancy for their last live birth, probably because by that time they already have received all five doses required for lifetime protection, compared with younger and lower parity women (17). Whereas 76 percent of births in urban areas were protected against tetanus, 70 percent of births in rural areas were protected against tetanus (17). There are also marked variations across regions with respect to tetanus coverage. Whereas a highest of 81 percent of births in the Volta region were protected against neonatal tetanus, a least of 61 percent of births were protected against neonatal tetanus in the Upper west region (17). Education of the mother is positively related to tetanus toxoid coverage in Ghana, with 83 percent of births to women with secondary or higher education being protected against neonatal tetanus, compared with 64 percent of births to women with no education (17). Similarly, women living in wealthier households are more likely to have received two or more tetanus toxoid injections during their last pregnancy and their births are more likely to be protected against tetanus than women in the lowest wealth quintiles (17).

A comparison between the 2003 and 2008 GDHS on the percentage of women who had two or more TT injections during their last pregnancy that ended in a live birth shows that there has been an increase from 50 percent in 2003 to 56 percent in 2008 (17).The most marked increase is observed in the Upper East region (46 percent in 2003, compared with 62 percent

in 2008) and the Greater Accra region (52 percent in 2003, compared with 66 percent in 2008). Contrary to the general trend, during the same period the proportion of women who had two or more TT injections during their last pregnancy that ended in a live birth declined in the Central and Upper West regions by about 4 or 5 percentage points (17).

1.4.7 Optimal antenatal care and its correlates

The following socio-economic and geographic factors have been identified as correlates of antenatal care; maternal age (63-65), maternal education (42, 49), paternal education (66, 67), literacy (68, 69), maternal occupation (66, 70), paternal occupation (71, 72) and region of residence (73, 74). The other correlates are; place of residence (75, 76), media exposure (68, 77) , health insurance coverage (77, 78), wealth (75, 79), ethnicity (42, 64), religion (42, 49), to mention a few. These will be discussed in chapter two of this study.

What needs to be known are the demographic and social correlates that differentiate Ghanaian women receiving optimal antenatal care from those who do not and that is the focus of this study.

2.0 SOCIAL AND DEMOGRAPHIC DETERMINANTS OF HEALTH-Empirical findings

2.1 Maternal age and antenatal care

Few studies have looked at the relationship between maternal age and how antenatal care services are utilized especially in Ghana. The existing literature reveals a mixed relationship between maternal age and antenatal service usage. In studies conducted in Nigeria and Indonesia, women in their middle childbearing ages were more likely to use antenatal care services compared with women in their early and late childbearing ages (64, 65). In contrast, young mothers especially those under twenty years were found to show a higher tendency to use hospital and delivery services as well as prenatal care and immunization than older women in a study conducted in Ghana (63). In a comparative analysis of antenatal care service usage by women in Sub-Saharan Africa, Magadi *et al.,* (80) found that teenagers received poorer antenatal care services compared to older mothers. Teenagers in this comparative study were also least likely to use both antenatal and delivery care services and were more likely to initiative ANC services late. Teenagers in that same study were more likely to make inadequate ANC visits during pregnancy. This comparative study involved several sub-Saharan African countries and as a result, its findings could be similar to the specific case of Ghana. Also in a qualitative study in Zimbabwe, younger women indicated that they preferred to visit the clinic often, mainly to be assured that the baby was in a proper position and growing well; older women above thirty-five years were not concerned about frequenting the clinics as a result of the experiences they had accumulated from previous pregnancies (81).

2.2 Maternal education

Several studies on the determinants of antenatal care usage have identified maternal education as a major determinant of ANC usage. In six studies conducted in Ghana, Indonesia, Nigeria and Pakistan, all found that educated women were more likely to use antenatal care services than their counterparts who had no education (42, 49, 64, 82-84). Some of the studies found additional years of schooling leading to increased and sufficient antenatal care utilization (42, 49). A study in Kwale district, Kenya, found that women with at least secondary school

education were about 1.8 times more likely to have had at least one antenatal care visit (85) compared to those having no education.

Education may serve as a proxy for information which has effects on health seeking behaviour through a number of ways (86). These include increased levels of health awareness and knowledge of available health services among the educated. A study in Guinea Bissau found that, apart from general educational knowledge, specific health knowledge has positive effects on women's health seeking behaviour including antenatal care (87). Also, in a study in India, attending the recommended number of antenatal care visits was characterized by being better educated (67, 88). In contrast to the above mentioned studies however, a study in Karachi, Pakistan found no association between education and utilization of antenatal care services (89). Due to the inconsistencies in the findings from other previous studies, it is difficult to predict whether education would be significantly associated to optimal antenatal care until the analyses of the data has been done.

2.3 Paternal education

Education has been identified as a predictor of antenatal care and paternal education has also been shown to have positive association with maternal use of antenatal care services in a number of studies conducted mostly in developing countries. A study in the Tamil Nadu area of southern India found that a husband's level of education was associated with a high number of antenatal care visits by his wife (67). Higher educational attainment of both women and their husbands had a positive influence on the utilization of antenatal care services in a study conducted in a village in Nigeria (66). In this particular study, 96 percent of women who utilized antenatal care services had postsecondary education. Also, 81percent of men whose wives utilized antenatal car services had postsecondary education. In the same study, 77 percent of women who did not utilize antenatal care services during pregnancy had husbands with no formal education. Interestingly, the 82 percent of women who did not utilize antenatal care services were married to men with no formal education (66). The pathways through which education acts are varied and diverse. It includes greater knowledge and awareness of the benefits of antenatal care services, greater ability to travel outside home to seek medical attention and perhaps a greater decision-making power at home (90, 91).

2.4. Literacy levels of respondents

There are many definitions of literacy. In this study, literacy levels of respondents simply refer to the capacity of respondents to read, write and have basic numerical skills (68). Society rewards individuals who are proficient and penalizes those who are not, in employment opportunities, job success, citizenship and active participation in the community (69). People with low literacy skills often feel alienated and have difficulty finding and accessing health information and services (69). The problem of illiteracy cuts across all societies but is more pronounced in the developing countries. Adult female literacy rate has been identified as one of ten of the key indicators to assess women's well-being (92). There are an estimated 876 million illiterate adults in the world, and the majority of them are women and girls (68). All countries ranked in the top ten for women's well-being have a female literacy rate of 90 percent and more (68). Africa has the lowest rate with wide disparities. For example, South Africa and Zimbabwe have a literacy rate close to 80 percent, while in some of the poorest countries, such as Burkina Faso and Niger, only 10 percent of women can read and write (68).

2.5 Respondent's occupation

Occupation which may be a proxy for household resources to finance health care is an important determinant of antenatal care. Several studies especially in the developing world have shown that there is a direct relationship between women's occupation and their partner's occupation and health care in general and antenatal care specifically.

A study conducted in Kumbotso village in northern Nigeria found that women who were civil servants or engaged in white-collar jobs utilized antenatal care services more than housewives and unemployed women (70). Income generating occupations of women had a positive influence on the rate of use of antenatal care services in a study in Nigeria (66) . In this study, 100 percent of civil servants, 75 percent of traders and 48 percent of farmers had higher rate of use of ANC services than women who were fulltime house wives with no other occupation constituting only 36 percent. Also, in a study conducted in India, women who were engaged in paid employment started antenatal care services earlier than those who were not earning any income (90). Contrary to the above findings, working women were less likely to attend antenatal care at healthcare facilities compared to non-working women in another research in rural northern India (93).

2.6 Husband/Partner's occupation

Regarding the occupation of respondent's partners or husbands, women whose husbands were engaged in white collar-jobs were about 2.4 times more likely to attend antenatal care services compared to women whose husbands were engaged in blue-collar jobs or manual labour in a study in a rural area of Pakistan (72). Similarly, women whose husbands were jobless or labourers had inadequate antenatal care attendance compared with those whose husbands were engaged in other jobs in a study conducted in a western urban district of Turkey (71). In a comparative study in five sub-Saharan African countries using DHS data, it was found that women whose husbands / partners were engaged in unskilled manual occupations were three times more likely to have inadequate antenatal care compared to women whose husbands were in professional, technical, managerial and clerical occupations in Ghana (94). Nigerian women whose husbands were engaged in agriculture were two times more likely to have inadequate antenatal care compared to women whose husbands / partners were engaged in professional, technical, managerial and clerical occupations in the same study.

2.7 Region of residence

Literature on the effect of geographical regions of residence and health disparities in general and antenatal care specifically is hard to come by. This is partly because demarcations within countries for administrative governance purposes vary from one country to another. In most African countries, the predominant social cleavage is ethnic and / or regional identity (73). Ghana is divided into ten political regions and an important characteristic is the strong and evident divide when it comes to the level of development between the rich south of the country and the poorer, dryer and less developed north of the country (74). A study in Ghana found that women residing in rural areas of Western / Central regions were almost twice as likely to see a doctor for prenatal care, compared with women residing in the Northern/Upper regions. Although Central / Western regions fall within southern Ghana, it does not clearly show the north-south divide because only two regions were considered from the south as against the three northern regions (42). Evidence from the 2006 multiple indicator cluster survey indicated that the three northern regions (Northern, upper east and upper west) are the most deprived in Ghana; the poorest and with highest percentages of their populations living in rural areas (95). The greatest proportion of deprivation in education is also experienced in

the three northern regions (95). The above literature show that there is a clear north-south divide in Ghana, with the north generally considered deprived and poor in several indicators including health and education. This however does not mean that there is no poverty and deprivation and the other factors resulting from the effect of poverty in the south of the country.

2.8 Place of residence

Place of residence has been identified as a significant factor in determining accessibility to maternal health care which also includes antenatal care, but the results are not consistent. Place of residence in this study simply considers whether women reside in urban or rural areas. Simkhada *et al.*, (82) found place of residence as a significant factor in determining antenatal care service usage in a review of literature in developing countries. In studies conducted in Ethiopia and Ecuador respectively, women in urban areas were found to be more likely to use ANC services than their rural counterparts (75, 76). In contrast, urban women in Karnataka areas of India were 45% less likely to receive antenatal care services compared with their rural counterparts (90). It is not clear whether it is a matter of accessibility or proximity or what exactly it is that influences antenatal care utilization. Most health institutions are located in urban areas making antenatal care accessible to urban dwellers. This trend is very much likely to influence antenatal care utilization in Ghana because the DHS report indicates that most of the women who do not receive ANC services live in rural areas (17).

2.9 Media exposure and antenatal care

The impact of media exposure cannot be underestimated although little is known from research in Ghana. Exposure to mass media, especially television and radio have been identified as significant predictors of the utilization of antenatal care (82). Women with high media exposure were more likely to receive antenatal care services than their counterparts with lower exposure in a research in India (90). Watching television every week substantially increased the chances of women seeing antenatal care professionals in a study conducted in a rural part of northern India (93). Although I have not come across any research in Ghana on

the impact of media exposure on antenatal care, it is highly anticipated that similar results as in previous studies would be expected.

2.10 Health insurance coverage

Although some research has been done on the impact of health insurance schemes on antenatal care utilization, little literature exist from the Ghanaian context. One study looking into community-based health insurance and access to maternal health services in three West African countries found that although the number of women seeking prenatal care was very high in two community-based insurance schemes in Ghana, there was no significant difference between the insured and the uninsured (77). This study was conducted in the Offinso and Nkoranza community-based insurance schemes. There are other studies from other developing countries but the findings have not been consistent. In a cross-national analysis to determine the association between government versus private financing of health services and antenatal care utilization and other maternal health care services in forty-two low-income and lower-middle-income countries, it was found that government financing which could also be called health insurance did not influence women's access to antenatal care services (78). Having health insurance coverage was found to have a positive and significant impact on the use of prenatal care in a study conducted in Turkey (86). A study in a western urban district of Turkey found that having health insurance gave women four times advantage of utilizing prenatal care compared to those not having health insurance coverage. Since cost has been identified as a major factor preventing a lot of women from seeking care (48, 49), the outcome from the present study is likely to be similar to those stated above.

2.11 Wealth and antenatal care

Household wealth or socioeconomic status often measured by income is generally accepted as a predictor of health (79). Studies have shown that household wealth or income or household living standard has a positive effect on usage of antenatal care services. Studies in Sub-Saharan Africa and in Indonesia have all shown that women of the highest socioeconomic status are more likely to receive quality and timely antenatal services (49, 64, 83). In a comparative analysis of the use of maternal health services between teenagers and older

mothers in sub-Saharan Africa, women with high economic status were more likely to receive adequate and early antenatal care services compared to those with low economic status (80). In a study conducted in Pakistan, women of higher income were twice more likely to use antenatal care services compared to those in the lower income group (89).Socioeconomic status also becomes an indicator of affordability of antenatal services and other related costs including transportation to health care facilities (49). Since income status is also related to occupation, it is not always a straight forward prediction as other factors could be influencing income.

2.12 Livestock ownership and health

Livestock are found almost everywhere in poor communities across many developing countries. An estimated two-thirds of resource poor rural households keep some form of livestock (96). There are various reasons for keeping livestock by many households in the developing world. Livestock development efforts in lower-income countries are primarily intended to generate income and meet the growing demand for animal-source foods (97). Apart from owning livestock for the express purpose of producing food for the household and for market, there may be occasional sales to meet urgent needs for cash for paying school bills and to meet medical cost (98). Keeping livestock is considered an alternative form of insurance, providing the family with assets that can be sold in times of crisis such as medical emergencies (99). The poor often do not have access to standard financial markets such as banks. Livestock therefore serve as alternative for storing their savings as "living savings account". Although this is not without risk, it provides a reasonably good protection against inflation and to meet emergencies such as medical conditions (100, 101).

2.13 Getting money for medical treatment

One of the problems encountered by women when accessing healthcare is "getting money for medical treatment". Financial constraints has been cited as the most important factor in non-use of antenatal care services (82). The cost of services including transportation and necessary laboratory tests have been reported to be major hindrances to antenatal care utilization (48, 49). A comparative study of five African countries indicated that getting money for medical

treatment is a big problem (94). The percentages of women who reported that getting money for medical treatment was a big problem ranged from 30.1 percent in Nigeria to 66.4 in Zambia. The study further revealed that a greater proportion of rural women compared to urban women have difficulty in getting money for medical treatment. The study found that this disparity is more pronounced in Nigeria where twice as many rural women reported having difficulty getting money for medical treatment (94).

2.14 Ethnicity

The relationship between ethnicity and antenatal care utilization is not a straight forward one as there is mixed relationships even within the same country. Addai (42) found no relationship between ethnicity and the use of maternal health services including ANC apart from family planning in a study conducted in Ghana. Whereas ethnicity made no significant difference for use of antenatal care services, it did make a significant difference in the use of skilled birth assistance and postnatal care in a study conducted in Nigeria (64). Both countries have several ethnic groupings and what is not known is whether there will be any differences across regions. This study is aiming to look at ways of improving ANC services for all women and not to label any ethnic group as non-users of ANC services.

2.15 Religion

The influence of religion on the utilization of maternal health services including ANC also presents mixed results. Overbosch *et al*., (49) found no relationship between religion and utilization of antenatal care services in Ghana. Contrary to this finding, Addai (42) found religion to have an influence on the use of antenatal care and other maternal health care services in a study also conducted in Ghana. They found that Traditional religion had a negative effect on antenatal care service utilization and other maternal health services except family planning in rural areas of Ghana. In another study in Ghana, Appiah-Kubi (63) found that being a Christian was associated with higher utilization of ANC services. Furthermore, Roman Catholics and Protestant Christians were more likely to use ANC services than other Christians. Though Moslem women were less likely to use antenatal care services, they were more likely to use such services compared to traditionalists and women without religion.

Though religion is important for research, it is not aimed at stigmatizing any religious group but to know how optimal antenatal care services can be improved for all women irrespective of religion due to its importance.

2.2 Conceptual framework

In view of the existing literature on the demographic and social factors which determine the population's health, the WHO's Commission for Social Determinant of Health's conceptual framework (CSDH) (102) is ideal for explaining the demographic and social correlates differentiating women receiving optimal antenatal care services from those receiving sub-optimal antenatal care services. Although it is useful for explaining this study, the CSDH conceptual framework is rather broad and developed from a western perspective and might not be suitable for guiding this research in a totally different context. Therefore, an adapted CSDH for very poor ruralities was used to guide this research. This adapted framework which is diagrammatically represented in figure 1 is ideal for guiding this research because the DHS data used for the analysis indicate that, rural women most of whom are poor are less likely to use antenatal care services compared to urban women.

The CSDH framework gives a general relationship existing among the three components of the framework and how they influence health and well-being. It shows the associations between socioeconomic and political context and social position, and the relationship between social position and material circumstances and how they combine to influence health care and well-being. The relationship between socioeconomic and political context and social position is two-way; with each having an influence on the other. It portrays a continuous chain of factors leading to health and well-being. The underlying principle aims at eliminating or reducing health inequities by bridging the gap between the rich and poor. The framework views the relationship between socioeconomic level and health as a gradient, such that those belonging to the highest socioeconomic level enjoy better health than those below and further down the socioeconomic ladder.

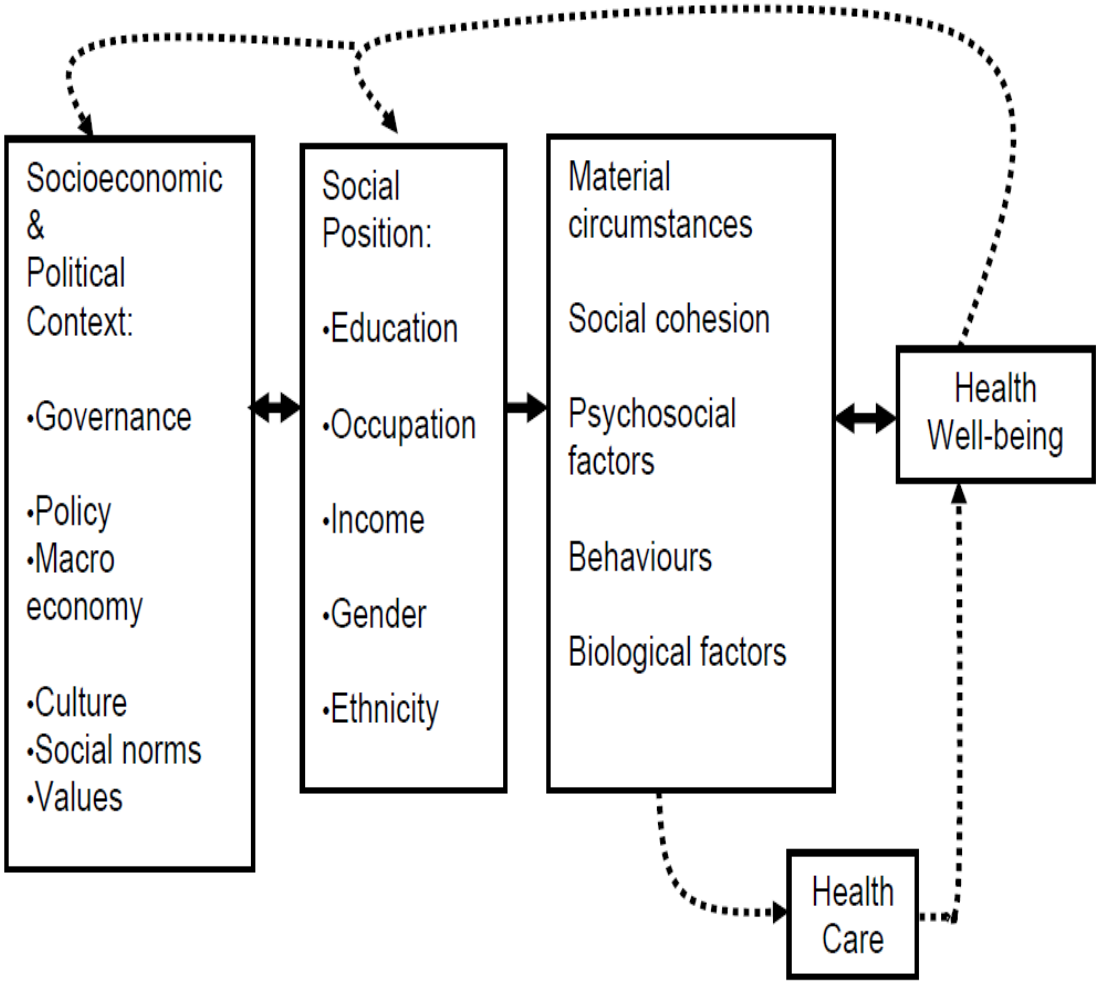

Figure 1. Social Determinants of Health Conceptual Framework, adapted from CSDH (2008), figure 4.1, page 43.

2.3 Socioeconomic and political context

Politics determines the governance of society which also influences the socioeconomic situation in that society. According to the CSDH, protecting and enhancing health equity is a primary responsibility of national governments (102, p. 7). This is an indication that political factors determine health indirectly, as both poor and good health are products of the political system. It must be recognized that the political process is also responsible for the equitable distribution of resources to ensure that the entire population enjoys good health. It is governments' responsibility to ensure that policies that ensure good health for all irrespective of socioeconomic status are in place. The performance of the macro economy is also indicative of the socioeconomic situation in a country. What is even more important is the fact that the political system in most countries like Ghana manages and controls national budgets

including health budgets. The amount of resources especially financial resources allocated to the health sector to a large extent will have a great impact on the health of the people. These socioeconomic and political factors are the foundation or basics on which the other factors stand. This implies that, in a good and conducive socioeconomic and political context, there is the highest likelihood that people will seek health care and have health and well-being. It also implies that in a bad socioeconomic and political context, access to health and well-being is hampered. The two-way arrow shows that these socioeconomic and political contexts affect social position and vice-versa. What is relevant to this study is how the socioeconomic factors and the political context will predict antenatal care utilization in Ghana.

2.4 Social position

Social position refers to a combination of indicators used to classify people into social classes (103, p. 6). The indicators of greatest interest are education, employment/occupation, income and ethnicity and gender. As already mentioned, the factors of social position are indicative of how the socioeconomic and political context functions. In a well functioning socioeconomic and political context, there will be access to quality education, employment opportunities which result in income to people. As already discussed, there is enough literature to the effect that more education is connected to the tendency to seek and to receiving better health care services. Education also has a relationship with income and occupation. As discussed earlier, the more education a person has the more the tendency that she/he will have an occupation and will earn an income compared to having no education. Studies on the usage of antenatal services have also confirmed the same results, indicating that the educated woman stands a higher chance of receiving antenatal care services than an uneducated woman. These elements of social position create inequalities in health and other aspects of society. The CSDH (102, pp. 7-8) recognizes health inequality as inequalities in people's capability to function, thereby compromising on their freedom. When such inequalities arise systematically as a result of people's social position, governance is said to have failed in its primary responsibility of ensuring fair access to basic goods and equal opportunities (Rauls J, 1957, cited in 102). According to the author, these inequalities limit people's freedom to choose among life-plans. Education, income and occupation have all been identified as predictors of antenatal care utilization. Gender as used in this study refers to the roles males and females play in decision making. This framework explores how the roles of men and women in decision making in a

household affects women's use of health care services including antenatal care services. As indicated in the framework, ethnicity is a factor which influences health and the utilization of antenatal care utilization. Literature already discussed portrays quite a complex relationship between ethnicity and antenatal care service utilization. Some studies found positive relationships between ethnicity and antenatal care services utilization while other studies reported no relationships as has already been discussed. These elements of social position also have an impact on material circumstances, social cohesion, behaviour and psychosocial and biological factors.

2.5 Material circumstances, psychosocial and behavioural factors

Even in the most rich countries in the world, poor people have substantially shorter life expectancies and more illnesses than the rich (104). Material circumstances of households such as owning a car, having a flush toilet and to mention a few, have often been cited as a measure of household wealth and has been found to be a predictor of health including women's use of antenatal care services (105). Household wealth most often is determined by social position factors such as education, occupation and income.

It has been found that psychosocial factors are associated to ill health, follow a social gradient, account for some or the entire social gradient in ill health, and are biologically plausible explanations (106, p.1234). There is further observation that there are psychosocial pathways associated with relative disadvantage which mostly act in addition to the direct effect of absolute material living standards (107). These psychosocial factors such as job strain, social support and coping styles eventually determine people's health status and well-being.

Behavioural factors such as diet, smoking, lack of physical exercise and alcohol consumption can be health enhancing or health damaging and eventually determine people's health and well-being. The CSDH framework identifies age and sex as elements of biological factors. In this study, no emphasis is on sex because the participants are all women. The framework shows how age influences people's attitude to health care and receiving health and well-being. The literature already discussed on maternal age showed a non-consistent result on the

relationship between age and the utilization of antenatal care services. As much as material circumstances, social cohesion, behaviour, psychosocial and biological factors influence health and well-being, health and well-being is also indicative of the state of those factors. Positive factors will produce positive health and well-being, while negative factors similarly will produce negative health and well-being.

Having given a general overview underlying the operation of the framework, I will now explain how this framework will guide my study in a Ghanaian context. As already indicated, the socioeconomic and political contexts are responsible for the creation of social position which in turn gives a reflection of the socioeconomic and political context. The interest of this study is how socioeconomic and social factors will influence or predict antenatal care services utilization in Ghana. Literature and the DHS report show that most of the women who do not receive ANC services or receive sub-optimal ANC services live in rural areas and mostly poor and uneducated. This gives an indication of the socioeconomic and political context in Ghana where rural folks have less access to the social position factors. There is evidence that the socioeconomic circumstances in which people live influence their health (108). The interest of this study is how the various factors interact to produce health as a whole, and how they interact to affect the utilization of antenatal care services in particular.

The ultimate objective of this framework is to contribute to equal access to health and well-being for all people. In relation to this study, the objective is to identify the factors that differentiate women receiving optimal antenatal care from those who receive sub-optimal antenatal care. This framework will be essential in identifying the socioeconomic and political context and the factors of social position determining antenatal care utilization. The interest of this study is about how socioeconomic and social position factors influence optimal antenatal care utilization in Ghana.

2.6 Problem statement

The factors discussed above make it imperative for a study into the factors which differentiate women receiving optimal and sub-optimal ANC services in Ghana.

Though some research has been done in this area in Ghana, those studies have either considered only certain parts of the country or limited their studies to the effect of economic factors such as living standards, consultation fees and travel cost on the utilization of antenatal care services (42, 109, 110). This study covers the entire country and also accesses the amount of care received by women which is a distinguishing factor from many other studies of similar kind conducted in Ghana. It is also different because it is looking at diverse factors accounting for the utilization of antenatal care services in Ghana.

The overall objective of this study is to add to the existing knowledge on the utilization of optimal antenatal care services. The study will specifically contribute to the knowledge of the demographic and social correlates that differentiate women who receive optimal and sub-optimal ANC services in Ghana. Knowledge of the correlates accounting for ANC usage could help inform policies to improve antenatal care utilization.

2.7 Research question

What are the demographic and social correlates that differentiate Ghanaian women who receive optimal versus sub-optimal antenatal care?

2.8 Significance of the study

This study focusing on optimal antenatal care is significant for a variety of reasons. It will first of all contribute to the existing wealth of knowledge on antenatal care utilization in Ghana. This study will specifically contribute to the knowledge of the demographic and social correlates differentiating women receiving optimal and sub-optimal antenatal care in Ghana. The outcome of this study will provide new dimensions for the fight to improving maternal health through antenatal care by governments, Non Governmental Organizations (NGO's), the health sector policy implementers and all organizations involved in achieving the fifth Millennium Development Goal. It will also be useful for advocacy on maternal health issues and result oriented decision making by policy makers.

3.0 METHODS

3.1 Study design

Quantitative design was used for this study using survey data from the Measure Demographic and Health Survey (Measure DHS+) conducted in Ghana in 2008. The data source is dependable as highly qualified personnel were trained to undertake the data collection process. Also, comprehensive interviews were used to obtain the various health indicators measured. Quantitative methodology was used to address the research questions, applying logistic regression analyses. The 19th version of the Statistical Package for the Social Sciences (IBM SPSS) was used for the data analyses.

3.2 Participants

The participants who qualified for this research were 1970 women of child bearing age (15-49 years) drawn from 11,778 households, from both rural and urban areas of the ten regions of Ghana.

3.3 Sample

The study considered a representative national sample. The national sample was selected based on a number of criteria. The objective of the study was to identify the demographic and social factors that differentiate Ghanaian women who receive optimal antenatal care from those who do not, using the DHS data for 2008. Samples were selected from both urban and rural areas and from all ten regions of the country. All women of child bearing age (15-49 years old) were selected fulfilling the first criteria. Women who had given birth or had pregnancies in the last five years preceding the survey were further selected from the women of child bearing age. Only usual or permanent residents of interviewed households were selected and therefore women who for a reason or the other spent the night preceding the interview in a different household were considered ineligible. The sample was conducted on data adjusted by sample weight to account for the stratified sampling design. The criteria of selection resulted in a national sample of 1970 female respondents.

3.4 Data

The data used for this study were provided by the Measure Demographic and Health Surveys (DHS+) project. This programme was established by the United States Agency for International Development (USAID) in 1984 and was designed as a follow-up to the World Fertility Survey and Contraceptive Survey projects. The project has been implemented in overlapping five-year phases; DHS-I ran from 1984 to1990; DHS-II from 1988 to1993; and DHS-III from 1992 to1998 with funding from the USAID. In 1997, DHS was folded into the new multi-project MEASURE program as MEASURE *DHS+*. The objectives of the programme are to "provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition in participating countries" (111). Since 1984 the program has collected, analyzed, and disseminated accurate and representative data on population, health, HIV, and nutrition through more than 260 surveys in over 90 countries (112).

The Ghana Demographic and Health Survey (GDHS) was first undertaken in 1988 (17). The 2008 GDHS was the fifth in a series of DHS to be undertaken in Ghana since 1988 and have all been implemented by the Ghana Statistical Service (GSS), in close collaboration with other stakeholders in various sectors of government, researchers, civil society organizations, and international organizations (17). This particular study was based on the DHS conducted in Ghana in 2008 with funding from the USAID and support from the United Nations Fund for Population Activities (UNFPA), the Danish International Development Agency (DANIDA), the United Nations Children's Fund (UNICEF) and the Ghana Aids Commission (GAC) (17).

The planning and implementation of the 2008 survey was carried out jointly by the GSS and the Ministry of Health/Ghana Health Service management team. It was designed to collect, analyse, and disseminate information on housing and household characteristics, education, maternal health and child health, nutrition, family planning, gender, and knowledge and behaviour related to HIV/AIDS. It included, for the first time, a module on domestic violence as one of the topics of investigation (17).

3.5 Data collection

The 2008 GDHS, like other DHS in Ghana was implemented by the Ghana Statistic Service in close collaboration with other stakeholders in various governmental, research, civil society organizations and international organizations. The survey consisted of three questionnaires; namely, the household questionnaire which collected information about the members of the entire household, the men's questionnaire which gathered information about men aged 15-59 years and the women's questionnaire which collected information about women between 15 and 49 years old. The content of these questionnaires was based on model questionnaires developed by the MEASURE DHS programme and the 2003 GDHS questionnaires (17). The process of conducting the 2008 DHS involved four stages. It was a household-based survey, implemented in a representative probability sample of 11,778 households selected nationwide. This sample was selected in such a manner as to allow for separate estimates of key indicators for each of the 10 regions in Ghana, as well as for urban and rural areas separately (17). A questionnaire workshop was organized by the Ghana Statistics Service to obtain input from the Ministry of Health and other stakeholders on the design of the 2008 GDHS questionnaires. Based on the 2003 GDHS questionnaire and informal meetings with local and international organizations, the DHS model questionnaire was modified to reflect relevant issues in population, family planning, domestic violence, HIV/AIDS, malaria and other health issues in Ghana (17). The questionnaires were translated from English into three major local languages. The questionnaires were pre-tested and the necessary corrections made in the first stage. The second stage involved the training of field staff and the identification of clusters, households and individuals for interview (17). The third stage was the processing of the data which involved editing, coding, verification and checking for consistency (17). The last and final stage involved analyses, writing of the final report and dissemination of the data and results to the public (17).

3.6 Measures

Due to the explorative nature of the study, all demographic and social variables that were considered to be of interest were considered for analyses. Variables were recoded to ensure enough responses in each category, and also to create meaningful categories within the

specific local context of the study. Variables were also reverse coded where necessary to ensure equal and correct directionality.

3.6.1 Dependent variables

The dependent variables in this study were optimal antenatal care and sub-optimal antenatal care. Optimal antenatal care was measured by women receiving at least four antenatal care visits with the first one occurring during the first trimester of the pregnancy, in addition to receiving the entire essential service package described in the earlier part of this thesis (23). Sub-optimal antenatal care was determined by receiving less than four antenatal care visits with or without the entire essential service package. This is regarded as the best measure of antenatal care recommended by the WHO and the GHS respectively (23, 49). Optimal antenatal care was coded 0, while sub-optimal antenatal care was coded 1 for all analyses.

3.6.2 Demographic and respondent characteristics measure

The demographic measures that were included in the study and were analysed were:

1. Respondent's *"current age"* was determined by the question, *"in what year and month were you born?"* The absolute ages were then categorized into two. Respondent aged between fifteen and twenty-four years old were combined and coded 1, while those aged between twenty-five and forty-nine years old were also combined and coded 0 and was made the reference category.

2. *Region* of the respondent documented at the very beginning of the household questionnaire was used to determine respondents region of residence and not by a specific question, but through the note *"Identification"* in which region, district, and locality was listed and registered. For the bivariate analyses, all the regions were recoded from 0 to 9. For the logistic regression analyses however, the seven regions located in the southern part of the country were combined and recoded 0 and also made the reference category while the other three regions located in the northern part of the country were combined and recoded 1.

3. Respondent's *"type of place of residence"* indicating whether respondents lived in *"rural" or "urban"* places was measured similarly as respondent's *"region"* above. For the purpose of the analyses, "urban" dwellers were recoded 0, while "rural" dwellers were recoded 1.

3.6.3 Wealth Index

Information on the wealth index is based on data collected in the Household Questionnaire. This questionnaire includes questions concerning the household's ownership of a number of consumer items such as a television and car; dwelling characteristics such as flooring material; type of drinking water source; toilet facilities; and other characteristics that are related to wealth status. To construct the wealth index, DHS applied a standard approach. Each household asset for which information is collected is assigned a weight or factor score generated through principal components analysis. The resulting asset scores are standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. These standardized scores are then used to create the break points that define wealth quintiles as: Lowest, Second, Middle, Fourth, and Highest. For the purpose of this study, these wealth quintiles were coded as follows; *richest = 0, richer = 1, middle = 2, poorer = 3 and poorest = 4*. Richest was made the richest group for this variable. Each household is assigned a standardized score for each asset, where the score differs depending on whether or not the household owned that asset (or, in the case of sleeping arrangements, the number of people per room). These scores are summed by household, and individuals are ranked according to the total score of the household in which they reside. The sample is then divided into population quintiles, five groups with the same number of individuals in each quintile (113). For the use in this thesis, the wealth quintiles were calculated for each sample separately.

3.6.4 Household ownership of livestock

To determine a household's ownership of livestock, herds, other farm animals, or poultry, respondents were asked, *"does this household owns livestock, herds, other farm animals, or poultry?"* The response category for this question were *"Yes"*= 1 and *"No"= 2*. These

responses were recoded into *"Yes"*= 0 and *"No"*= 1 for the purpose of the analyses for the study and "Yes" was made the reference group.

3.6.5 Health insurance coverage

To determine whether respondents were covered by any form of health insurance, respondents were asked *"do you have any health insurance or are you a member of a mutual health organization?"* The response categories to this question were *"yes"* and *"no"*. The responses were recoded into *"yes"*= 0 and *"no"*= 1 for the purpose of the analyses and yes made the reference category.

3.6.6 Literacy

Literacy level of was assessed by requesting respondents to read a simple sentence to determine their reading capabilities. The respondent was subsequently categorized into one of the following: *"cannot read at all", "able to read only parts of sentence", "able to read whole sentence", "no card with required language" or "blind/visually impaired".* These categories were regrouped into *"able to read whole sentence"=0, "able to read only parts of sentence"=1, "cannot read at all"= 2*. This variable was included in the analyses and "yes" made the reference group.

Whether participants had ever participated in a literacy program was assessed by asking respondents, "Have you ever participated in a literacy program or any other program that involved learning to read or write (not including primary school)?" The responses were *"Yes"*= 1 and *"No"= 2*. These responses were recoded into *"Yes"= 0* and *"No"= 1*. "Yes" was made the reference and the variable was also included in the analyses.

3.6.7 Educational measures

A number of variables measured respondent's education but the two that were considered appropriate were, "educational attainment and literacy level". Educational attainment was

measured by the level of school completed by the respondent and had the following response categories: *"no education", "incomplete primary", "complete primary", "incomplete secondary", "complete secondary", and "higher".* These categories were recoded into the following five categories*: "higher education"= 0, "complete secondary school"= 1, "incomplete Secondary"= 2, complete primary"= 3, "incomplete primary school" = 4, and "no education" = 5.*

Partner's educational attainment was determined through the question *"what was the last level of education that your partner/husband graduated from?".* Response options were *"no education", "incomplete primary", "complete primary", "incomplete secondary", "complete secondary", and "higher".* These options were collapsed into five categories and coded as follows: *"higher education"= 0, complete secondary school"= 1, "incomplete Secondary"= 2, complete primary"= 3, "incomplete primary school" = 4, and "no education" = 5.* The educational attainment of both the respondent and partner were included in the analyses and higher education was made the reference category in both variables.

3.6.8 Occupational variables

Respondent's occupational status was measured by the question "What is your occupation? That is, what kind of work do you mainly do?" An open question as it was, a range of responses were give and these were later combined into the following categories: *"not working/did not work", "professional, technical, management", "clerical", "sales", "agriculture self-employed", "agriculture employee", "household & domestic", "services", "skilled manual", and "unskilled manual"and "don't know".* For the purpose of the analyses of this study, these categories were again combined and recoded as *"Professional/service/technical, clerical and sales",* all of which were put into the broad category *"White collar job" = 0, "agriculture/self employed, agriculture, household and domestic, services, skilled manual and were all recoded into "Agric/Manual or skilled labour" = 1 and "not working"= 2.*

Partner's occupation was measured similarly as the above: "What is your husband/partner's occupation, that is, what kind of work does he mainly do?" And "What was your (last) husband/partner's occupation? That is, what kind of work did he mainly do?" In the same

way as with respondent's occupation, the given responses were recoded into "not working/did not work", "professional, technical, management", "clerical", "sales", "agriculture self-employed", "agriculture employee", "household & domestic", "services", "skilled manual", and "unskilled manual" and "don't know". These were combined and recoded into "Professional/service/technical, clerical and sales", all of which were put into the broad category "White collar job" = 0, and "agriculture/self *employed, agriculture, household and domestic, services, skilled manual and were all recoded into "Agric/Manual or skilled labour" = 1,* for the purpose of the analyses and white colar job was made the reference category in both variables.
The category *"not working"* was excluded from the analyses for husband's occupation because a small number of respondents reported their husbands were not working.

3.6.9 Media exposure

Frequency of reading newspaper/magazine*: "Do you read a newspaper or magazine almost every day, at least once a week, less than once a week, or not at all?"* These responses were maintained and recoded into: *"almost every day" = 0, at least once a week"= 1, less than once a week" =2 and "Not at all"= 3.*
Frequency of listening to radio: *"Do you listen to the radio almost every day, at least once a week, less than once a week or not at all?"* The same response options and coding as for reading newspaper or magazine above were used in analyses.

Frequency of listening to television: *"Do you watch television almost every day, at least once a week, less than once a week or not at all?"* The same response options and coding as for reading newspaper or magazine and frequency of listening to radio above were maintained and used in the analyses. Almost every day was made the reference group in the literacy variables above.

3.6.9 Respondent's autonomy

Final say on what to do with money husband earns: Respondent were asked*, "Who usually decides how your husband's/partner's earnings will be used: you, your husband/partner, or you and your husband/partner jointly?"* The response categories for this question were:

"respondent", "husband/partner", "respondent and husband/partner jointly", "husband/partner has no earnings" and "other". These responses were collapsed and recoded into three categories, namely: *"respondent alone"= 0, "respondent and husband/partner"=1 and "husband/partner alone"= 2*. This variable was included in the analyses and "respondent alone" made the reference group.

3.6.10 Getting money for medical treatment

With respect to factors that prevent women from getting medical advice and treatment for themselves, the question sought to know whether respondents had a big problem or not.
"Many different factors can prevent women from getting medical advice or treatment for themselves. When you are sick and want to get medical advice or treatment, is each of the following a big problem or not?"
"Getting money needed for treatment?" The response categories for this question were, *"big problem", and "not a big problem"*. The responses were recoded into *"not a big problem"= 0 and "big problem"= 1*, for the analyses. "Not a big problem" was made the reference group for the analyses
"The distance to the health facility?" Similar responses and codings as *"Getting money needed for treatment?"* above were used. This variable however was not statistically significant in the bivariate analyses and was therefore excluded from the binary logistic regression analyses.

3.6.11 Concern there may be no female health provider

"Concern that there may not be a female health provider?" Similar responses and codings as "*Getting money needed for treatment?"* above were used. This variable however was not statistically significant in the bivariate analyses and was also excluded from the binary logistic regression analyses.

3.6.12 Concern there may be no drugs at medical facility

"Concern that there may be no drugs available?" The response categories for this question were, *"big problem", and "not a big problem"*. The responses were recoded into *"not a big problem"= 0 and "big problem"= 1,* for the purpose of the analyses. *"*Not a big problem" was made the reference group for the analyses

3.6.13 Respondent's ethnicity

Respondents *"ethnicity"* was determined by the question, *"to which ethnic group do you belong?"* The response categories were, *"Akan, "Ga/Dangme", "Ewe", "Guan", "Mole/Dagbani", "Grussi", "Gruma", "Mande"* and *"Other"*. These responses were recoded into *"Akan"= 0, "Ga/Dangme"= 1, "Ewe"= 2,"Guan"= 3, "Mole/Dagbani"= 4, "Grussi"= 5, "Gruma"= 6, "Mande"= 7* and *"Other"= 96*, for the purpose of the analyses.

3.6.14 Respondent's religion

Respondent's *"religion"* was also determined by asking the question, *"what is your religion?"* The responses for this question were; "*Catholic", "Anglican", "Methodist", "Presbyterian, "Pentecostal/Charismatic", "Other Christian", "Moslem", "Traditional/Spiritualist", No Religion"* and *Other"*. This variable was not statistically significant in the bivariate analyses and was not included in the logistic regression analyses.

3.7 Data analyses

The statistical analyses were performed using IBM's SPSS for Windows, version 19.0. The sample was selected based on the set of criteria outlined in section 3.5, page 35. All analyses were conducted on data adjusted by sample weights to account for the stratified sampling design. The following procedure for the statistical analyses was carried out:

1. The data set was screened for outliers and missing data.

2. Relevant items were recoded in new categories and reverse coded to ensure similar and correct directionality for scores.
3. Data were analysed through descriptive statistics, including frequency distributions, mean, standard deviation, skewness and kurtosis (tables 1 in appendix).
4. Factor analyses were performed to assess the inter-correlation among items considered for inclusion in scales.

5. Correlations between the dependent variables and the various independent variables were assessed for each sample. Pearson Product-Moment Coefficient was used to calculate correlations of continuous variables. For categorical variables, cross tabulations and Chi-Square tests for independence were used to calculate correlation with the dependent variables.

6. Variables that were found to be statistically significantly correlated to the dependent variables were included in the various univariate, bivariate and multiple binary logistic regression analyses.
7. Another aspect of importance was the significance level compared to the odds ratio. Each added variable in a regression analysis reduces the degrees of freedom. As the significance level is more sensitive than the odds ratio to the sample size, it was considered important to assess both values in the discussion. This was to ensure that valuable information about the effect of important predictors was kept.

a. Strategy for binary logistic regression analyses

The logistic regression analyses were performed as a single unit analysis with classical social determinant of health and other variables not classified as social determinants of health in the national sample but in two parts. In the first part, all analyses were performed with age controlled for. The following variables were included in the analyses in a series of three variables at each stage until the last variable: respondent's current age, region of residence, type of place of residence, wealth index, household owns livestock, herds or other farm animals, health insurance coverage, literacy level of respondent, ever participated in a literacy program, respondent's educational attainment, partner's educational attainment, respondent's occupation, partner's occupation, frequency of reading newspaper or magazine, frequency of listening to radio, frequency of watching television, final say on deciding what to do with

money husband earns, getting money for medical treatment, concern there are no drugs at medical facility and ethnicity of respondent. These were the predictor variables found statistically significant in the bivariate analyses.

In the second part, only six variables which were found statistically significantly associated to optimal antenatal care in the first part of the binary logistic regression analyses were analysed. The second part of the analyses was necessitated because most of the values obtained at the end of the first part of the analyses were only protective and had no risk associations. The intention therefore was to perform the second part of the analyses to determine the risks levels or factors associated with not having optimal antenatal care. In this part, only the six predictor variables that were significantly associated to optimal antenatal care in the first part of the analyses were analysed one after the other until the last variable.

b. Ethical considerations

The data used for this study were collected before the start of this study and had been given ethical approval for the purposes of research. As large institutions of data collection, Measure DHS and IFC Macro have defined guidelines for ethical practices when obtaining information from individuals. All participants taking part in the study gave informed consent before the start of the data collection process and an additional consent was retrieved for the measurement and use of biometric information by the University of Bergen. For obtaining the data, an application was sought by the Faculty of Psychology at the University of Bergen detailing the purpose and use of the data. Being part of a research for which ethical clearance has already been given invariably gives me permission to use the data for analyses and research.

4.0 RESULTS

4.1 Descriptive results

4.1.1 Optimal and sub-optimal antenatal care

Optimal antenatal care which was defined as the attendance of at least four antenatal care visits with the first occurring during the first trimester of a pregnancy and in addition receiving the entire essential service package described in the methods. 53.6 percent of respondents received optimal antenatal care compared to 46.4 percent who had sub-optimal antenatal care (Table 2).

4.1.2 Respondent's current age

The age distribution of the national sample ranged from 15 to 49 years old (Table 2). This age range was selected for the study because only women of child bearing age were of interest to the study and not other women. The mean age for the national sample was 30.1 years old (Table 1).

4.1.3 Respondent's region of residence

This variable considered which of the ten regions of the country the respondent resided in at the time of the interview. In the national sample, the highest percentage of 19.5 of the respondents resided in the Ashanti region while as little as 2.8 percent resided in the Upper West region (Table 2).

4.1.4 Respondent's type of place of residence

This variable considered respondent's current place of residence, whether respondent's resided in urban or rural areas. In the national sample, 41 percent resided in urban areas whiles 59 percent lived in rural areas (Table 2).

4.1.5 Wealth index

Respondent's responses for this variable were closely distributed compared to many other variables in the national sample. The richest and richer response categories constituted 15.7 and 21.5 percent respectively. A good percentage of 19.5 of respondents belonged to the middle wealth quintiles while 21.9 and 21.7 percent of the respondents constituted the poorer and the poorest wealth quintiles (Table 2).

4.1.6 Household owns livestock, herds or farm animals

This variable as a wealth item considered whether respondent's households owned livestock, herds or farm animal. In the national sample, 49.2 and 50.8 percent indicated yes and no respectively (Table 2).

4.1.7 Health insurance coverage

This variable considered whether respondents were or were not covered by health insurance. As is shown in table 2, in the national sample, 41.1 percent of respondents indicated they were covered by health insurance while a greater proportion of 58.9 percent said they were not covered by health insurance.

4.1.8 Respondent's literacy level

In the national sample, 21.5 percent of respondents reported they were able to read whole sentences. Nearly half of those who could read representing 12.9 percent indicated that they were able to read only read part of sentences. Astonishingly, 65.6 percent of the respondents reported that they could not read at all (Table 2).

4.1.9 Ever participated in a literacy program

This variable considered whether participants had taken part in any literacy program outside a formal school. In the national sample, just 6.3 percent of respondents indicated they had been involved in a literacy program outside primary school. A worrying 93.7 percent of respondents reported they had not been in any literacy program outside primary school (Table 2). Overall, about 12 percent constituted missing data in the frequency distribution which is far higher than the mostly acceptable limit of 5 percent. It is not clear what could be the cause for such a high percentage of missing data. It could be probable that it was an oversight during the data entry process. It is also probable that respondents confused between this question and the question immediately before this "respondent's literacy level" and perhaps did not answer it or interviewers did not ask it due to the same confusion indicated above.

4.1.10 Educational attainment

Educational attainment explored the amount of education respondents had obtained at the time of the interview. Table 2 shows the distribution of education for the national sample. For the national sample, 2.5 percent of respondents had higher education while 5.6 percent had complete secondary school. The greatest proportion of 38.2 percent of respondents had incomplete secondary school compared to 5.9 percent who had complete primary education. A sizeable percentage of 17.9 of the respondents had incomplete primary while a good proportion of women constituting 29.8 percent of respondents reportedly had no education.

4.1.11 Partner's educational attainment

For this variable, 8.3 percent of respondents indicated their husbands or partners had higher education while 12.8 percent of the partners were reported to have complete secondary school. The greatest proportion of 39.4 percent of respondents reported that their partners had incomplete secondary school while only 2.1 percent of the partners were reported by the respondents to have complete primary school. The respondents indicated that 5.3 percent of their partners had obtained incomplete primary school while a high percentage of 21.8 of

respondents indicated that their partners had no education (Table 2). This variable also recorded a missing value of 10 percent which is higher than the allowable limit of 5 percent. The reason for the high missing value is not know but could be due to the fact that some respondents were not sure about their partner's educational attainment and may have either not answered or gave wrong responses.

4.1.12 Respondent's occupation

This variable assessed the occupational activity respondents were engaged in at the time of the interview. The variable had ten occupational groupings and was therefore categorized into three main groups, namely White collar job, Agric/Manual labour and those who were not working. In the national sample, 48.0 percent of were involved in occupations related to professional, service or technical work, known as white collar job or occupation. A relatively high number of respondents constituting 41.6 percent were involved Agricultural related activities and skilled/ unskilled manual labour. A relatively small number of respondents forming 10.4 percent reported they were not working (Table 2).

4.1.13 Partner's occupation

This variable had similar categories like the respondent occupational variable and was treated similarly. In the national sample, 34.2 percent of respondents reported that their husbands or partners were involved in White collar occupations while a greatest proportion of 65.3 percent of partners were reported to be engaged in agricultural or manual labour related activities. A relatively small number constituting 0.4 percent of respondents indicated their partners were not working (Table 2). A missing value of 8 percent was recorded, above the 5 percent acceptable limit. One of the reasons for this could be respondent's inability to clearly indicate what their partners did for a living or the question was perhaps not asked due to oversight on the part of the interviewers.

4.1.14 Frequency of listening to reading newspaper/magazine

Only 1 percent of respondents reported they read a newspaper or magazine almost every day in the national sample. A further 5.7 percent reported reading a newspaper or magazine at least once a week. While 5 percent of respondents said they read newspaper or magazine less than once a week, an astonishing 88.4 percent of respondents indicated that they never read newspaper or magazine (Table 2).

4.1.15 Frequency of listening to radio

In the national sample, 50.4 percent of respondents indicated they listen to radio almost every day compared to 24.3 percent of respondents who indicated they listened to radio at least once a week. Respondents who indicated they listen to radio less than once a week constituted 7 percent while a further 18.3 percent of the national sample reported not listening to radio at all (Table 2).

4.1.16 Frequency of watching to television

In the national sample, 29.3 percent of respondents said they watching to television almost every day while 16.4 percent of respondents watched television at least once a week. The composition of respondents who watched television less than once a week was 8.8 of the national sample whiles while a greater proportion of 45.4 percent of respondents said they at all do not watch television (Table 2).

4.1.17 Final say on what to do with money husband earns

This variable assessed who made the final decisions regarding a husband's income in a household and was categorized into three. In the national sample, 37.3 percent of respondents said final decisions on husband's income was taken by both respondents and their partners. Comparatively, a small proportion of 7.4 percent of respondents indicated that they had the

final decision on what to do with their partner's earnings. A greater proportion of respondents representing 55.3 percent indicated that final say on what to do with money husbands earn lay with their partners (Table 2). A proportionally higher percentage of 13 percent of responses was missing. The cause is not known but one possible explanation could be that the question was not answered or asked.

4.1.18 Getting money for medical treatment

This variable considered whether respondents had problems getting money for medical treatment. A good proportion of respondents constituting 53.9 percent indicated they had no problems getting money for medical treatment in the national sample, while 46.1 percent of respondents indicated they had a big problem getting money for medical treatment (Table 2).

4.1.19 Concerns there are no drugs at medical facility

The variable assessed one of the reasons why respondents did not go to medical facilities, which was that there were no drugs available at medical facilities. In the national sample, 55 percent of respondent said they had no problem about the availability of drugs at medical facilities while 45 percent indicated they had big problems with the drug availability at medical facilities (Table 2).

4.1.20 Ethnicity

This variable considered the distribution of the ethnicity of respondents as is shown in table 2. In the national sample, a highest of 47.4 percent of respondents indicated they were Akans while a least of 0.8 said they belonged to the Mande ethnic group.

4.2 Bivariate Analyses

4.2.1 Demographics

As presented in table 3, Chi-square test of independence was used to test for the correlation between antenatal care and respondent's current age, region of residence, place of residence and ethnicity.

Respondent's aged 25-49 years were in the first category and coded 0, while those aged 15-24 years were in the second category and coded 1. Respondent's current age was statistically significant with 55.7 percent of respondents aged 25-49 years receiving optimal antenatal care compared to 46.8 percent of respondents aged 15-24 years (X^2=11.462, p<0.001). A significantly higher percentage of 53.2 of respondents aged 15-24 years received sub-optimal antenatal care compared to 44.3 percent of respondents aged 25-49 years. For region of residence, a highest of 65.5 percent of respondents in the Upper west region received optimal antenatal care compared to a least of 30.9 percent in the Northern region **(**X^2=78.35,p<0.000**)**. This variable was statistically significantly associated to optimal antenatal care. Also, a highest proportion of 69.1 percent of respondents in the Northern region received sub-optimal antenatal care compared to 34.5 percent of respondents in the Upper west region. Ethnicity was also significantly associated to optimal antenatal care. A highest percentage of 66.7 of respondents from the Grussi ethnic group received optimal antenatal care compared to a least of 28.1 percent of respondents belonging to the Gruma ethnic group (X^2=51.53, p<0.000). Also, 71.9 percent of respondents receiving sub-optimal antenatal care belonged to the Gruma ethnic group compared 25.0 percent of respondents from the Mande ethnic group.

Place of residence was also statistically significantly correlated to optimal antenatal care. Urban women respondents were the highest to receive optimal antenatal care compared to rural women respondents with 56.9 percent and 41.5 percent respectively. Respondents residing in rural areas had a percentage point of 58.5 receiving sub-optimal antenatal care compared to their 43.1 of their counterparts residing in urban areas (X^2=31.269, p=0.000). The following demographic variables were not included in the analyses because they were not considered relevant or appropriate to the context of the study or had too high degrees of freedom; respondent's year of birth, respondent's age in five year groups, sex of household head, age of household head and age of partner.

Chi-square tests of independence were performed to test for the strength of the correlation between the various wealth items and antenatal care. A number of wealth related items were included in the analyses to test for significance in the national sample. The following variables were statistically significant to antenatal care at the 0.001 significance level; wealth index, household owns livestock, herds or farm animals, health insurance coverage, final say on what to do with money husband earns, getting money for medical treatment and concern there are no drugs at medical facility as is shown in table 3. A number of household items were excluded from the analyses because those individual items were not considered valuable wealth variables in the context of the study. However, the following were found not to have any statistical significance correlation with antenatal care and household owns cattle, household owns goats.

Wealth index was statistically significantly correlated to optimal antenatal care, with 73.1 percent of respondents who received optimal antenatal care belonging to the richest wealth index, compared to 39.5 percent of respondents belonging to the poorest wealth index (X^2=100.59, p<0.000). Also, 60.5 percent of respondents belonging to the poorest wealth quintile received sub-optimal care compared to 26.9 percent of respondents belonging to the highest wealth index.

4.2.3 Educational variables

Chi-square test for independence was used to assess the relationship between antenatal care and educational variables. As is shown in table 3 for the national sample, respondent educational attainment, partner's educational attainment and literacy level of respondent were positively associated with antenatal care with statistical significance at the 0.000 level, suggesting that higher levels of education or literacy was associated with optimal antenatal care while lower levels of education and literacy was associated with sub-optimal antenatal care. Furthermore, there was also a significant correlation between antenatal care and whether respondents had ever participated in a literacy program outside primary school with a Chi-square value of 11.91 at $p < 0.001$. Additionally, frequency of reading newspaper or magazine, frequency of listening to radio or watching television were all found to be statistically significantly associated with antenatal care such that higher frequency of reading

newspaper or magazine, listening to radio or television resulted in higher optimal antenatal care and vise-versa.

4.2.4 Occupational variables

To ascertain the impact of occupation on utilization of antenatal services, Chi-square tests for independence were performed. Both respondent and partner's occupation were statistically significant to antenatal care in the national sample at the 0.001significant level. In this respect, respondents and partners who were reported to be involved in gainful employment resulted in higher utilization of optimal antenatal care services while those who were reported not to be working resulted in lower utilization of optimal antenatal care services (Table 3).

4.3 Binary Logistic Regression Analyses

The various logistic regressions performed were with respect to the national sample and explored the correlation between the various predictor variables already analysed in the descriptive analyses and optimal antenatal care. As has already been indicated in the method section 3.7, page 39, the classical and the alternative model regressions were performed with age controlled for in all analyses.

National sample-Ghana (n=1970).

Logistic regression was used to test various models of variables that were identified as statistically significantly associated with optimal antenatal care in the bivariate analyses.

4.4 Part 1

4.4.1 Regression with demographic variables

Binary logistic regression was used with respondent's current age, region of residence and type of place of residence entered in the equation. The model was statistically significant at the 0.001 significance level, X^2=65.399. The model's explanation power was between 1

percent (Cox and Snell R Square) and 2 percent (Nagelkerke R Square) with correctly classified cases of 58.1 percent. All three predictor variables were statistically significant. Controlling for age, respondent's type of place of residence contributed the most to the model with an odds ratio of 1.526 ($p < 0.001$). This implied that women living in the northern part of the country were about 1.5 times less likely to receive optimal antenatal care compared to the reference category which was women living in the southern part of the country. Respondent's region of residence was statistically significantly related to optimal antenatal care and found to be protective with an odds ratio of 0.576. This indicated that women living in the southern part of the country which was the reference group were less likely to receive sub-optimal antenatal care compared to their counterparts living in the northing part of the country. With respect to age, the odds ratio for having sub-optimal care was 0.693 indicating that women aged15-24 years were at risk compared to those aged 25-49 which was the reference category ($p < 0.001$) as presented in table 4.

4.4.2 Logistic regression with demographic, household wealth variables and social determinants of health

In this analysis, respondent's current age, region of residence, type of place of residence, wealth index, household ownership of livestock and health insurance coverage were entered into the model. After controlling for age, region of residence, wealth index and health insurance coverage were found statistically significant as is shown in table 5. Type of place of residence and household ownership of livestock made no statistical significance. The model as a whole was statistically significant at $p < 0.001$, $X^2=129.714$. The variance explained by the model was between 4 (Cox and Snell R Square) and 8 percent (Nagelkerke R Square) with corrected classified cases of 61.2 percent. Respondent's region of residence was also found to be protective with an odd ration of 0.701. The odd ratios of wealth were also protective ranging from 0.276 to 0.800 in the richer to the poorest wealth quintiles compared to the reference category which was the richest wealth quintile, $p<0.001$.

4.4.3 Logistic regression with demographic, wealth index, health insurance coverage and literacy variables

At this stage of the binary logistic regression analyses, there were three additional variables to the model. The complete model as a result had age, region of residence, wealth index, health insurance coverage, literacy, ever participated in a literacy program and respondent's educational attainment. The model as a whole was significant at $p<0.001$, $X^2=108.205$. The model explained between 4 (Cox & Snell R Square) and 7 percent (Nagelkerke R Square) of the variance with and correctly classified 59.9 percent of cases. Of the seven variables in the model, five made a statistical significance to the model while literacy level of respondent and educational attainment of respondent did not make statistical significance. After controlling for age, health insurance coverage came top as the greatest contributor to the model with an odd ratio of 1.425. This indicated that women who had health insurance as the reference category were about 1.4 times at an advantage of receiving optimal antenatal care compared to women who had no health insurance. The odd ratios for respondent's region of residence and participation in a literacy program were found to be protective with values of 0.739 and 0.439 respectively. This indicated that women living in the southern part of the country were less likely to receive sub-optimal care as the reference group compared to women living in the northern part of the country; also women who had participated in a literacy program being the reference group were also least likely to receive sub-optimal care compared to women who had not taken part in any form of literacy program. Wealth index was also found protective with odd ratios of 0.322 to 0.650 in the richer to the poorest wealth quintiles compared to the reference categories at which was the richest wealth quintile, $p<0.001$ as is shown in table 6.

4.4.4 Logistic regression with demographic, wealth, health insurance, literacy, educational and occupational variables

At this stage of the model, age, region of residence, wealth index, health insurance, participation in a literacy program in addition to partner's educational attainment, respondent's occupation and partner's occupation were included, while variables that were not significant in the previous stage of analyses were excluded. The model as a whole was significant, $X^2=106.468$, $p<0.001$ and explained between 5 percent (Cox and Snell R Square)

and 8 percent (Nagelkerke R Square) of the variance in the model and correctly classified 61.4 percent of the cases. Region of residence, partner's educational attainment, respondent's occupation and partner's occupation did not contribute significantly to the model. Health insurance coverage at this stage was still the strongest predictor to the model with an odds ratio of 1.307, indicating that having no health insurance increased the risk of receiving sub-optimal antenatal care by about 1.3 times compared to the reference. Participation in a literacy program and age were both found to be protective with odd rations of 0.490 and 0.693 respectively. The odd ratios for wealth ranged from 0.538 and 1.009 from the richer and the poorest wealth quintiles respectively compared to the reference category as is shown in table 7.

4.4.5 Logistic regression with demographic, wealth, health insurance and literacy variables

At this stage of the analyses, age, wealth index, health insurance coverage and participation in a literacy program which were statistically significant in the previous analyses were maintained. Additional variables included were; frequency of reading newspaper or magazine, frequency of listening to radio and frequency of watching television. The variance explained by the model was between 4 percent (Cox and Snell R Square) and 7 percent (Nagelkerke R Square) and was statistically significant, $X^2=112.252$, $p<0.001$ and correctly classified 62.0 percent of the cases. Frequency of reading newspaper or magazine, frequency of listening to radio and frequency of watching television did not contribute anything statistically significant to the model. With age controlled for, both wealth index and participation in literacy program recorded protective values as shown in table 8. Health insurance contributed the most to the model with an odds ratio of 1.361, indicating that not having health insurance increased women's risks of receiving sub-optimal care by about 1.4 times compared to the reference group who had health insurance.

4.4.6 Logistic regression with demographic, wealth, health insurance, literacy, autonomy and medical facility variables

Variables that were not statistically significant in the previous analyses were excluded in this analysis and new variable introduced. The new variables added to the model were; final say on deciding what to do with money husband earns, getting money for medical treatment and concern there are no drugs at medical facilities in addition to age, wealth index, health insurance and participation in a literacy program. The model as a whole was statistically significant at $p<0.001$, $X^2=105.536$ and explained between 4 percent (Cox and Snell R Square) and 8 percent (Nagelkerke R Square) of the variance in the model. The model also correctly classified 61.0 percent of the cases. Only final say on deciding what to do with money partner earns was not statistically significant in the analysis. Of the five that were statistically significant after age had been controlled for, health insurance still contributed most to the model but with a reduced odds ratio of 1.291. Participation in a literacy program, getting money for medical treatment and concern there no drugs at medical facility recorded protective values of 0.513, 0.781 and 0.702 respectively as shown in table 9. With respect to wealth, protective values ranging from 0.364 to 0.835 in the richer and the poorest quintiles compared to the reference group which was the richest wealth quintile were observed.

In this analysis, variables that were not significant in the previous analyses were eliminated and only ethnicity introduced to the model. The complete variables in the model therefore were; age, wealth index, health insurance coverage, participation in a literacy program, getting money for medical treatment, concern there are no drugs at medical facility and ethnicity. All the variables except ethnicity were statistically significant and the model was statistically significant, $X^2=141.433$, $p<0.001$, explaining between 6 percent (Cox and Snell R Square) and 11 percent (Nagelkerke R Square) of the variance in the model. The model correctly classified 61.8 percent of cases. After controlling for age, health insurance contributed most to the model with an odds ratio of 1.312, indicating that having health insurance increased women's chances of obtaining optimal antenatal care by about 1.3 times as the reference group compared to not having health insurance. With respect to wealth, protective values of 0.362, 0.452, 0.648 and 0.817 among the richer, middle, poorer and poorest wealth quintiles respectively compared to the reference category. Participation in a literacy program, getting money for medical treatment and concern there are no drugs all recorded protective values of 0.445, 0.806 and 0.694 respectively as is presented in table 10.

4.4.7 Logistic regression with age, wealth, health insurance, literacy, medical facility variables

In the final model, only statistically significant variables in the previous analysis were analysed. As a result, the following variables were in the model; age, wealth index, health insurance coverage, participation in a literacy program, getting money for medical treatment and concern there are no drugs at medical facility. All variables were statistically significant, X^2=110.599, p<0.001, and explained between 4 percent (Cox and Snell R Square) and 7 percent (Nagelkerke R Square) of the variance and correctly classifying 60.2 percent of the cases. After controlling for, health insurance as in the previous analyses still emerged as the strongest contributor to the model with and protective values as shown in table 11.

4.5 Part 2

As already indicated in section 3.7, page 37, the second part of the binary logistic regression was necessitated in order to explore risks factors associated with not receiving optimal antenatal care with reference to the various predictor variables. Each of the predictor variables was entered one after the other until the last but only the final model is presented in table 12.

The model as a whole was significant, X^2=110.599, p<0.001 and explained between 4 percent (Cox and Snell R Square) and 7 percent (Nagelkerke R Square) of the variance in the model. It also correctly classified 60.2 percent of the cases. After controlling for age in this final analysis, the odds ratio for having optimal antenatal care was 1.198 for the richer quintile, compared to the richest which was the reference category (p<0.345), and not statistically significant. The odds ratio for having sub-optimal antenatal care for the middle quintile was 1.723, compared to the richest wealth quintile which was the reference category (p<0.005). The odds ratio for having optimal antenatal care for the poorer quintile was 2.131, compared to the reference category which was the richest wealth quintile (p<0.000). The odds ratio for receiving optimal antenatal care for the poorest wealth quintile was 2.886, compared to the richest wealth quintile which was the reference category (p<0.000). This indicate that women falling into the middle, poorer and poorest wealth quintiles were 1.7, 2.1 and 2.9 times less

likely to receive optimal antenatal care compared to the richest wealth quintile which was the reference category.

With respect to health insurance, the odds ratio for having sub-optimal antenatal care was 1.332, indicating that women who did not have health insurance were about 1.3 times less likely to receive optimal antenatal care ($p<0.007$). The odds for participating in a literacy program was 2.108, given an indication that women who had participated in some form of literacy program outside primary school were about 2 times at an advantage of receiving optimal antenatal care compared to those who had not participated in any literacy program outside primary school ($p<0.001$).

With respect getting money for medical treatment, the odds ratio was 1.233, meaning that women who had problems or difficulty getting money for medical treatment were about 1.2 times at risk of receiving sub-optimal antenatal care compared to women who had no difficulty getting money for medical treatment. Regarding the concern for availability or unavailability of drugs at medical facilities, no risk were found associated with this variable and as a result record a protective value of 0.699.

5.0 DISCUSSION OF RESULTS

In the final analysis, the study found that nationally, the odds of having optimal antenatal care was significant with only one of the classical social determinants of health, namely wealth. The other variables not considered classical social determinants of health that were also significantly associated to optimal antenatal care were; participating in a literacy program, having health insurance coverage, having money for medical treatment and Concern there are no drugs at medical facility after controlling for age. The odds of having received optimal antenatal care were significant for women in the middle, the poor and the poorest wealth quintiles, compared with the richest quintile which was the reference. Women in the middle, poorer and poorest wealth quintiles were 1.7, 2.1 and 2.9 and times at risk of receiving optimal care compared to the richest quintile as the reference. Wealth Index emerged as the strongest predictor of optimal antenatal care recording odds ratios of 2.886 in the final or reduced model. Respondent's age, Wealth Index, Having health insurance coverage, participating in a literacy program, having money for medical treatment and Concern there are no drugs at medical facility were significant in all analyses. With respect to the Wealth Index, belonging to the middle, poorer and poorest wealth quintiles recorded increased odds of having sub-optimal antenatal care compared to the richest and the richer wealth quintiles.

The relationship between social factors or socio-economic factors and health and antenatal care in particular have been well documented through numerous research across the globe especially in developing countries where maternal mortality is still a big problem. What makes this research unique from others conducted in Ghana on antenatal care is its emphasis on the amount of care received by women at ANC facilities. Although some research has been done in relation to the content and amount of care received by women during prenatal care, they mostly have been done in developed countries such as Australia, Canada, Germany and the United States and a few in developing countries such as Turkey (60, 71). To date, I have not yet come across any study that has looked at antenatal care in relation to the amount of care provided to women at health facilities in the context of Ghana.

A study that looked at the factors associated with the utilization and content of prenatal care in a western urban district of Turkey found women aged between nineteen and thirty-four years, having at least six years of education, having a history of one abortion increased the likelihood of obtaining adequate prenatal care (71). Women having their first birth were 5.1

times more likely to receive an adequate number of services compared to those having their third or more. Furthermore, the odds of receiving an adequate amount of care 2.9 times higher for a woman who was expecting her second birth than her counterparts of a higher parity. Being married to a worker or a spouse from other job groups showed an increasing probability of being included in the adequate category compared with those with jobless spouses.

The main findings of this study points to parts of research in health that have not been considerably addressed or often overlooked. This research discusses the factors that distinguish women receiving optimal antenatal care from those receiving sub-optimal antenatal care in the Ghanaian context. With this in mind, there are other concerns that come to the fore. The biggest question that comes to mind is why the statistical model explains very little about the factors that distinguish women receiving optimal antenatal care from those who do not? Why do most of the social determinants of health which have contributed significantly to antenatal care in other studies in Ghana and in other countries fail to make any statistical significance in this study? The discussion part of this thesis attempts to throw more light on the questions that have been raised from the results of the study.

5.1 What can explain why age is related to antenatal care?

With respect to age, most of the existing literature has focused on access to antenatal care services. A study in Ibadan, Nigeria found that married women who were twenty-five years or older were more than twice more likely to utilize antenatal car facilities compared to women less than twenty-five years (114). A study in western Kenya also found that women aged nineteen years old or younger were less likely to attend antenatal care but in the same study also, women aged thirty-four years or older were less likely to attend antenatal care (115). Another study in northern India found that women who married at nineteen years of age or older were more likely to access antenatal care services compared to women who married younger than nineteen years of age (93). Now, regarding access to optimal antenatal care and age, this study found that a significantly higher proportion of women aged twenty five years or older obtained optimal antenatal care compared to women younger than twenty-five years of age table 3.

One of the reasons that could explain why women younger than twenty-four years are less likely to obtain optimal antenatal care could be the issue of class. It is quite probable that

many of these younger women who received sub-optimal care were teenagers when they became pregnant or were older but had no husbands when they got pregnant. The Ghanaian society frowns on teenage pregnancy and getting pregnant without a husband. Such people are often treated with contempt and are likely to be a factor that could prevent a lot of women from seeking and obtaining antenatal care and optimal antenatal care respectively. Due to the attitude of society towards such mothers, they are likely to avoid public places including health facilities where they could obtain antenatal care. This is confirmed by a study in Guatemala where married women were more likely to receive and seek early antenatal care than single and unmarried women (105).

Being young and without a husband also presents another challenge. Such young women are likely to face financial problems in relation to the cost of seeking medical attention and for their upkeep because they may not be engaged in any form of employment. This is further exacerbated by the way women attend antenatal care visits in Ghana. It has more or less become a fashion where women dress neatly, hanging their hand bags when attending care visits. Women who are unable to dress well will feel ashamed to visit antenatal care facilities. This is confirmed by a study in Zimbabwe where women indicated that they were ashamed to visit ANC facilities with torn and tight clothes (81).

Another possible explanation could be illiteracy. Some of these women are also likely to have no or little literacy to know and understand the consequences of not seeking antenatal care or the benefits of attending antenatal care. Having some amount of formal education or literacy could increase their chances of obtaining optimal antenatal care as better educated women have been found to receive the recommended number of antenatal care visits (67, 88).

Parental and family neglect is another probable factor that could hinder younger women from obtaining optimal antenatal care. It is quite natural for parents to be disappointed when their daughters get pregnant when none of them are prepared for the pregnancy. When such unwanted pregnancies happen and often with men who are not responsible, there is the tendency for parents and families to neglect or even abandon such poor women to their fate. Such young women are very likely not to even attend ANC because they lack support from family and sometimes the very men who got them pregnant. This is consolidated by a study in Turkey where unwanted pregnancy, inadequate social support and not being employed were identified as barriers to receiving prenatal care (88).

5.2 Why is the wealth index related to optimal antenatal care?

The wealth index is generally accepted as a predictor of health including optimal antenatal care (79). It simply accesses what respondents owned and what they did not own accordingly, accordingly grading respondents into the different wealth quintiles. The national sample was categorized into five quintiles with the majority falling into the two lowest quintiles and the least percentage falling into the richest quintile as have been reported in several other studies where wealth index was used as a measure (116). The outcome of this study is not surprising because studies in Kenya and Nepal have indicated that women from households with higher economic status are more likely to receive adequate and early antenatal care services compared with women of lower economic status (117, 118).

Wealth Index could give an indication of how wealthy a household is because it is quite likely that wealthy households would own the most valuable assets. Wealth Index in this situation could be a good measure of income and could explain why respondents from the richest, richer and middle wealth quintiles were more likely to receive optimal antenatal care compared to the poorer and the poorest wealth quintiles. This is confirmed by a study in Guatemala where owning a car or truck was associated with higher access and utilization of prenatal care (105).

There are multiple pathways by which socio-economic status determines health; therefore a comprehensive analysis must include macroeconomic contexts and social factors as well as more immediate social environments, individual psychological and behavioural factors, and biological predispositions and processes (119). This may explain perhaps why this study has explained very little about the factors distinguishing women receiving optimal care from those receiving sub-optimal care.

5.3 Why is health insurance related to optimal antenatal care?

The health insurance scheme in Ghana was established to replace the “cash-and-carry” system where attendees to medical facilities were required to pay for medical services before they were attended to, which had been in place since 1985 (120). It is quite obvious that this “cash-and-carry system will not be a problem for the rich in society but will be a problem for the poor or the socioeconomically disadvantaged in society. The relationship between health insurance and optimal antenatal care in this study as a result cannot be surprising as majority

of Ghana's population is said to be poor (121). The relationship between health financing and health is clear from many studies conducted but not much has been done with respect to antenatal care in Ghana. Since cost of medical services including transportation and laboratory test has been identified as a barrier to women's access to antenatal care (48, 49), it makes sense that even poor people who otherwise could not have afforded ANC services would have access due to the health insurance now in place.

This study as expected contradicts the results of a cross-national study to determine the association between government-versus private financing of health services and antenatal care utilization and other maternal care services in forty-two lower and middle income countries. In this study, health financing did not influence women's access to antenatal care services (78). Although this previous study only considered access to antenatal care, it is quite obvious that without access to antenatal care, there cannot be any mention of optimal care and therefore, not influencing access to antenatal care obviously would not have influenced optimal care if that had been considered.

Also worth mentioning is the tendency for expanded coverage for more women under the health insurance scheme than otherwise would have been under the "cash-and-carry" system. Although expanded coverage necessarily does not translate into optimal care, it gives more women access to a service many would not have had. Access could lead to improved antenatal care attendance which could also lead to optimal antenatal care, with proponents of care expansion pointing to health improvement as a likely benefit (122).

5.4 Why participating in literacy program is related to optimal antenatal care?

There are a number of pathways through which people learn about various aspects of health: formal education, mass media and social networks and diffusion (123). The outcome of this research will meet the expectation of many people on the effect of literacy on health in general and antenatal care to be specific. The mention of literacy to many people connotes to formal education which is far from reality. As already stated, literacy is acquired through several pathways across the world including Ghana. The proliferation of radio stations across Ghana in recent times could have a positive effect on literacy. A radio stations can be found in almost every district of the country which certainly can only increase and improve literacy across the country. This could be a good response to a question asked by Andrzejewski, Reed

and White, does where you lives influence what you know? Community effects on health knowledge in Ghana (123). Living at a place where one has no access to information leads to almost no literacy compared to living at a place where there is access to information through various media. Yes, where you live influences what you know. Although listening to television and radio were statistically not significant in the study, their effect cannot however be down played. In the past where access to mass media was difficult, most people living in rural Ghana hardly had radio sets not to mention television sets, and where they did, there were only few languages on the national radio. Today, radio stations are closer to the people and broadcast in their own native languages where they can better understand and make meaning out of each broadcast. This can only be a plus for literacy and will most likely have a positive impact on health and optimal antenatal care. Additionally, many more people have access to televisions today than before and it can be expected that literacy through this medium can enhance and improve antenatal care.

5.5 Why is getting money for medical treatment related to optimal antenatal care?

One wonders why there should be concern for money for medical treatment when there is the national health insurance scheme in place to assist the poor. Although the insurance scheme is in place, it should be noted that not all women are ensured either because they cannot afford it or due to ignorance or due to other unknown reasons. The bottom line is that not all are ensured with the national health insurance and for such people, getting money to attend to medical facilities may be a challenge and could influence their health situation and also influence their behaviour to seek and obtain optimal antenatal care especially in poorer areas.

Another point worth consideration as to why money for medical treatment is a concern is the fact that other related charges to health care are not covered by the health insurance. A lot of people especially living in rural areas have to travel for long distances before they can access health care which comes with its associated inhibitive cost of transport which is not covered by the health insurance. This is confirmed by Forster, Simfukwe and Barbe that access to efficient, affordable and safe transport in the developing world is limited and directly impacts upon the ability of individuals to seek timely health services. They indicate that more than 60 percent of people in poor countries live more than eight kilometres from a health care facility making it not only expensive, but also difficult to access health care (124). This cannot be

different from the situation of many women in Ghana. This is also emphasized by the fact that access to health services in the developing world is poor and even gets significantly worse in the rural areas (125). A study conducted in Ghana found that about 79 percent of births were supervised by medical practitioners in urban areas as opposed to only 33 percent in rural areas (125). This conclusion can be generalized to other health concerns of which antenatal care is paramount. It can even be argued that if the rate of antenatal care attendance is high in an area, it is quite likely that delivery at health facilities will be equally high because it is during antenatal care visits that women are advised and encouraged to deliver at medical facilities where they can receive the best of attention. All these point to the fact that the transportation cost element is hindering a lot of people from accessing health care including antenatal care.

5.6 Why is concern that there are no drugs at medical facility related to optimal antenatal care?

For a lot of people, the mention of a hospital or a health facility often connotes to being sick and visiting such a facility means receiving treatment often in the form of medicine or drugs. Although receiving medication is not the ultimate objective of attending antenatal care, many women could shun the facility just thinking that they would not be given any medication. The professional experience I have had working in the health sector in some rural areas of Ghana has been that, many health facilities often do not have medicines to handle even the commonest of ailments. It is quite natural and normal that if people cannot get medication for common ailments like headache, they likely may not send any serious condition there including pregnancy which should not be seen as a sickness. This situation could keep a lot of women from visiting health facilities for antenatal care visits.

5.7 Methodological issues

5.7.1 Cross-sectional study

As a cross-sectional design, it is not possible to draw conclusions about causality from this research. For the purposes of determining causality, a study will require the analyses of at least three waves of data in structural equations. In this study however, there was only one

wave of data and therefore not possible to draw conclusions about causality. Additionally, this study is exploratory and causal conclusions are necessarily not the main aim of the research. The main priority of the research was to identify what social and demographic factors distinguish women who obtain optimal antenatal care from those who obtain sub-optimal antenatal care in Ghana using the 2008 DHS data.

5.7.2 Self-report

Self-report is a returning methodological issue in survey studies (126). The quality of the DHS data is assured as the DHS institution responsible for the development and collection of this data has extensive experience. The data used for this research was collected through face-to-face interviews by highly trained personnel. One of the potential validity issues related to survey studies is that a data collector cannot completely prevent under or over reporting or giving false responses. It is not easy to avoid response sets especially for sensitive topics (126). For this research, few variables analysed may be sensitive and there is not enough reason to consider this a as a methodological issue. There could not be any better alternative to survey and self-report for the collection and use of the data in this research. When necessary precautions concerning survey instruments and response sets are taken, the limitations of the methodology must be accepted (127, p.55).

5.7.3 Sample size

For an analyses to be said to have `sufficient` statistical power in regression analyses, there is the need for a certain number of respondents in relation to the number of variables. Of utmost importance is the number of parameters to be estimated (B coefficient). A model with five variables for example will estimate five B coefficients. On the other hand, if one variable is grouped into four, one group or category will be designated as the reference and B coefficients will be estimated for the other three categories. In a situation like this, a total of six B coefficients (parameters) would be estimated.

There is no fast rule to minimum or maximum n to parameter ratio and there is no generally acknowledged definition of what sufficient statistical power is. The ideal situation is to have

as large an n as possible and as few parameters to estimate as possible. The regression analyses in this thesis meets the often cited guideline of N > 50 + 8 x number of dependent or predictor variables (parameters to be more precise), suggested by Tabachnik and Fidell (128). With nineteen dependent variables for the binary logistic regression in this study, a sample size of N > 202 would satisfy the above suggested guideline. The sample size in the current study was 1970 women.

5.7.4 Comment on variables

A large number of variables were considered for analyses in this study because the social factors or social determinants of health exist at many levels, and the selection was also based on theoretical considerations. My intention was to examine all plausible social factors available in the data set. Only plausible social determinants of health were examined and should not be misunderstood as fishing for variables. After considering a wide range of variables through the analyses, six variables were significantly related to antenatal care but there is almost no success in predicting what factors distinguish women who obtain optimal antenatal care from those who obtain sub-optimal antenatal care.

All the models of the binary logistic regression have been included in the appendix to show the logic of progression in the analyses, but readers with less time available may choose to look at table 12 in the appendix, which is the final model.

5.7.5 Recommendations for further research

The outcome of this study calls for further research. A further research that would look into why only one social determinant of health was significantly associated to optimal antenatal care. In order to increase the proportion of women receiving optimal antenatal care in order to reduce maternal mortality, there is the need for a research that would identify which factors significantly predict optimal antenatal care in the Ghanaian context. Studies that qualitatively examine the structural and individual life situation of Ghanaian women could explain the predictors of optimal antenatal care much better. One possible qualitative study would be the positive deviant study method. In this study, women who received both optimal and sub-

optimal antenatal care could be identified and their life situations studied in order to determine what factors differentiate the two groups.

5.7.6 Practical Implications

It is clear from this study that it is not enough to focus on the classical social determinants of health for women to achieve optimal antenatal care. The activities of government and other non-governmental organizations working to improve maternal health ought to carefully plan and develop health programs and interventions that will suite cultural and specific local context. Local health promotion initiatives involving participatory needs assessments might yield valuable information that more effectively can improve optimal antenatal care (127). It is essential to note that this exploratory study alone is not enough to be used as a basis for change, but should be added to the wealth of knowledge on antenatal care.

6.0 CONCLUSION

This research investigated the demographic and social correlates that differentiate Ghanaian women who receive optimal versus sub-optimal antenatal care using the DHS 2008 data set. The research reveals that nationally, Wealth Index was the only classical social determinant of health that was statistically significantly associated to optimal antenatal care. The other five predictors of optimal antenatal care were; Participated in a literacy program, Health insurance coverage, Having money for medical treatment, Concern there are no drugs at medical facility and respondent's Age. However the variance explained by the statistical model is almost insignificant. This indicate that, although the six afore mentioned predictors were significant, they do not tell much about what differentiate women receiving optimal verses sub-optimal antenatal care. This research has shown that it is not very safe to generalize findings based on analyses from other countries even within the same region. Due to the complex nature of social phenomena, it is important to follow up this research with a qualitative study and a possible suggestion is the Positive Deviant approach. In order to increase the receipt of optimal antenatal care and reduce maternal mortality, it is important that particular attention be given to what risk and protective factors impact on optimal antenatal care in Ghana.

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Appendix

Frequencies

Bivariate analyses

Logistic regression analyses

Appendix

Table 1. Respondent's age distribution in the national sample

Respondent's age distribution	N	Minimum	Maximum	Mean
	1970	15	49	30.1

Table 2. Univariate descriptive statistics, all candidate predictor variables

Variable	Frequency	Percentage (%)
Antenatal care		
Optimal care	1056	53.6
Sub-optimal care	914	43.4
Total	1970	100
Respondent's current age		
15-24 Years	470	23.9
25-49 Years	1500	76.1
Total	1970	100
Frequency distribution for respondent's region of residence		
Western	180	9.1
Central	189	9.6
Greater Accra	247	12.5
Volta	163	8.3

Eastern	177	9.0
Ashanti	385	19.5
Brong Ahafo	206	10.5
Northern	276	14.0
Upper East	94	4.8
Upper West	55	2.8
Total	1970	100.0
Frequency distribution for respondent's type of place of residence		
Urban	808	41.0
Rural	1163	59.0
Frequency distribution of respondent's Wealth index		
Richest	308	15.7
Richer	419	21.3
Middle	383	19.5
Poorer	431	21.9
Poorest	428	21.7
Total	1970	100
Frequency distribution of respondent's household's ownership of livestock		
Yes	961	42.9
No	993	50.8
Missing	16	
Total	1970	100
Frequency distribution of respondent's health insurance status		
Yes	810	41.1
No	1158	58.9

Missing	3	
Total	1970	100
Frequency distribution of respondent's literacy level		
Able to read whole sentence	422	21.5
Only able to read parts of sentences	253	12.9
Cannot read at all	1285	65.6
Missing	11	
Total	1970	100
Frequency distribution of respondent's participation in a literacy program		
Yes	110	6.3
No	1624	93.7
Missing	237	
Total	1970	100
Frequency distribution of respondent's educational attainment		
Higher	49	2.5
Complete secondary	111	5.6
Incomplete secondary	753	38.2
Complete primary	116	5.9
Incomplete primary	353	17.9
No education	588	29.9
Missing	2	
Total	1970	100
Frequency distribution of respondent's partner’s educational attainment		

Higher	164	9.2
Complete secondary	252	14.3
Incomplete secondary	777	43.9
Complete primary	42	2.4
Incomplete primary	105	6
No education	430	24.3
Missing	200	
Total	1970	100

Frequency distribution of respondent's occupation

White collar job	941	48
Agric/Manual labour	816	41.6
Not working	203	10.4
Missing	10	
Total	1970	100

Frequency distribution of respondent's partner's occupation

White collar job	621	34.2
Agric/Manual labour	1184	65.3
Not working	8	0.4
Missing	158	
Total	1970	100

Frequency distribution of respondent Frequency of reading newspaper or magazine

Almost every day	20	1
At least once a week	111	5.7
Less than once a week	98	5

Not at all	1737	88.4
Missing	4	
Total	1970	100

Frequency distribution of respondent's frequency of listening to radio

Almost every day	992	50.3
At least once a week	478	24.3
Less than once a week	137	7
Not at all	361	18.3
Missing	3	
Total	1970	100

Frequency distribution of respondent's frequency of watching television

Almost every day	577	29.3
At least once a week	323	16.4
Less than once a week	174	8.8
Not at all	893	45.4
Missing	4	
Total	1970	100

Frequency distribution on decision of how husband's earnings are used

Respondent alone	126	7.4
Respondent and husband/partner	640	37.3
Husband/partner alone	947	55.3
Missing	258	
Total	1970	100

Frequency of respondent's getting money for medical treatment		
No problem	1060	53.9
Big problem	908	46.1
Missing	3	
Total	1970	100
Frequency distribution of respondent's concern about drug availability		
No problem	1083	55
Big problem	885	45
Missing	3	
Total	1970	100

Table 3.

Bivariate descriptive statistics, all candidate predictor variables.

VARIABLE	Optimal ANC		Sub-Optimal ANC	
Respondent's Current Age (X^2=11.462,p<0.000**)**	Frequency	%	Frequency	%
25-49 Years	836	55.7	664	44.3
15-24 Years	220	46.8	250	53.2
Respondent's region of residence (X^2=78.35,p<0.000**)**	Frequency	%	Frequency	%
Western	104	57.8	76	42.2
Central	105	55.9	83	44.1
Greater Accra	158	64.0	89	36.0
Volta	88	53.7	76	46.3
Eastern	88	49.7	89	50.3
Ashanti	226	58.7	159	41.3
Brong Ahafo	113	54.9	93	45.1
Northern	85	30.9	190	69.1
Upper East	54	58.1	39	41.9
Upper West	36	65.5	19	34.5
Region of residence in 2 groups (X^2=31.9,p<0.000)	Frequency	%	Frequency	%
Southern Ghana	881	56.9	666	43.1
Northern Ghana	176	41.5	248	58.5
Residence (X^2=31.27,p<0.000)	Frequency	%	Frequency	%

Urban	494	61.1	314	38.9
Rural	562	48.4	600	51.6
Wealth index (X^2=100.59,p<0.000)	Frequency	%	Frequency	%
Richest	226	73.1	83	26.9
Richer	259	61.7	161	38.3
Middle	200	52.2	283	47.8
Poorer	203	47.0	229	53.0
Poorest	169	39.5	259	60.5
Household ownership of livestock (X^2=15.26,p<0.000)	Frequency	%	Frequency	%
Yes	473	49.2	488	50.8
No	576	57.9	418	42.1
Health insurance coverage (X^2=28.56,p<0.000)	Frequency	%	Frequency	%
Yes	562	48.5	596	51.5
No	492	60.7	318	39.3
Literacy level of respondents (X^2=45.38,p<0.000)	Frequency	%	Frequency	%
Able to read whole sentence	280	66.4	142	33.6
Only able to read parts of sentence	146	57.7	107	42.3
Cannot read at all	662	48.4	663	51.6
Ever participated in a literacy program (X^2=11.91,p<0.001)	Frequency	%	Frequency	%
Yes	74	67.3	36	32.7
No	816	50.3	807	49.7

Respondent's educational attainment (X^2=67.35,p<0.000)	Frequency	%	Frequency	%
Higher	41	83.7	8	16.3
Complete Secondary	79	71.8	31	28.2
Incomplete Secondary	440	58.5	312	41.5
Complete Primary	54	46.6	52	53.4
Incomplete Primary	187	53.0	166	47.0
No Education	254	43.3	333	56.7
Partner's educational attainment (X^2=75.32,p<0.000)	Frequency	%	Frequency	%
Higher	113	68.9	51	31.1
Complete secondary	171	67.8	82	32.4
Incomplete secondary	430	55.3	348	44.7
Complete primary	14	33.3	28	66.7
Incomplete primary	50	47.2	56	52.8
No education	173	40.3	256	59.7
Respondent's Occupation (X^2=18.34,p<0.000)	Frequency	%	Frequency	%
White collar job	569	60.5	371	39.5
Agric/ manual labour	375	45.9	442	54.1
Not working	109	53.4	95	46.6
Partner's Occupation (X^2=32.39,p<0.000)	Frequency	%	Frequency	%
White collar jobs	388	62.6	232	37.4
Agriculture/Manual labour	575	48.6	609	51.4
Not working	5	62.5	3	37.5
Frequency of reading newspaper/magazine (X^2=43.61,p<0.000)	Frequency	%	Frequency	%

Almost every day	16	80	4	20
At least once a week	82	73.2	30	26.8
Less than once a week	72	73.5	26	26.5
Not at all	884	50.9	853	49.1
Frequency of listening to radio (X^2=43.83,p<0.000)	Frequency	%	Frequency	%
Almost every day	586	59.1	406	40.9
At least once a week	256	53.6	222	46.4
Less than once a week	73	53.7	63	46.3
Not at all	140	38.8	221	61.2
Frequency of watching television (X^2=79.34,p<0.000)	Frequency	%	Frequency	%
Almost every day	392	67.9	185	32.1
At least once a week	176	54.5	147	45.5
Less than once a week	92	52.9	82	47.1
Not at all	395	44.2	498	55.8
Final say on what to do with money husband earns (X^2=17.16,p<0.000)	Frequency	%	Frequency	%
Respondent alone	68	54	58	46
Respondent and Husband/Partner	382	59.8	257	40.2
Husband/Partner alone	466	49.2	481	50.8
Getting money for medical treatment (X^2=24.00,p<0.000)	Frequency	%	Frequency	%
No problem	622	58.6	439	41.4
Big problem	432	47.6	476	52.4

Concern there are no drugs at medical facility (X^2=8.33,p<0.004)	Frequency	%	Frequency	%
No problem	548	50.6	535	49.4
Big problem	505	57.1	379	42.9
Ethnicity of respondent (X^2=51.53,p<0.000)	Frequency	%	Frequency	%
Akan	544	58.2	390	41.8
Ga/Dangme	52	51.0	50	49.0
Ewe	141	56.2	110	43.8
Guan	22	40.0	33	60.0
Mole-Dagbani	189	48.2	189	51.8
Grussi	40	66.7	20	33.3
Gruma	27	28.1	69	71.9
Mande	12	75.0	4	25.0

Table 4. Model 1.

Logistic regression analyses with demographic variables predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients	B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
						Lower	Upper
Respondent's Age							
Current Age	-0.367	0.108	11.637	0.001	0.693	0.561	0.855
Region of Residence	-0.552	0.114	23.525	0.000	0.576	0.460	0.720
Type of place of residence	0.423	0.095	19.699	0.000	1.526	1.266	1.840

Ref. = Reference category

The model was statistically significant, $X^2 = 65.399$, $p < 0.001$. The model explained between 1 % (Cox & Snell R Square) and 2 % (Negelkerke R Square) of the variance, and correctly classified 58.1 % of the cases.

Table 5. Model 2.

Logistic regression analyses with demographic and wealth variables predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients		B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
							Lower	Upper
Respondent's Age								
	Current Age	-0.288	0.111	6.778	0.009	0.750	0.603	0.931
Region of Residence		-0.355	0.132	7.254	0.007	0.701	0.542	0.908
Type of place of residence		-0.090	0.128	0.498	0.480	0.914	0.712	1.174
Wealth Index								
Ref:	Richest							
	Richer	-1.287	0.221	34.055	0.000	0.276	0.179	0.425
	Middle	-0.794	0.186	18.214	0.000	0.452	0.314	0.651
	Poorer	-0.427	0.170	6.316	0.012	0.652	0.467	0.910
	Poorest	-0.223	0.152	2.145	0.143	0.800	0.593	1.078
Household ownership of livestock		-0.087	0.108	0.643	0.423	0.917	0.741	1.134
Health Insurance Coverage		0.348	0.098	12.627	0.000	1.416	1.169	1.716

Ref. = Reference category

The model was statistically significant, $X^2 = 129.714$, $p < 0.001$. The model explained between 4 % (Cox & Snell R Square) and 8 % (Negelkerke R Square) of the variance, and correctly classified 61.2 % of the cases.

Table 6. Model 3.

Logistic regression analyses with demographic and social determinants of health predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients		B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
							Lower	Upper
Respondent's Age								
	Current Age	-0.346	0.118	8.581	0.003	0.708	0.562	0.892
Region of Residence		-0.302	0.147	4.205	0.040	0.739	0.554	0.987
Wealth Index								
Ref:	Richest							
	Richer	-0.717	0.213	11.331	0.001	0.488	0.322	0.741
	Middle	-0.595	0.171	12.107	0.001	0.551	0.394	0.771
	Poorer	-0.319	0.167	3.662	0.056	0.727	0.524	1.008
	Poorest	-0.123	0.157	0.617	0.432	0.884	0.650	1.202
Health Insurance Coverage		0.354	0.105	11.375	0.001	1.425	1.160	1.751
Respondent's literacy level								
Ref:	Able to read whole sentence							
	Able to read only parts of sentence	-0.189	0.180	1.101	0.294	0.828	0.582	1.178
	Cannot read at all	-0.129	0.164	0.620	0.431	0.879	0.637	1.212
Participated in a literacy program		-0.822	0.220	13.923	0.000	0.439	0.285	0.677
Respondent's educational attainment								
Ref:	Highest							
	Complete secondary	-1.789	0.952	3.536	0.060	0.167	0.026	1.079
	Incomplete secondary	-1.556	0.970	2.574	0.109	0.211	0.032	1.412
	Complete primary	-1.820	0.959	3.601	0.058	0.162	0.025	1.062

Incomplete primary	-1.622	0.960	2.854	0.091	0.198	0.030	1.297

Ref. = Reference category

The model was statistically significant, $X^2 = 108.205$, $p < 0.001$. The model explained between 4 % (Cox & Snell R Square) and 7 % (Negelkerke R Square) of the variance, and correctly classified 59.9 % of the cases.

Table 7. Model 4.

Logistic regression analyses with demographic and social determinants of health predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients	B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
						Lower	Upper
Respondent's age							
Current age	-0.367	0.136	7.345	0.007	0.693	0.531	0.903
Region of residence	-0.239	0.159	2.251	0.134	0.787	0.576	1.076
Wealth index							
Ref: Richest							
Richer	-0.620	0.237	6.832	0.009	0.538	0.338	0.856
Middle	-0.614	0.195	9.888	0.002	0.541	0.369	0.793
Poorer	-0.203	0.184	1.215	0.270	0.817	0.570	1.171
Poorest	0.009	0.170	0.003	0.957	1.009	0.723	1.408
Health insurance coverage	0.268	0.113	5.644	0.018	1.307	1.048	1.630
Participated in a literacy program	-0.713	0.231	9.519	0.002	0.490	0.311	0.771
Partner's educational attainment							
Ref: Highest							
Complete secondary	-0.069	0.273	0.063	0.801	0.934	0.547	1.595
Incomplete secondary	-0.691	0.218	10.052	0.002	0.501	0.327	0.768
Complete primary	-0.280	0.159	3.101	0.078	0.756	0.554	1.032
Incomplete primary	0.311	0.370	0.707	0.401	1.364	0.661	2.816
No education	-0.209	0.233	0.803	0.370	0.811	0.513	1.282
Respondent's occupation							
Ref: White collar job							
Agric/manual labour	0.259	0.210	1.518	0.218	1.296	0.858	1.957

Not working	0.271	0.204	1.765	0.184	1.311	0.879	1.954
Partner's occupation	0.071	0.136	0.268	0.604	1.073	0.822	1.402

Ref. = Reference category

The model was statistically significant, $X^2 = 106.468$, $p < 0.001$. The model explained between 5% (Cox & Snell R Square) and 8 % (Negelkerke R Square) of the variance, and correctly classified 61.4 % of the cases.

Table 8. Model 5.

Logistic regression analyses with demographic, wealth and literacy variables predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients		B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
							Lower	Upper
Respondent's age								
	Current age	-0.359	0.119	9.183	0.002	0.698	0.554	0.881
Wealth index								
Ref:	Richest							
	Richer	-0.734	0.222	10.869	0.001	0.480	0.310	0.743
	Middle	-0.664	0.173	14.792	0.000	0.515	0.367	0.722
	Poorer	-0.383	0.157	5.953	0.015	0.682	0.501	0.927
	Poorest	-0.266	0.146	3.323	0.068	0.766	0.576	1.020
Health insurance coverage		0.308	0.105	8.650	0.003	1.361	1.108	1.671
Participated in a literacy program		-0.706	0.218	10.451	0.001	0.494	0.322	0.757
Frequency of reading newspaper or magazine								
Ref:	Almost every day							
	At least once a week	0.218	1.272	0.029	0.864	1.244	0.103	15.065
	Less than once a week	0.012	0.349	0.001	0.973	1.012	0.510	2.006
	Not at all	-0.225	0.291	0.596	0.440	0.799	0.452	1.413
Frequency of listening to radio								
Ref:	Almost every day							
	At least once a week	-0.468	0.141	10.999	0.001	0.626	0.475	0.826
	Less than once a week	-0.370	0.155	5.678	0.017	0.691	0.509	0.936
	Not at all	-0.323	0.222	2.118	0.146	0.724	0.469	1.118
Frequency of watching television								

Ref:	Almost every day							
	At least once a week	0.163	0.168	0.942	0.332	1.177	0.847	1.635
	Less than once a week	0.082	0.205	0.161	0.689	1.085	0.727	1.621
	Not at all	0.264	0.160	2.700	0.100	1.302	0.950	1.783

Ref. = Reference category

The model was statistically significant, $X^2 = 112.252$, $p < 0.001$. The model explained between 4% (Cox & Snell R Square) and 7 % (Negelkerke R Square) of the variance, and correctly classified 62.0 % of the cases.

Table 9. Model 6.

Logistic regression analyses with demographic, wealth and literacy variables predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients		B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
							Lower	Upper
Respondent's age								
	Current age	-0.373	0.134	7.747	0.005	0.689	0.530	0.896
Wealth index								
Ref:	Richest							
	Richer	-1.010	0.199	25.800	.000	0.364	0.247	0.538
	Middle	-0.839	0.161	27.274	.000	0.432	0.315	0.592
	Poorer	-0.415	0.162	6.548	.010	0.660	0.481	0.907
	Poorest	-0.180	0.153	1.378	.240	0.835	0.618	1.128
Health insurance coverage		0.255	0.113	5.081	.024	1.291	1.034	1.611
Participated in a literacy program		-0.667	0.228	8.548	.003	0.513	0.328	0.803
Final say on deciding what to do with husband's income								
Ref:	Respondent alone							
	Respondent and husband/partner	-0.204	0.209	0.952	0.329	0.815	0.541	1.229
	Husband/partner alone	-0.188	0.116	2.625	0.105	0.829	0.660	1.040
Getting money for medical treatment		-0.247	0.110	5.003	0.025	0.781	0.629	0.970
Concern there are no drugs at medical facility		-0.353	0.109	10.549	0.001	0.702	0.567	0.869

Ref. = Reference category

The model was statistically significant, $X^2 = 105.536$, $p < 0.001$. The model explained between 4% (Cox & Snell R Square) and 8 % (Negelkerke R Square) of the variance, and correctly classified 61.0 % of the cases.

Table 10. Model 7.

Logistic regression analyses with demographic, wealth and literacy variables predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients		B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
							Lower	Upper
Respondent's age								
	Current age	-0.322	0.118	7.447	0.006	0.725	0.575	0.913
Wealth index								
Ref:	Richest							
	Richer	-01.017	0.205	24.599	0.000	0.362	0.242	0.541
	Middle	-0.794	0.166	22.875	0.000	0.452	0.326	0.626
	Poorer	-0.433	0.164	6.997	0.008	0.648	0.470	0.894
	Poorest	-0.203	0.156	1.698	0.193	0.817	0.602	1.108
Health insurance coverage		0.271	0.107	6.482	0.011	1.312	1.064	1.617
Participated in a literacy program		-0.809	0.222	13.253	0.000	0.445	0.288	0.688
Getting money for medical treatment		-0.215	0.105	4.246	0.039	0.806	0.657	0.990
Concern there are no drugs at medical facility		-0.366	0.103	12.604	0.000	0.694	0.567	0.849
Ethnicity of respondent								
Ref:	Akan							
	Ga/Dangme	0.268	0.243	1.209	0.271	1.307	0.811	2.105
	Ewe	-0.154	0.161	0.911	0.340	0.858	0.626	1.176
	Guan	0.593	0.315	3.539	0.060	1.809	0.976	3.355
	Mole-Dagbani	0.075	0.144	0.267	0.605	1.077	0.812	1.430
	Grussi	-0.867	0.310	7.826	0.005	0.420	0.229	0.771
	Gruma	0.731	0.263	7.706	0.006	2.077	1.240	3.479
	Mande	-0.726	0.648	1.254	0.263	0.484	0.136	1.724

Other	0.622	0.289	4.629	0.031	1.862	1.057	3.281

Ref. = Reference category

The model was statistically significant, $X^2 = 141.433$, $p < 0.001$. The model explained between 6% (Cox & Snell R Square) and 11 % (Negelkerke R Square) of the variance, and correctly classified 61.8 % of the cases.

Table 11. Model 8.

Logistic regression analyses with demographic, wealth and literacy variables predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients		B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
							Lower	Upper
Respondent's age								
	Current age	-0.326	0.116	7.863	0.005	0.721	0.574	0.906
Wealth index								
Ref:	Richest							
	Richer	-1.060	0.190	31.049	0.000	0.346	0.239	0.503
	Middle	-0.879	0.151	33.806	0.000	0.415	0.309	0.558
	Poorer	-0.516	0.151	11.716	0.001	0.597	0.444	0.802
	Poorest	-0.303	0.144	4.437	0.035	0.739	0.557	0.979
Health insurance coverage		0.287	0.105	7.385	0.007	1.332	1.083	1.638
Participated in a literacy program		-0.746	0.218	11.738	0.001	0.474	0.310	0.727
Getting money for medical treatment		-0.210	0.102	4.229	0.040	0.811	0.664	0.990
Concern there are no drugs at medical facility		-0.358	0.100	12.787	0.000	0.699	0.574	0.851

Ref. = Reference category

The model was statistically significant, $X^2 = 110.599$, $p < 0.001$. The model explained between 4% (Cox & Snell R Square) and 7 % (Negelkerke R Square) of the variance, and correctly classified 60.2 % of the cases.

Table 12. Model 9.

Logistic regression analyses with demographic, wealth and literacy variables predicting optimal antenatal care.

National sample n=1970. Ghana DHS, 2008.

Coefficients		B	S.E.	Wald	Sig.	O.R	95% C.I.for O.R	
							Lower	Upper
Respondent's age								
	Current age	0.326	0.116	7.863	0.005	1.386	1.103	1.741
Wealth index								
Ref:	Richest							
	Richer	0.181	0.191	0.893	0.345	1.198	0.824	1.743
	Middle	0.544	0.192	8.027	0.005	1.723	1.183	2.510
	Poorer	0.757	0.188	16.212	0.000	2.131	1.475	3.081
	Poorest	1.060	0.190	31.049	0.000	2.886	1.988	4.190
Health insurance coverage		0.287	0.105	7.385	0.007	1.332	1.083	1.638
Participated in a literacy program		0.746	0.218	11.738	0.001	2.108	1.376	3.230
Getting money for medical treatment		0.210	0.102	4.229	0.040	1.233	1.010	1.507
Concern there are no drugs at medical facility		-0.358	0.100	12.787	0.000	0.699	0.574	0.851

Ref. = Reference category

The model was statistically significant, $X^2 = 110.599$, $p < 0.001$. The model explained between 4% (Cox & Snell R Square) and 7 % (Negelkerke R Square) of the variance, and correctly classified 62.0 % of the cases.