AN EXAMINATION OF THE ROLE OF ANTENATAL CARE ATTENDANCE IN PREVENTING ADVERSE BIRTH OUTCOMES IN SOUTH AFRICA.

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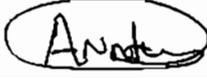
ACKNOWLEDGEMENTS

DECLARATION

I HEREBY DECLARE THAT THIS WORK IS MY OWN, BOTH IN CONCEPTION AND EXECUTION, AND THAT ALL THE SOURCES I HAVE REFFERED TO OR QUOTED HAVE BEEN AKNOWLEDGED AND INDICATED BY MEANS OF COMPLETE REFERENCES

SIGNED: _____

DEDICATION

THIS WORK IS DEDICATED TO:

MY SON, NKANYISO, MY DAUGHTERS, HALALA AND ANO .

ABSTRACT

Increasing adverse birth outcome are a major concern in South African maternal care and globally In South Africa. perinatal mortality rate of 40/1000 and maternal mortality ratio of 150/100 000 are poor considering the fact that 95.1 percent of women attend antenatal care and 83.7 percent of women deliver in a medical facility.

This study focuses on the effect of lack of adequate antenatal care on adverse birth outcome using data from the 1998 South African Demographic and Health Survey. The analysis is based on univariate and bivariate analysis to examine the effect of socio- demographic characteristics on adverse birth outcomes. In addition, binary logistic regression is used to examine the impact of antenatal and socio-demographic characteristics on adverse birth outcome.

The results show majority of women reporting adverse birth outcome are those who delivered though caesarean section (53 percent) and that most of these women are likely to be educated and have better socio economic status and that they are likely to be Non African. It is also shows that the proportion of women attending antenatal care adequately is very high in South Africa. The results show that the use of antenatal care is determined by a range of socio demographic factors including the level of education and the economic status of the mother. Only timing of antenatal care, place of delivery and race had a significant effect on adverse birth outcome. All other variables were not significant. Results from the binary regression analysis show that women who started their antenatal care during second and third trimester (95%CI: 0.211-0.975), were Non African (95%CI: 1.082 to 2.098) and delivered in a private health facilities (95%CI: 0.28 to 0.73) were more likely to have adverse birth outcome compared to their counterparts.

Most women choosing caesarean section do so without adequate information on the disadvantages of delivering through caesarean section. Therefore, there is a need to focus maternal health education to all women in South Africa regardless of their socio- economic status background

TABLE OF CONTENTS

CHAPTER THREE

CHAPTER FOUR

CHAPTER FIVE

LIST OF TABLES

ACRONYMS

ACIDS:	Africa Centre Information Demographic Survey
AIDS	Acquired immunodeficiency syndrome
ANC	Antenatal care
API	Asset and Possessions Index
ARV	Antiretroviral
DHS	Demographic and Health Survey
DOH	Department of Health
GIS	Geographic Information System
HIV	Human immunodeficiency virus
MNH	Maternal and Neonatal Health
MNPI	Maternal and Neonatal Program Effort Index
SADHS	South African Demographic and Health Survey
SMI	Safe Motherhood Initiative
STI	Sexually Transmitted Infection
UN	United Nations
WHO	World Health Organization

CHAPTER ONE
INTRODUCTION

1.1   Background of the study

Studies have shown that almost a third of pregnant woman experience some illnesses during pregnancy (WHO 2005). If not treated properly, these illnesses are likely to result in adverse birth outcomes such as maternal deaths, stillbirths, low birth weights and emergency caesarian sections. According to the Centre for Reproductive Rights (2005), at least 30 to 40 percent of infants and more than half a million women die every year as a result of poor care during pregnancy and delivery. Globally, about four million newborns die before they are four weeks old each year, and 98 percent of these deaths occur in developing countries (Bale, Stoll and Adetokunbo 2003; WHO 2005). Newborn deaths now contribute almost 40 percent of all deaths in children under five years of age and more than half of infant mortality worldwide, and of these deaths, 28 percent of newborn deaths occur in Africa (WHO 2005).

More than 20 million of all low birth weight babies are born in less developed countries and this is a result of poor maternal health and poor nutrition of mothers during pregnancy (Bale, Stoll and Adekokuno 2003). Low birth weight is likely to increase the risk of infant mortality and also lead to problems in infant and child development (ibid). Stillbirths are also high in developing countries. For example, a study conducted in a hospital in Harare in Zimbabwe found that the annual still birth rate was 61 per 1000 live births. In addition, the pre-term births were 168 per 1000 live births (Feresu et al. 2004). This is indeed worrying and emphasizes the need for special and comprehensive interventions, especially in developing countries to investigate the causes of these deaths.

Research has shown that women who do not obtain adequate antenatal care significantly reduce their chances of a favourable pregnancy outcome (Magadi et al. 2001). Antenatal care means "care before birth", and includes counseling, education, screening and treatment to monitor and to promote the well being of the mother and fetus (Di Mario et al. 2005). As a result, interventions aimed at circumventing unfavourable pregnancy outcomes, such as low birth weight, are most effective during pregnancy and delivery (Magadi et al. 2000; Bloom et al. 1999). Such lack of care can be defined as late initial attendance, few or inadequate number of visits, incomplete care, or poor content of care due to poor health service delivery by the health care facility (Gissler and Hemminki 1995). Antenatal care is widely assumed to have an effect on limiting unfavourable birth outcomes. In fact, antenatal care has been proposed as an important means of achieving the millennium development goals of reducing

maternal mortality by three quarters between 1990 and 2015 and reducing mortality rate of children under the age of five years by two-thirds between 1990 and 2015 (WHO 2004).

In sub-Saharan Africa, antenatal care is widely used as part of primary health care strategies (Nielses 2000). The Safe Motherhood Initiative (SMI) was launched in 1987 and has been very influential in the field of maternal and child health. According to Chapman (2003) SMI is the international program to reduce the number of women affected by preventable and treatable complications during pregnancy and child birth through provision of improved high quality maternal health services. One of the key messages from SMI is that each and every pregnancy should be treated as a risk, considering the fact that all pregnant women are at risk of complications and in need of the same basic services and monitoring during pregnancy (Maternal and Neonatal Health Program 2005; Penn-Kekana and Blaauw 2002; Nielses 2000).

Recently, there has been a shift from the traditional routine antenatal care visits with more than twelve visits per pregnancy to more focused antenatal care visits with at least four visits per pregnancy. The more focused antenatal care concentrates on interventions that aim at detection and prevention of the problem that might affect the pregnant woman, counseling and health promotion to encourage good health throughout the pregnancy and to prepare for birth and possible complications (Maternal and Neonatal Health Program 2005).

1.2   Statement of the problem

The main purpose of antenatal care is to improve pregnancy outcomes for both the mother and the child (Gharoro and Igbafe 2000). Antenatal care is thus important in identifying women at increased risk of adverse pregnancy outcomes and for establishing a relationship between the health providers and the women (Magadi et al. 2003; Pallikadavath et al. 2004).

However, in terms of birth outcomes South Africa fares relatively poorly compared to upper-middle income countries. The maternal mortality ratio of 150/100 000, and an estimated perinatal mortality rate of 40/1000 are poor considering the fact that 95.1 percent of women attend antenatal care, and 83.7 percent of women deliver in a medical facility. At the same time, the medical infrastructure in place rendering comprehensive essential obstetric care is satisfactory (Penn-Kekana and Blaauw 2002).

2

1.3   Justification of the study

While it seems plausible that antenatal care improves birth outcomes, evidence based studies in South Africa as to whether it actually does is largely lacking. During the literature search at the time, there was no study in South Africa that used the Demographic and Health Survey (DHS) to investigate whether birth outcomes depends on whether or not a pregnant woman attends antenatal facility.

Nevertheless, there have been international clinical trials studies that looked at the effect of antenatal care on birth outcomes. However, these clinical trials fail to adequately inform about the importance of antenatal care as it does not compare recipients and non-recipients of antenatal care. Randomized controlled trials have been confined to investigating the effectiveness of different forms of antenatal care; but have not been able to compare those using and those not using antenatal care (Carolli et al. 2001).

Similarly, a number of cross-sectional studies in African countries compare the effectiveness of different frequencies and different timings of antenatal care visits, but do not address the more fundamental question: whether women who attend any antenatal care have better birth outcomes than women who do not. For instance, Magadi, Madise and Diamond (2000) investigate the impact of antenatal care on birth outcomes using data from the 1993 Kenya DHS. The study found that women who make more frequent antenatal care visits are likely to have more favourable birth outcomes than women who attend antenatal care less frequently. However, the study does not compare the birth outcomes of those who visited an antenatal care facility with those who did not.

Another study conducted in India using the 1998-1999 Indian National Family Health Survey shows that women of lower socio-economic status are less likely to attend antenatal care than women of higher socio-economic status, but does not investigate whether such differences in attendance across socio-economic status also leads to differences in birth outcomes (Bloom et al.1999).

Therefore this study focuses on the characteristics of pregnant women attending antenatal care. It also focuses on the effect of lack of adequate antenatal care on adverse birth outcome using data from the 1998 South African Demographic and Health Survey.

1.4   Aims and objectives

The aim of this study is to examine the relationship between antenatal care attendance and birth outcomes in South Africa. The specific objectives of the study are:

- To describe antenatal care attendance behaviour among pregnant women in South Africa.
- To investigate the influence of antenatal care attendance on birth outcomes.
- To provide recommendations for intervention strategies to reduce adverse birth outcomes in South Africa.

The study aims to answer the following questions:

- What are the characteristics of pregnant women attending antenatal care?
  - o   What is the level of antenatal care attendance?
  - o   What are the socio-demographic factors of women attending antenatal care?
- Are women with fewer antenatal care visits more likely to have adverse birth outcomes (low birth weights, still births and neo-natal deaths; delivered through Caesarian section) compared to those with more frequent visits?
- Are women with no antenatal care visits more likely to have adverse birth outcomes (low birth weights, still births and neo-natal deaths; delivered through Caesarian section) compared to those who visited antenatal care facilities?

This study has two hypotheses:

- Women from lower socio-demographic backgrounds have lower antenatal care utilization
- High levels of antenatal care attendance will result in lower adverse birth outcomes such as low birth weights and deaths.

1.5   Conceptual framework

Figure 1 shows the structure of the conceptual framework model that is adopted in this study, which is propounded by Magadi (2003) and referred to as 'pathways of unfavourable birth outcomes' model. The model identifies a number of factors which do not have direct effect on adverse birth outcomes but contribute to these outcomes indirectly through intermediate factors. The desirability of the pregnancy, access to health facilities and marital status has no direct effect on adverse birth outcomes, such as low

4

birth weight, caesarean section and still births, but are linked to these outcomes through antenatal care. The model identifies antenatal care as the central link between socio- demographic, reproductive factors and birth outcomes.

Socio-economic and demographic factors are likely to affect reproductive behaviour and accessibility of a maternal health facility. Literature has shown that women who are educated are more likely to have improved status and access to information and services. Educated women are likely to convert health information they receive through the media and other means of information into meaningful and effective practices. As a result, educated women are more likely to use modern family planning practices compared to less educated women (Case et al. 2005; Nielses 2000; MacKian 2003).

Higher economic status is often associated with higher educational level. The model states that women with higher levels of education and higher economic status are more likely to use modern contraceptive methods than women with lower levels of education and lower economic status. They are also more likely to be living in urban areas than rural areas. Moreover, if they are situated far from health facilities they might be able to afford transport costs. In addition, they can afford consultation and medicine fees when using private health facilities.

The model also states that socio-demographic factors such as education, economic status, and type of residence have a direct effect on birth order. Women with less education, low household socio-economic status and living in rural are more likely to have a higher number of children born compared to women with high education, high socio-economic status and living in urban areas. Also, the model shows that marital status directly affect birth order and desirability of pregnancy, as married women are more likely to be more willing to be pregnant and may have higher number of children compared to never married women.

The model states that birth order may have a direct effect on maternal care and nutritional status of the pregnant woman. Women with two or more previous pregnancies may be less likely to seek medical attention when pregnant due to the fact that they have, for example, successfully delivered without any complications, and as a result, do not perceive any risks related to the present pregnancy. However, it may also be possible that older women with experience of adverse birth outcome may seek medical attention when pregnant due to their previous difficult experiences with pregnancy.

Studies show that women who are pregnant for the first time are more likely to utilize maternal health care compared to women with more than one previous pregnancy (Morrison et al. 1989). This could be due to the fact that most women will use maternal health facilities for the confirmation of their pregnancy. In addition, due to their lack of experience, they may consider themselves at risk of an adverse birth outcome and may decide to utilize maternal health care services.

The availability and accessibility of services will determine if women receive antenatal care services. In this instant, distance becomes the most important determinant influencing access to health care. Several studies have shown that distance to the health facility is significantly associated with use of health services (Tanser et al. 2005; McCray 2004; Magadi et al. 2000). Literature has shown that women who reside far from health facilities may, for example, lack transport to the health care facility or they may lack money to pay for transport. In some developing countries, user fees in the health facilities are still in operation; as a result some women may lack enough money to pay for the services rendered to them (Tanser et al. 2005). However, it is important to note that South Africa has health policies that allow pregnant women and children less than six years of age to access health facilities free of charge.

Birth outcomes such as size of the baby and utilization of caesarean section are directly affected by the number of antenatal care visits and the timing of first antenatal visit. Studies have shown that pregnant women with adequate antenatal care are likely to have favorable birth outcomes compared to women with less or inadequate antenatal care. In addition, women who initiated antenatal care early have been found to have better birth outcomes compared to those who initiated antenatal care late (Magadi et al. 2001). In addition, the framework states that the sex of the child and multiple births independently affects the birth outcomes of the child.

Socio-economic and Demographic Factors

Urban/Rural residence
Ethnicity
Education level
Household socio-economic status
Marital status
Age group

Reproductive Behaviour and Accessibility
of a Maternal Health Facility

Birth order
Desirability of pregnancy
Use of family planning
Time to nearest facility

Maternal Health Care and Nutritional Status

Number of antenatal care visits
Timing of first antenatal visit
Mother's height
Mother's weight-for-height

Sex of child
Multiple births

Birth Outcome

Premature birth
Size of baby at birth
Caesarean section

1.6   Organization of the dissertation

The first chapter has outlined the research problem by providing background information of the study, aims of the study and the conceptual framework. Chapter two reviews relevant literature on factors influencing antenatal care visits. Chapter three describes the study setting, the process of data collection and the methods employed to analyze the data. The next chapter reports on the main findings of the study and the final chapter provides a discussion of the results and the conclusions.

CHAPTER TWO

LITERATURE REVIEW

2. Introduction

The chapter firstly reviews literature on the adverse birth outcome in South Africa, including infant deaths, low birth weight and caesarean section. It also reviews literature on antenatal care attendance, including frequency and timing of antenatal care visits. It then examines the effect of socio-economic and demographic factors on antenatal care. Finally, the chapter reviews the relationship between birth outcomes and antenatal care attendance.

2.1   Adverse birth outcomes in South Africa

2.1.1   Infants deaths

WHO (2006) estimates that every year over four million babies die in the first four weeks of life; three million of these deaths occur in the early neonatal period. In developing countries, the risk of death in the neonatal period is six times greater than in developed countries; in the least developed countries it is over eight times higher. With 41 neonatal deaths per 1000 live births, the risk of neonatal death is highest in Africa; the sub-Saharan regions of Eastern, Western and Central Africa have between 42 and 49 neonatal deaths per 1000 live births. South Central Asia, with 43 neonatal deaths per 1000 live births, shows rates close to those registered in sub-Saharan Africa, while the neonatal mortality rate for Latin America and the Caribbean is 15 per 1000 live births. Most neonatal deaths occur in Asia, which is where most children are born. Given the high mortality rate in the South Central Asia sub-region, over 40% of global neonatal deaths take place here, which presents a formidable challenge.

Moreover, it is estimated that more than 3.3 million babies are stillborn every year; one in three of these deaths occurs during delivery and could largely be prevented. Ninety-eight per cent of the deaths take place in the developing world. The risk of still births are highest in Africa, with the rate of 32 per 1000 live births, followed by Asia, with 27 per 1000 live births and Oceania with 23 per 1000 live births. Europe has the lowest estimate of still births, with 8 per 1000 live births and Latin America and Caribbean, with 10 per 1000 live births (WHO 2006).

The neonatal mortality and still birth rate for South Africa is 21 and 18 per 1000 live births, respectively, less than that of the total African region estimates (WHO 2006). Preliminary results from

the South African Demographic Health survey also shows that the estimated neonatal death rate is 19.2 per 1000 live births, which is relatively similar to that of WHO estimates (DoH 1999).

The child's personal circumstances at birth are very important for the survival of the child in the early stages of life. According to WHO (2006), the most important determinants of neonatal and still births are multiple pregnancies and the sex of the child. Almost one half of twins and almost all triplets are born preterm and have a higher risk of dying than full term infants. Every year, more males are born each year than females, with the ratio of 106 per 100, but they are less likely to survive their first four weeks of life (ibid).

Also, mother's own health status is also important for the survival of child in the early stages of life. According to Adentunji (2000) differences in prevalence of HIV/AIDS may play a critical role in determining whether or not a country will have higher rate of under 5 mortality. Using data from the DHS from countries with different levels of HIV/ AIDS prevalence, Adentunji (2000) observed an increase in most countries with high adult HIV prevalence, but a decrease in almost every country with moderately high and low prevalence of HIV/AIDS.

The survival of the child at an early stage of life may also be affected by the socio- economic status of the mother. A study conducted in rural South Africa on the risks, amenities, and child mortality shows that the mother's birth history, education and marital status were important in determining child survival (Argeseanu 2004).

The effectiveness and accessibility of health care services for pregnant women may play a significant role in influencing the rates of perinatal deaths. According to Pattinson et al. (2005), inadequate staffing and health facilities, poor care in labour, poor neonatal resuscitation, basic care and difficulties for mothers in accessing care, may have an effect on neonatal deaths and still birth rates in South Africa.

2.1.2 Low birth weight
Low birth weight has been defined as a weight at birth of less than 2,500 grams. More than 20 million infants worldwide are born each year with low birth weight, 95.6 percent of them from less developed countries and this is a result of poor maternal health and poor nutrition of mothers during pregnancy (WHO 2005; Bale, Stoll and Adekokuno 2003).

Worldwide, the percentage of low birth weight infants in 2000 was 15.5 percent, 16.5 percent in developing countries and only seven percent in developed countries. The Asian continent is estimated to be having highest proportion of low birth weights, followed by the African continent. Within the African region, Northern and Western Africa are estimated to have the highest proportion of low birth weights (15.4 percent), followed by the Southern Africa region (14.6 percent), and Middle Africa (12.3 percent) (WHO 2004). A study conducted in Harare hospital, Zimbabwe, shows that the rate of low birth weight was 199 per 1000 (Feresu et al. 2004).

In Zimbabwe, low birth weight was associated with older mothers aged 35+, rural residence and multiple gestation (Feresu et al. 2004). However, according to WHO (2004), low birth weight is associated with preterm births (before 37 weeks of gestation) or intra- uterine growth retardation. The causes of prematurity is unknown in many cases, however, they may include high maternal blood pressure, hard physical work, domestic abuse, acute infections, including TB and HIV/AIDS, stress and other psychosocial factors (Bale, Stoll and Adekokuno 2003). On the other hand, intra-uterine growth retardation is likely to be caused by unhealthy maternal lifestyle factors, such as consumption of alcohol, cigarette smoking, substance abuse and poor nutrition.

It is generally recognized that being born with low birth weight is a disadvantage for the infant. Infants born with low birth weight suffer from high rates of morbidity and mortality and often remain underweight, stunted or wasted from the neonatal period through childhood (WHO 2004). In addition, low birth weight may affect the person throughout life with poor growth in childhood, and a higher incidence of adult diseases, such as Type II diabetes, hypertension and cardiovascular diseases, and if they are females, may have higher risk of having low birth weight babies when they become mothers (ibid).

2.1.3 Caesarean section

A caesarean section is a surgical process to deliver a baby, which is usually performed when a vaginal delivery would put the baby or mother's life at risk, though in recent times it has been performed upon request (Fenton et al. 2003). There has been considerable debate over the years as to what represent reasonable rates of cesarean section. The World Health Organization (WHO) suggests that rates of caesarean sections should be between 5-15% in the world (WHO 1994). Debate around these numbers has centered on implications that rates under 5% suggest that perhaps the population does not have

sufficient access to life-saving health care and very high rates of caesarean section may put both women and their infants at risk.

Approximately one in eight births in developing countries is born via caesarean section (Stanton and Holtz 2006). Except for the sub Saharan Africa, all regions have attained the WHO minimum limit of five percent, with Latin America and the Caribbean and East Asia greatly exceeding the WHO maximum rate of 15 percent, having regional caesarean birth rates of 26 percent. Although the sub Saharan African region has less than five percent rates of caesarean section births, South Africa exceeds the WHO recommendations at 15.4 percent (DoH 1999; Stanton and Holtz 2006).

Most caesarean sections are performed as emergencies without preoperative preparation, especially when vaginal delivery pose a risk to the mother or baby (Fenton et al. 2003). Reasons for caesarean section delivery include complications such as active herpes, pre- eclampsia; prolonged labour or failure to progress, apparent fetal or maternal distress, abnormal presentation such as breech or transverse positions, failure in induction of labour, failed instrumental delivery, the baby is too large, and so on (Fenton et al. 2003).

However, concerns have been raised in recent years that caesarean section is performed for reasons other than medical necessity. It is argued that caesareans are performed because they are profitable for the hospital, or because a quick caesarean is more convenient for an obstetrician than a lengthy vaginal birth, or because women choose the surgery for convenience purposes (Mckenzie et al. 2003). According to the study conducted in Soweto in South Africa, there was evidence that caesarean sections were also influenced by non- medical and potentially inappropriate factors, thus, the caesarean section were more likely to be conducted during the weekends compared to during the week (Matshidze et al. 1998).

Due to the costs associated with this procedure, socio-economic status becomes an important indicator of access to obstetrical care and this too can be evidenced in rates of cesarean section. Studies from developing countries have shown that in some populations, cesarean section rates amongst the poorest 20% of the population are under 1%, clearly indicating insufficient access to life-saving care (Stanton and Holtz 2006). In Kenya, the highest proportion of caesarean section deliveries was among women from households of high socio-economic status (Magadi 2003).

13

Literature shows that high rates of caesarean delivery do not necessarily indicate better delivery and post natal care and is likely to be associated with high risks of adverse birth outcomes. A study conducted in Latin America on caesarean delivery rates and pregnancy outcomes found while there might have been a need for caesarean surgery to take place due to primiparity previous caesarean deliveries, etc; the chances of adverse outcomes were vast. The results of the Latin American study showed that an increase in the rates of caesarean delivery was associated with an increase in fetal deaths and morbidity, resulting in babies being admitted to intensive care for seven days or more. In addition, rates of preterm delivery rose at 10 to 20 percents rates of caesarean section deliveries between (Villar et al. 2006).

Other studies have found similar results on the adverse effects of caesarean deliveries throughout the world. According to the Coalition for Improving Maternity Services fact sheet (2004), babies born through caesarean section are 50 percent more likely to have low Apgar scores, five times more likely to have required assistance with breathing and to be admitted to intermediate or intensive care. Some babies will inadvertently be delivered prematurely due to the fact that they might not be naturally ready for delivery. In addition, babies delivered through caesarean section are more than four times as likely to develop persistent pulmonary hypertension compared to naturally born babies. Also, they may find it difficult to form an attachment with their mothers, and might be likely to have difficulties breastfeeding.

According to a study conducted in Canada, women who have planned caesareans had an overall rate of severe morbidity of 27.3 per 1000 deliveries compared to an overall rate of severe morbidity of 9.0 per 1000 planned vaginal deliveries. The planned caesarean group had increased risks of cardiac arrest, wound haematoma, hysterectomy, major puerperal infection, anaesthetic complications, and haemorrhage requiring hysterectomy over those suffered by the planned vaginal delivery group (Shiliange 2007).

Another study found that women who had just one previous ceasarian section were more likely to have problems with their second birth. Women who delivered their first child by cesarean delivery had increased risks for malpresentation, placenta previa, antepartum hemorrhage, prolonged labor, emergency cesarean, uterine rupture, preterm birth, low birth weight, small for gestational age and stillbirth in their second delivery (Robyn 2007).

14

2.2   Use of antenatal care

Studies have shown that the utilization of antenatal care during pregnancy have a significant effect on reducing adverse birth outcomes, hence maintaining the importance of adequate use of antenatal care services by pregnant women (Magadi et al. 2000).

It has been shown that use of antenatal care in sub-Saharan Africa is high. According to AbouZahr et al. (2003) the level of antenatal care attendance in sub-Saharan African countries increased between 1990 and 2000, with some countries documenting an increase of 45 percent in attendance. However, a decrease in attendance has been reported in some parts of South Africa. In rural KwaZulu-Natal a study was conducted to measure the use of primary health care services (Dedicoat 2003). The study reported a decrease in the use of antenatal care services as compared to other primary health services in rural KwaZulu-Natal. The authors argue this decrease may be due to the corresponding increase in attendance at family planning services. It is likely that, due to family planning services, the pregnancy rate is decreasing, hence the decrease in the antenatal care attendances (Dedicoat 2003). Camlin and Moultrie (2004) also observed that in rural KwaZulu-Natal, fertility has declined rapidly for about two decades and would have reached below replacement level in 2003. Family planning services have therefore played an important role in bringing the fertility rates down in the area, and this has resulted in a decline in attendance at health facilities for pregnancy related purposes.

Wilkinson et al. (2001) investigating the impact of removing user fees on clinic attendance in one of the mobile clinics found that there was a gradual and sustained fall in the number of women presenting for antenatal care despite the removal of the user fees. The study suggests that the fall was due to the congestion at health facilities and reduced consultation times, caused by the increased access to curative services, which in turn discouraged pregnant women from attending the antenatal care services (Wilkinson et al. 2001).

The number of antenatal visits is important in influencing the quality of care received by pregnant women. Internationally, four antenatal visits per pregnancy of low risk group women have been recommended based on the evidence that fewer visits with specific services are more effective than generalised visits (Villar et al. 2001).

However, the standard recommended number of antenatal care visits in South Africa is still according to previous protocols and requires monthly visits up to the 28th week of pregnancy, followed by bi-weekly visits to the 36th week of pregnancy, and weekly visits thereafter till delivery (Varga 2001). Apart from these routine visits, the policy recommends that a pregnant woman report to the clinic any time she feels unwell or has any complications. This could be due to the fact that South African pregnant women are likely to be at high risk due to HIV/AIDS, poor nutrition, TB and other diseases.

The first antenatal visit should be made as early as possible, as soon as the woman thinks she is pregnant (DoH 2005). During the antenatal care visit the development of the pregnancy is to be monitored. In addition, the woman is to be given HIV/AIDS counseling and testing as well as information on health hazards such as anemia and hypertension. Moreover, the woman should be screened, and treated if necessary for HIV and other sexually transmitted diseases, and tetanus vaccinations should also be administered (Khan et al. (2005).

Evidence shows that although a large proportion of pregnant women attend antenatal care the frequency of attendance is still low. A study conducted in a district hospital in KwaZulu-Natal shows that almost 98 percent of pregnant woman attended antenatal care at least once during pregnancy. Of those reported to have visited antenatal care, less than 50 percent of pregnant women visited the clinic four times, and only a few visited more than four times (Buch et al. 2003). Other Southern African studies have also shown low frequency of antenatal care attendances (Fantahum et al. 2000; Khan et al. 2005). In Ethiopia, the majority of women visited the antenatal clinic only once and very few had at least three visits (Fantahum et al. 2000). In Bangladesh, only 29 percent of pregnant women were recorded as having received adequate service during check ups (Khan et al. 2005).

2.3   Timing of first antenatal care visit

There are many advantages of early initiation of antenatal care visits. According to Gharoro and Igbafe (2000), first booking for antenatal care is one of the important components of the service since it gives the provider the opportunity to collect basic medical information that will form the basis of care of the pregnant women throughout the pregnancy. In addition, early initiation of antenatal care is recommended to prevent and treat anemia, to screen and treat syphilis, and to identify and manage women with medical complications (Gharoro and Igbafe 2000).

16

Early care also allows for the development of interpersonal relationships between the health care provider and the pregnant woman so that her particular needs and wants are known and expressed. In countries where abortion is legal, early contact with the health system allows women with unwanted pregnancies to be referred for safe abortion services (WHO 1996). However, several studies indicate that most pregnant women in developing countries delay their first booking during pregnancy. In Sub-Saharan Africa, studies have shown that women are more likely to report attendance between the second and third trimester of their pregnancy (AbouZahr 1998).

In a study conducted in Ethiopia, out of 364 pregnant women, only one woman in the study began attendance of antenatal care in her first trimester. The majority of women only visited a health facility in their third trimester (Fantahum et al. 2000). A recent study in Bangladesh also shows similar results where out of those who visited the antenatal care, the majority of pregnant women (66 percent) were more likely to report their first attendance during the second trimester and above (Khan et al. 2005).

The same pattern is observed in Southern African countries. In Mozambique, almost 86 percent of women reported that they did not initiate consultation during the first trimester of their pregnancy. The majority reported initiating antenatal care between five to seven months, with the mean time of six months (Chapman 2003). In Zimbabwe, a qualitative study found that almost 70 percent of women reported that they had initiated consultation within the fifth month (Nielses 2000).

A qualitative study conducted in the Hlabisa district found that women were likely make their first visit to the antenatal care clinic around median gestation age of 20 weeks (Myer and Harrison 2003). Also, in KwaZulu-Natal, in the Empangeni area, Buch et al. (2003) found that of all pregnant women who initiated antenatal care visits, only 15.3 percent had started antenatal care in their first trimester, more than 68.4 percent had their first visit in their second trimester and about 16.3 percent in their third trimester.

A study conducted by Varga (2001) in Durban found that the mean gestation age at first antenatal care visit was more than 5 months and about 32 percent and 66 percent reported to initiating their first antenatal care in the second and third trimester, respectively. The study also found that women were likely to delay initiation of antenatal care by about four months between the discovery of pregnancy and initiation of antenatal care (Varga 2001).

These results were also observed in other developing countries. A study was conducted in Jamaica to compare under-users and those using antenatal care adequately (McCaw Binns et al. 1995). The study found that about 61 percent of pregnant women reported to have presented themselves for antenatal care in their second semester. According to McCaw Binns et al. (1995), women who presented themselves late for antenatal care were likely to be self employed, unmarried and teenagers. In addition, they were also likely to represent the group who had previously uneventful pregnancies and for whom the present pregnancy has been basically without problems.

The reasons for the late antenatal care attendance included: lack of access to the antenatal care facility, uncertainty about pregnancy status, perception that the mother had to feel the fetus moving inside them for them to report to the facility, and lack of perceived benefits of antenatal care in general (Myer and Harrison 2003). The behaviour of reporting late and failure to follow up on antenatal care may result in adverse birth outcomes such as deaths and illnesses of the mother and child.

2.4   Factors affecting antenatal care attendance

Literature shows that pregnancies are affected by antenatal care seeking behaviour. Socio-economic status and demographic factors influences birth outcomes, through antenatal care seeking behaviour (Pallikadavath et al. 2004; Magadi et al. 2000). A review of literature suggests that in developing countries, the utilisation of antenatal care can be influenced by socio-economic factors such as the level of education of the pregnant women (Magadi et al. 2000; Abdel Hady and Yahia 2002); demographic factors such as parity, maternal age, place of residence; and environmental factors such as distance to the clinic (Nielses 2000, Mekonnen and Mekonnen 2002).

Other authors argue that demographic factors such as parity and age of the mother and also infections, such as STI's, including HIV/AIDS can affect birth outcomes independently. These factors can be prevented through early detection and treatment of such problems (Fraser, Brockert and Ward 1995; Smith and Pell 2001); however, literature has suggested that the majority of women tend to initiate antenatal care much later during their pregnancy, thus limit the chances of treating these conditions early during pregnancy.

2.4.1   Socio-economic factors

Many studies have shown a strong association between levels of education and health care utilization. In their study investigating how socio-economic status affects the health seeking behaviour of people of

Umkhanyakude district in KwaZulu-Natal, Case et al. (2005) found that there was a significant association between education and health seeking behaviour. The results indicate that less educated people were more likely to use traditional healing as opposed to Western medicine. On the other hand, better educated and wealthier people were more likely to seek assistance from a medical practitioner or hospital in the earlier period of illness than the less educated and poor people (Case et al. 2005). The choices made by less educated people might be based on the level of knowledge of traditional and modern practitioners rather than the affordability of these services.

Maternal and child health care utilization has been reported to be associated with the level of education of the mother. A study conducted in Russia shows that educated women are more likely to use health facilities during pregnancy and also, during delivery. The study found that education was the most significant factor associated with adverse birth outcomes (Grjibovski et al. 2002). This shows an indirect effect of education on birth outcomes through use of health facilities such as antenatal and delivery care.

A study conducted in rural Bangladesh indicates that mother's education had a positive effect on maternal and child health service use independent of other background characteristics (Chakraborty et al. 2003). It was found that women with secondary or higher education were almost 1.8 times more likely to seek treatment from doctors or nurses as compared to women with lower levels of education (Chakraborty et al. 2003).

A study in Ethiopia also illustrated a linear relationship between education and maternal health care seeking behaviour. The study found that almost 72 percent of women with at least secondary education received antenatal care from a health care professional. In the multivariate analysis, women with secondary education, independent of other variables, were four times more likely to use antenatal care as compared to women with no education. (Mekonnen and Mekonnen 2002).

In addition, a study conducted in South India found that women with at least five years of education were more likely to have had the recommended number of antenatal care visits compared to women with less education (Nielsen et al. 2001). Another study conducted in India using a household survey also found that education significantly increases the use of antenatal and postnatal care. Attendance increased as the level of education increased (Shariff and Singh 2002).

There are a number of factors that may contribute to this relationship between antenatal care attendance and education. According to Overbosch, et al. (2002), the education of a woman might lead to more decision making power within the household. Furthermore, it may increase her knowledge of modern health care and its effectiveness. In addition, education might lead to a higher living standard because of her or her partner's increased earnings. As a result, the education of the mother might also be correlated with several other factors that may influence the use of antenatal care.

However there are some studies that have reported no linear relationship between level of education and antenatal care seeking behaviour. A study conducted recently in the Ubombo area in rural Northern KwaZulu-Natal found that a substantial number of women (48 percent) classified as high utilizers of antenatal care services only had a primary school education. This study found that education was not associated with the use of antenatal care. Instead, the utilization of prenatal care was found to be significantly associated with attendance at the nearest residential clinic (McCray 2004).

Studies have also shown a linear relationship between income and health care utilization, including antenatal and delivery care. MacKian (2003) found that the level of income also influenced the type of health care sought. He suggests that as income increases, people are more likely to seek care from professional western medical doctors. In rural KwaZulu-Natal, it was found that asset ownership was associated with at least seven-tenths of a percentage point increase in the probability of seeing a medical doctor. Those who owned more assets were more likely to visit a doctor when ill than those with fewer assets (Case et al. 2005).

A study in Cape Town found that lack of income might lead to no antenatal care attendance. The results show that one of the main reasons women did not attend the antenatal care clinic were lack of transport money to get to the clinic (Jewkes et al. 1998). Another study conducted in Bangladesh indicates that a higher proportion of working women (35.4 percent) had sought help from a medical professional compared to those who did not work (Chakraborty et al. 2003).

In some parts of the world, health care is not free. In addition to the knowledge of the importance of health care utilization, women need to have enough income to pay for these services. Women with no income are more likely to be dependant on their partners or other family members such as in-laws for their income and therefore lack decision-making powers. As a result, women with an income are more

likely to make decisions about their health. Assuming that women have knowledge of the benefits of seeking health care, they are also more likely to seek help if they have means to do so.

Having said that, it is important to note that basic health care in South Africa is free for pregnant women and children under 5 years. However, there are some associated costs that women need in order to access the health facility, for example, transport fees to and from the clinic. As a result, women residing in rural areas, where health care facilities are likely to be far from their homesteads, are likely to lack enough income to attend the clinic, regardless of the knowledge of importance of seeking health care during pregnancy. In contrast, McCray (2005) found that asset ownership was not associated with utilisation of services in northern KwaZulu-Natal. However, it is important to note that interpreting these results must be done with cautiousness as small sample size was used (314 women) for this study.

Nielsen et al. (2001) also supported the above findings in a study conducted in South India. The authors indicate that cash income; type of house and other indicators of wealth of the household were not significantly associated with the use of antenatal care services. Women who were poor had at least five antenatal visits, which was not very different from those who were considered well off.

2.4.2 Partner characteristics

Literature shows that women with husbands of higher socio-economic status are more likely to seek treatment from a doctor or a nurse as opposed to women with husbands of lower socio-economic status. Educated husbands are more likely to appreciate the importance of health care and thus may provide support and also, the means for their partners to visit the antenatal care facilities frequently (Shariff and Singh 2002).

The result from a study conducted in India indicated that having a husband with matriculation increased the probability of receiving pre and post natal care by about 10 percent and 8 percent, respectively (Shariff and Singh 2002). Shariff and Singh (2002) argue that the magnitude of the effect of husband's education indicates that education affects utilisation directly through preferences and through increased household income. In another study conducted in the district of Tamil Nadu in India, women married to husbands with more than five years of schooling were likely to have the recommended number of antenatal care visits (Nielsen et al. 2001).

Other studies show the effect of husband education on the type of health service. A study conducted in Saudi Arabia shows that women married to professional and semi-professionals husbands with a smaller family size and higher family income were more likely to seek care from private clinics as compared to mothers with non-professional husbands with lower income and bigger family size (Abdel-Hady and Yahia 2002). These studies seem to suggest that education and income level of partner are related and are both important predictors of antenatal care attendance.

2.4.3 Demographic factors

Several studies have demonstrated a significant association between parity and use of health care facilities in developing countries. It is suggested that women with no previous birth will tend to utilise antenatal care services due to the fear of the perceived risk of first pregnancies (Chakraborty et al. 2003). On the other hand, women with many children are less likely to seek medical attention due to the many demands on their time or they may decide not to use the service as they perceived themselves as experienced pregnant women (Chakraborty et al. 2003).

A study conducted in rural Bangladesh shows a relationship between number of children ever born and seeking of antenatal care. The study found that women with no children were more likely to attend antenatal care than women with at least four children. Almost 29 percent reporting that they sought care from a doctor or a nurse as compared to 26.1 percent of women with at least four children. The proportion increased again as the number of pregnancies increased to more than four previous pregnancies. About 35 percent of women with five or more previous pregnancies had sought care from a doctor or a nurse (Chakraborty et al. 2003). However, the authors argue that these results are inconclusive as the logistic regression estimates did not show any significant impact of the number of previous pregnancies on maternal health care use. A study in Nigeria also found that women with no previous pregnancies reported increased booking at antenatal care service, followed by a decline in booking by mothers with more than one previous pregnancy. Again the level of booking increased for multifarious mothers attending antenatal care service for the first time (Gharoro and Igbafe 2000).

Other studies show a negative relationship between number of antenatal care visits and number of children ever born. In South India, women with no previous pregnancies were more likely to have five or more antenatal care visits compared to those with more than one previous pregnancy (Nielsen et al. 2001). A study in India also illustrated that the higher the number of children, the lower is the probability of prenatal and postnatal care (Sheriff and Singh 2002).

22

In contrast, another study showed a positive relationship between the use of antenatal care and the number of children ever born. The study conducted in Northern KwaZulu-Natal found that women with multiple pregnancies seemed to use prenatal care services more often than those experiencing their first pregnancies (McCray 2004). When interpreting these results, the size of the sample should be taken into account as it is not nationally representative.

Similarly, a study in Ethiopia shows that among urban women, antenatal care use was higher for those with two or more children compared to those with only one child (Mekonnen and Mekonnen 2002). According to the authors, it is unclear why urban women who have just started childbearing are less likely to seek antenatal care than middle parity women.

It is well established that maternal age has the significant effect on the utilisation of maternal health care services. However, it is still not clear which age category is most likely to use health services. According to Chakraborty et al. (2003), older women may be more likely to use medical services due to the experience they may have accumulated over the years. However, younger women may also be more likely to use the medical service due to the improvement in educational opportunities for women in recent years (Mekommen and Mekommen 2002).

In a study conducted in rural Bangladesh, about 42 percent of older women, aged more than 35 years, sought medical help from a professional practitioner, while almost 29 percent of women aged 20 years and below sought help from a medical practitioner (Chakraborty et al. 2003). However, a study in Ethiopia indicates the opposite pattern. Women aged 35 years or younger were more likely to use antenatal care, as opposed to women older than 35 years old (Mekommen and Mekommen 2002). These results are consistent with the findings of a study in Northern KwaZulu-Natal (McCray 2004). The study in Northern KwaZulu-Natal shows that women aged 15 to 24 years old were least likely to use prenatal care (McCray 2004).

Other studies have shown that age of the mother may also independently affect pregnancy outcomes. A study conducted in United States investigating the effect of age of the mother on adverse birth outcomes found that among white married mothers, young teenage mothers were significantly more likely than mothers aged 20 to 24 years to deliver an infant who had low birth weight and they were also more likely to deliver prematurely (Fraser, et al.1995). This study illustrates that younger age

conferred an increased risk of adverse birth outcomes that was independent of important confounding socio-economic factors (ibid).

A study conducted in Scotland with the aim of determining whether the first and second births among teenagers were associated with increased risk of adverse birth outcomes found that women with a first birth during their teenage years were not at increased risk of any adverse outcomes and were significantly at decreased risk of requiring emergency caesarean section. However, second births among teenagers were found to be associated with an almost threefold risk of a premature birth and stillbirth compared with women aged 20 and 24. (Smith and Pell 2001).

Marital status can influence the level of antenatal care utilisation. In Kenya, it was found that unmarried women and those who started childbearing at ages younger than 20 years were less likely to use antenatal care services compared to those who are married and were aged more than 20 years old (Magadi et al. 2000).

Some studies have found little effect of marital status on the use of antenatal care. Mekonnen and Mekonnen (2002) found married women residing in rural areas were 20 percent more likely to use antenatal care than unmarried women residing in the same areas. Unmarried women were found to be more than twice as likely as married women to receive delivery assistance from health care services.

2.4.4 Environmental factors

One of the important determinants of antenatal care utilization is the physical accessibility of the health care services. Access in this study refers to the availability of the health care service in closer proximity to the users (Chakraborty et al. 2003). Women living in rural areas are likely to be living some distance from health facilities. In order to access health facility, they are expected to walk long distances or spend money on transport in order to receive antenatal care. This may cause women not to receive antenatal care frequently due to lack of time, energy to walk and money for transport.

In a study in the Hlabisa district using maps developed through the GIS technology, Tanser et al. (2001) found that geographical distance is one of the important determinants of primary health care utilisation in rural areas. The results from this study indicate that people living closer to the clinics were more likely to attend the clinics than those living far from clinics. In addition, the results also show that

clinics situated on or at the intersection of major public transport routes attracted a large number of patients (Tanser et al. 2001).

Another study in rural Northern KwaZulu Natal also found that health utilisation level is significantly associated with geographical distance. The results show that women who were classified as low users and began prenatal care late were more likely to be residing far from the clinic than high users of antenatal care (McCray 2004).

These results are consistent with findings from other developing countries. A study in rural Nepal shows that the use of antenatal and child immunization services was much higher when the health facility was located in the community (Acharya and Cleland 2000). In addition, a study in Kenya found that the frequency of antenatal visits was also affected by the accessibility of antenatal care services, with increased distance causing lower frequency of antenatal care visits (Magadi et al. 2000).

2.5 The effect of antenatal care on birth outcomes

Studies have shown a connection between antenatal care attendance and birth outcomes. According to Overbosch et al. (2002), expectant mothers with sufficient antenatal care generally have better pregnancy outcomes than those who lack such care, both in terms of their own health condition and that of their babies.

Magadi, et al. (2001) analyzing data from the Kenya Demographic surveillance cross-sectional study on the timing and frequency of antenatal care attendance of pregnant women found that women with no antenatal care attendance were more likely to experience adverse birth outcomes than those women who had attended antenatal care. The highest proportion of premature births and small size babies was observed among those who did not receive any antenatal care compared to those who completed at least one visit. According to Magadi, et al. (2000), fewer antenatal visits may lead to undesirable birth outcomes because they limit the amount and quality of care that a pregnant woman receives.

A study conducted in India showed that women with a higher number of antenatal care visits were more likely to use safe delivery care, as compared to those with fewer antenatal visits. According to this study, women with high levels of antenatal care had greater odds of using health professionals during delivery than women with lower levels of antenatal care (Bloom et al. 1999). These studies

suggest that low birth weight and infant mortality are more prevalent among mothers making no or fewer antenatal visits.

Researchers argue that given high levels of infant and maternal mortality and morbidity there is a need for adequate antenatal care during pregnancy. These studies demonstrate that women with adequate antenatal care are less likely to have increased risks of maternal mortality, morbidity and infant mortality (AbouZahr 1998; Mekonnen and Mekonnen 2002; WHO 2005).

Others have demonstrated the association between the lack of antenatal care and adverse pregnancy outcomes, such as low birth weights, premature delivery, untreated sexual transmitted infections and others (Magadi, et al. 2000). The study shows that low birth weights, premature deliveries and untreated sexual transmitted disease are more prevalent in women with no or less than adequate antenatal care.

The effect of antenatal care on birth outcomes is also applicable to developed countries. A study conducted in the United States illustrates that women who did not receive prenatal care were more likely to have increased foetal death rates (Vintzileos et al. 2002).

2.6   Other factors affecting birth outcomes

A study conducted in Scotland to determine whether a short interval between pregnancies is an independent risk factor for adverse obstetric outcomes revealed that women getting pregnant after less than six months of previous pregnancy were more likely to have had their second birth complicated by intrauterine growth restriction (Smith, et al. 2003). The study shows that after controlling for a number of factors (age, marital status, previous birth weights, smoking, and socio-economic status), a short inter-pregnancy interval was an independent risk factor for preterm delivery and neonatal death in the second birth (Smith, et al. 2003).

A study conducted in the United States on Mexican-origin Hispanic and non-Hispanic white women examining the effect of inter-pregnancy intervals on pre- mature delivery observed a significant relationship between preterm births and short inter-pregnancy intervals. The study showed that, after adjusting for the confounding factors, women with inter-pregnancy intervals less than 18 months were 14-47 percent more likely to have very premature and moderately premature infants than women with

inter-pregnancy intervals of 18-59 months. In addition, women with inter-pregnancy intervals more than 59 months were more likely to have very premature and moderately premature deliveries than women with inter-pregnancy intervals 18-59 months (Fuentes-Afflick and Hessol 2000).

Other studies have demonstrated an association between birth intervals and maternal mortality and morbidity. A study conducted in Latin America and the Caribbean shows that women with less than 6 months interval had higher risks for maternal deaths, third trimester bleeding, premature membranes and anaemia as compared to women with inter-pregnancy intervals of 18 to 23 months, while those women with more than 59 months interval had significantly higher risks of pre-eclampsia and eclampsia (Conde-Agudelo and Belizan 2005).

2.7   Summary

This chapter has outlined the available literature on the relationship between antenatal care and socio-demographic factors. It also outlined the literature available on the effect of antenatal care attendance and timing of first antenatal care visits on adverse birth outcomes. Based on the above research findings, I expect that education and income levels will have a greater effect on antenatal care attendance, and that antenatal care attendance and birth intervals will have a greater effect on birth outcomes.

CHAPTER THREE

RESEARCH METHOD AND DESIGN

3. Introduction

This study used secondary data from the South African Demographic and Health Survey. The advantage of using readily available data is that it is cost effective in that no cost is needed for data collection; also it saves time as there is no need to design data gathering tools and also conduct interviews.

3.1 Research design

3.1.1 Geographical location of the study

The Republic of South Africa is situated in Southern Africa. It has a population of 43.6 million with a total fertility rate of 2.6 per 1000 (Maternal and Neonatal Program Index 2003). The country has nine provinces: KwaZulu-Natal, Gauteng, Western Cape, Eastern Cape, Northern Cape, Mpumalanga, Free State, North West and Northern Province. About 50 percent of the country's population currently falls below the national poverty line and more than 50 percent of the population still live in rural areas (Department of Health 1999).

3.1.2 Methodology

The South African Demographic and Health Survey (SADHS) collected in 1998 was used in this study. The survey was conducted by the Department of Health, Medical Research Council and Macro International. The main objectives of the SADHS 1998 include the provision of up to date information on basic demographic indicators and that of maternal and child health status.

Enumeration areas were selected based on the 1996 census data. The sample of this survey was selected to be nationally representative. Stratified random sampling was used to select the sampling units for this survey. A total of 12 860 households were selected, of which 12 247 were interviewed. These included 11 735 women aged 15-49 years who were individually interviewed (Department of Health 1999). Data from the women's questionnaire was used to answer the research questions in the study.

A questionnaire was used to collect information from all women aged 15 to 49 years, including background characteristics such as socio-economic and demographic status and pregnancy history such as number of pregnancies a woman ever had, whether those pregnancies resulted in live births or not, and whether the child was breastfed or not. Moreover, information on antenatal care and delivery care was also collected. It included number of antenatal care visits a woman had during the specific pregnancy and the timing of the first antenatal care visit. Women were also asked to specify the site of delivery and whether or not they were attended by a professional health practitioner during delivery.

Women who reported having given birth in January 1997 to the end of survey in 1998 were selected for the analysis. There were 1361 women who gave birth in 1997 and 1998. Of these, 21 reported two births in this period with 14 reporting multiple births and 7 reporting two separate pregnancies and births. These 21 births were added to the vertical data set of 1361 to make up 1382 cases of analysis. Out of the 1382 cases, 138 (10 percent) were sample units with missing key characteristics for analyses, and thus were not included. The final sample for this analysis was 1,244.

The rationale for selecting specific variables in the study

(i)   Adverse birth outcome

Adverse birth outcome is a dependant construct. It was constructed using the variables: 'lost before term', 'still births' and 'neonatal deaths'; 'delivery by caesarean section' and 'low birth weight (less than 2500g)'. The outcome of the birth was considered adverse if one or more of the above variables had occurred and each birth per woman was analyzed separately. The event of an adverse birth outcome was coded as '1' and a normal birth outcome as 0.

(ii)   Antenatal care attendance

In this study antenatal care attendance is a key factor in determining the outcome of pregnancy. This variable was used in two forms: firstly, as a dependant variable to evaluate the effect of socio-demographic factors on the frequency of antenatal care visits; and secondly, as an explanatory variable in explaining the risk of adverse birth outcomes. The antenatal care variable was divided into three categories: 'no antenatal care', 'less than 4 visits' and '4 or more visits'.

(iii)   Gestation age at first visit

Timing of first antenatal care visit is important in measuring the effectiveness of care received by pregnant women visiting the antenatal care facility. This variable is used as an explanatory variable in

29

the analysis. It was divided into four categories: 'no visits' (0), 'first trimester' (1-3 months), 'second trimester' (4-6 months) and 'third trimester' (7-9 months).

(iv)   *Amenities and Possessions Index (API)*

API is an explanatory variable used to measure the socio-economic status of the respondents. According to Kishor and Neirtzel (1996), the measurement of household standards based on a combination of collective goods and facilities which are shared by the members of the households is less likely to suffer from the income measures problems. The API stands as a good measure of the effect of economic status on the number of antenatal care visits a woman is likely to have during her pregnancy and its effect on birth outcomes (Kishor and Neirtzel 1996).

The index was calculated using the formula developed by Kishor and Neirtzel (1996). The Amenities and Possessions Index was calculated based on an individual's access to the basic amenities of toilet facilities, drinking and non-drinking water, electricity, and to four consumer durables (radio, television, refrigerator, and car).

The variable has four categories:
- A person with high API was considered to have piped water in their residence; own flush and not shared toilet, electricity and, all four consumer durables.
- A person with medium high API was considered to have the combination of any kind of water other than surface water and 'other' kind of water, any kind of flush and pit toilet lactrine or 'other' kind of toilet, may or may not have electricity, and at least two of any of the four consumer durables.
- A person with medium API was considered to have the combination of any kind of drinking and non drinking water including surface water, any kind of toilet facility including those who reported they had no toilet facility, may have or not have electricity, and any combination of the four consumer durables or not having the four consumer durables.
- Lastly, a person with low API was defined as a person with only surface water for drinking and non drinking purposes, no toilet facility, no electricity and none of the four consumer durables (Kishor and Neirtzel 1996).

(v) Highest educational level

Education is likely to influence frequency of antenatal care visits. A number of studies show that women with high levels of education are likely to utilize health care facilities available to them unlike women with lower levels of education (Magadi et al. 2003; Nielsen et al. 2001 and Morrison 1989). The education variable was used as an independent variable and was divided into four categories: 'no education', 'primary education', secondary education', and 'tertiary education'.

(vi) Demographic factors

Several studies suggest that there are differences in antenatal care attendance based on the demographic characteristics of the mother (Grjibovski et al. 2002; Fuentes-Afflick and Hessol 2000 and Fraser et al. 1995). Some of the socio-demographic characteristics used in the study include age of the mother, parity, place of residence, and ethnicity.

3.2   Statistical Techniques

Data was analyzed using Statistical Package for Social Sciences (SPSS) program. The following test statistics were used:

Univariate analysis is used to describe the characteristics of the women in the sample, frequency of antenatal care and adverse birth outcome. Bivariate analysis was used to examine the effect of socio-demographic characteristics on antenatal care and the effect of antenatal care on birth outcomes. First, the effect of socio-economic and demographic factors (age of the mother, highest education level, API, place of residence and parity) on antenatal care was analysed. Second, the effect of antenatal care factors (number of antenatal care visits and timing of first antenatal care visit) on birth outcomes were also analysed. Chi squared test for homogeneity was used in the bivariate analysis to identify factors significantly associated with the outcome variable since the dependant variables were categorical.

Multivariate analysis (specifically binary logistic regression) was used to examine the impact of socio-demographic characteristics and antenatal care on birth outcomes. The odd ratios were calculated, where the event of adverse birth outcome was coded as 1 and 0 where there was no event.

The binary logistic regression is usually represented by the following equation:

$$Y = \beta_1 x_1 + \beta_2 x_2 + \cdots \beta_p x_p + \mu_i$$

Where $Y = \ln\left[\dfrac{p_i}{1-p_i}\right]$ is the probability of experiencing an adverse birth outcome.

$\beta_1 x_1 + \beta_2 x_2 + \dots \beta_p x_p$ are estimated coefficients associated with individual level characteristics of experiencing the risk of recent adverse birth outcomes, and μ_i are the disturbances in the regression models. The assumption in this analysis is that $E(\mu_i) = 0$ (Zambuko and Mturi 2005).

Missing values are a big concern in data analysis and the dilemma is whether to include or delete them in the data. Including the missing values in the analysis may result in the distortion of the result, can inflate or deflate summary statistics and can destroy the ordinal and interval character of the variables. While on the other hand, the exclusion of missing values may introduce bias in the sample and may reduce it to non-acceptable levels (de Vaus: 2002). In order to avoid confusion and distortion of results, missing values were therefore excluded in the analysis, with the assumption that the distribution for missing values was normal. The deleted data accounted for 10% of the target population.

3.5 Limitations of the study

The following limitations should be taken into account when interpreting the results for this study. Firstly, data used was retrospective in nature, thus there is the possibility of recall bias. To address this limitation, the researcher selected data from January 1997 to December 1998 in order to minimize recall bias.

Secondly, the demographic and health survey did not collect information on critical factors that have been shown to influence frequency and timing of antenatal care visits. As a result, the study could not examine the role of environmental factors such as distance and transport to the antenatal care facility, which might be critical factors determining the frequency and timing of antenatal care visits.

The data for the study is primarily quantitative and does not allow for the exploration of issues in any detail and in particular the reasons behind the late initiation of antenatal care. In addition, some variables were not readily available and as a result it was necessary to construct new variables. Moreover, the dependant variable includes caesarean as an adverse birth outcomes, however, caesarean section can be a choice of convenience irrespective that there is no adverse effect on the baby or the

mother. Lastly, the large number of missing values in this data might affect reliability of the results. However, the proportion of women giving birth are few, as a result the number of missing cases automatically increase by its proportion.

3.6   Summary

This chapter describes the research design of the study. It starts by briefly providing contextual background information on the study and then examining the main source of data. It looks in some detail at the main variables of the study and the selected techniques for data analysis. The limitations of using secondary data were also explained.

CHAPTER FOUR
RESULTS

4. Introduction

This chapter presents the findings from the analysis of the secondary data. It starts by outlining the background characteristics of the sample and then examining frequency and timing of antenatal visits. The chapter also explores the relationship between socio-demographic characteristics and antenatal care and the impact of frequency and timing of antenatal care on birth outcomes.

4.1 Characteristics of respondents

Table 4.1 shows the characteristics of the respondents. The majority of women (83.2 percent) were aged 15 to 34 years. Only 16.4 percent of women in the group were aged 35 to 49 years old. The majority of the sample (58.8 percent) was residing in rural areas. Almost 81.8 percent were African women. More than half of the respondents (51.4 percent) were married, 43.6 percent were never married and only 5 percent were either divorced or widowed. Most of the respondents had at least one child. Of the sample, 34.3 percent of respondents had one child, 39.4 percent had two to three children, and 27 percent had four or more children. The level of education was relatively high. The majority of respondents (62.9 percent) had attained at least secondary school education but almost 37.1 percent had no or primary school education. Table 4.1 also shows that only eight percent of respondents were categorized as having a high API. The majority of respondents (53.4 percent) were classified as having a medium API and 35 percent a medium high API. Only four percent of respondents were classified as having a low API.

Table 4.1: Socio-Demographic Characteristics of Respondents

Age:		
15-24	500	40.2
25-34	540	43.4
34-49	204	16.4
Place of Residence:		
Rural	731	58.8
Urban	513	41.2
Race		
African	1017	81.8
Other	227	18.2
Marital Status:		
Never Married	542	43.6
Currently Married	640	51.4
Formerly Married	62	5.0
Parity		
1	427	34.3
2-3	490	39.4
4-5	207	16.6
6+	120	9.6
Highest Level of Education:		
Primary or Less	461	37.1
Secondary or More	783	62.9
API		
High	98	7.9
Medium High	431	34.6
Medium	664	53.4
Low	51	4.1
N	1244	100

4.2 Frequency of antenatal care visits

Table 4.2 shows the frequency of visits to antenatal care facilities by women during their pregnancy. The majority of women reported that they had visited an antenatal care facility during their pregnancy, with more than 16 percent reporting at least four visits. The mean and median number of antenatal care visits by pregnant women was 5.65 and 5, respectively. The minimum number of antenatal care visits was no visits and the maximum was 19 visits. Almost four percent of pregnant women reported no antenatal visits during their pregnancy. The highest frequency (16.2%) of antenatal care visits was four visits.

Table 4.2: Number of antenatal care visits

	N	%
0	49	3.9
1	31	2.5
2	68	5.5
3	158	12.7
4	201	16.2
5	157	12.6
6	174	14.0
7	98	7.9
8	109	8.8
9	60	4.8
10	57	4.6
11	14	1.1
12	38	3.1
13	4	0.3
14	8	0.6
15	5	0.4
16	3	0.2
17	1	0.1
18	2	0.2
19	7	0.6
N	1244	100

4.3 Number of antenatal care visits, timing of antenatal care and delivery site

Table 4.3 shows the frequency and timing of antenatal care visits and the delivery sites. The number of antenatal care visits is categorized into three categories: no visits, less than four visits and four or more visits. Four antenatal care visits are recommended internationally for low risk women. It is expected that women in high risks groups will have more than four visits.

Table 4.3 also shows that 77.9 percent women visited the antenatal care clinic at least four or more times, 18.2 percent visited the antenatal care clinic less than four times (1-3 visits) and only 3.9 percent did not visit the antenatal care facility during pregnancy. In South Africa, most women are likely to be categorized as 'high risk' due to high prevalence of HIV/AIDS, hence they are also more likely to be advised to visit the clinic more than four times during pregnancy.

Table 4.3: Antenatal care, gestation age at first visits and delivery site

Variable	N	%
Number of Antenatal Care Attendance		
None	49	3.9
Less than 4 visits	226	18.2
4 or more visits	969	77.9
Gestation age at first visit		
First Trimester	289	23.4
Second and Third Trimester	906	73.2
None	49	3.9
Delivery Site		
Private Health Facility	84	6.8
Public Health Facility	942	76.0
Home	213	17.2
N	1244	100

The results also show that most women tend to initiate antenatal care only after the first trimester. Only 23.4 percent reported having initiated antenatal care during their first trimester. Almost three quarter reported having initiated antenatal care during their second and third trimester. Few women reported that they did not visit the antenatal clinic at all during their pregnancy (3.9 percent). Distance to the clinic and lack of transport to the health facilities, especially in rural areas may affect the timing of first antenatal care visits of women during pregnancy.

The results show that, only 17.2 percent women delivered at their homes. The majority of respondents (76 percent) delivered in a public health facility. Public health facilities include public hospitals, clinics and other public medical health facilities. Only 6.8 percent reported that they had delivered in private health facility. The majority is African and may be heavily affected by unemployment and poverty, and as a result, cannot afford to visit private health services and instead rely on public health services since the services are free in South Africa.

4.4 Adverse birth outcomes in South Africa

Table 4.4 shows adverse birth outcomes experienced by respondents in this study. A total of 334 (27 percent of the whole sample) births were reported to have resulted in an adverse birth outcome. Out of all women reporting adverse birth outcome, more than 50 percent (176) of births were through caesarean section delivery. Having a caesarian section delivery is considered unnatural and normally done due to complications arising during pregnancy or delivery. However some women may choose to deliver through caesarian section due to some advantages associated with it, such as the convenience for mother and the surgeon as well as reducing the risk of HIV transmission from mother to the child.

Table 4.4: Adverse birth outcomes

	N	%
Adverse Birth Outcomes		
Delivered by caesarean section	176	53.0
Birth weight less than 2500g	112	33.5
Lost before term	36	10.8
Still births	9	2.7
Neonatal	1	0.3
N	334	100

38

Another interesting finding was that of the women who delivered through caesarean section, more that 50 percent delivered in private health facilities compared to public health facilities. About 34 percent (112) of the children born weighed less than 2500g. This may be considered unfavourable due to the fact that children born underweight are more vulnerable to infections compared with infants born with adequate weight. In addition, some of these infants were born before term and may need extra care. More than 10 percent of these pregnancies were lost before term (abortion), 2.7 percent were stillbirths and only 0.3 percent were neonatal deaths.

Table 4.5 shows the association between frequency of antenatal care visits and socio-demographic factors. The results show that other races were significantly (X^2= 43.576; p= 0.000) more likely than Africans to visit the antenatal care four or more times. Women residing in urban areas (83.6 percent) were significantly (X^2=17.053; p = 0.000) more likely to visit the antenatal care four or more times compared with women residing in rural areas (73.9 percent.

Table 4.5 also shows that there was a significant (X^2= 11.391; p= 0.003) association between level of education and number of antenatal care visits. Women with secondary or higher education (80.7 percent) were significantly more likely to have four or more antenatal care visits than women with primary or less education level (73.1 percent).

There was a statistically significant (X^2= 16.763; p= 0.002) relationship between the age of the mother and antenatal care attendance. Women aged 25 to 34 years (81.1 percent) were significantly more likely to visit the antenatal care facility four or more times compared with women aged 15 to 24 years (77.2 percent) and women aged 35 to 49 years (71.1 percent).

Almost 80 percent of currently married women reported visiting the clinic four or more times, while 77.5 percent of never married and 64.5 percent of formerly married women reported having visited the antenatal clinics four or more times. However, the relationship was found not to be statistically significant (X^2= 7.547; p= 0.110).

Table 4.5: Antenatal care visits by characteristics of respondents (n=1244)						
	No Visits		Less than 4 visits		4 or more visits	
Race	N	%	N	%	N	%
African	31	3	216	21.2	770	75.7
Other	18	9	10	4.4	199	87.7
Place of Residence:						
Rural	36	4.9	155	21.2	540	73.9
Urban	13	2.5	71	13.8	429	83.6
Highest Level of Education:						
Primary or Less	26	5.6	98	21.3	337	73.1
Secondary or More	23	2.9	128	16.3	632	80.7
Age:						
15-24	14	2.4	100	20.0	386	77.2
25-34	27	5.0	75	13.9	438	81.1
34-49	8	3.9	51	25.0	145	71.1
Marital Status:						
Never Married	21	3.9	101	18.6	420	77.5
Currently Married	24	3.8	107	16.7	509	79.5
Formerly Married	4	6.5	18	29.0	40	64.5
Parity						
1	14	3.3	68	15.9	345	35.6
2-3	19	3.9	82	16.7	389	40.1
4-5	7	3.4	42	20.3	158	16.3
6+	9	7.5	34	28.3	77	7.9
API						
High	3	5.9	20	39.1	28	54.9
Medium High	26	3.9	14	21.4	496	74.7
Medium	15	3.5	59	13.7	357	82.8
Low	5	5.1	5	5.1	88	89.8
N	49	3.9	226	18.2	969	77.9

There was a statistically significant relationship (X^2 = 17.149; p = 0.009) between frequency of antenatal care and parity. Women with less previous pregnancy experience were more likely to seek antenatal care attention compared with those with more previous experience. More than 80 percent of women with one child reported four or more visits during their pregnancy, compared with 79.4 percent of women with two to three children, 76.4 percent of women with four to five children and 64.2 percent of women with six or more children.

The results also show that there is a significant relationship (X^2 = 38.707; p = 0.000) between frequency of antenatal care and socio-economic status. About 90 percent of women categorized as having a high API reported having visited the antenatal care facility at least four or more times during pregnancy, compared with women categorized as having a medium high API (82.8 percent), medium API (74.7 percent) and low API (54.9 percent). The increased socio-economic status is likely to increase the frequency of antenatal care visits.

4.5   Timing of first antenatal care

Table 4.6 shows the relationship between the timing of first antenatal care visit and socio-demographic factors. The results show that African women were significantly (X^2= 91.053; p = 0.000) less likely to initiate antenatal care visits during the first trimester of pregnancy compared with other races. Only 18.4 percent of African women had initiated antenatal care during their first trimester compared with about 44.6 percent of women of other races who reported having visited antenatal care clinic during their first trimester.

Women in rural areas were significantly (X^2= 25.488; p = 0.000) less likely than women in urban areas to report having initiated their first antenatal care visit during their first trimester. More than 30 percent of urban women reported having initiated their first antenatal care visit in their first trimester compared with 18.4 percent of rural women.

Table 4.6: Timing of antenatal care visits by socio-demographic factors						
	No Visits		First Trimester		Second and Third Trimester	
Race	N	%	N	%	N	%
African	25	2.5	189	18.7	797	78.8
Other	17	7.6	100	44.6	107	47.8
Place of Residence:						
Rural	13	2.5	156	30.5	342	66.9
Urban	29	4.0	133	18.4	562	77.6
Highest Level of Education:						
Primary or Less	23	5.0	96	21.0	339	74.0
Secondary or More	19	2.4	193	24.8	565	72.7
Age:						
15-24	8	1.6	100	20.2	386	78.1
25-34	27	5.0	154	28.6	357	66.4
34-49	7	3.4	35	17.2	161	79.3
Marital Status:						
Never Married	14	2.6	98	18.3	423	79.1
Currently Married	25	3.9	179	28.0	435	68.1
Formerly Married	3	4.9	12	19.7	46	75.4
Parity						
1	8	1.9	100	23.9	311	74.2
2-3	19	3.9	136	27.8	335	68.4
4-5	7	3.4	43	20.8	157	75.8
6+	8	6.7	10	8.4	101	84.9
API						
High	3	5.9	5	9.8	43	84.3
Medium High	22	3.3	118	17.9	520	78.8
Medium	11	2.6	108	25.3	308	72.1
Low	6	6.2	58	59.8	33	34.0
N	49	3.9	289	23.2	906	72.8

Age was also found to be significantly ($X^2=$ 26.544; p= 0.000) associated with the timing of first antenatal care visit. Women aged 25-34 years were more likely to initiate their first antenatal care visit in their first trimester (28.6 percent) compared with women aged 15-24 (20 percent) and women aged

35-49 (17 percent). Similarly, marital status was also found to be significantly (X^2= 18.797; p= 0.001) associated with timing of first antenatal care visit. Currently married women were significantly more likely to initiate their first antenatal care visit in their first trimester (28 percent) compared with never married (18 percent) and formerly married women (19.7 percent).

Parity had a significant (X^2= 27.024; p= 0.000) relationship with timing of first antenatal care visit. Women with six or more children were less likely to visit an antenatal care facility in their first trimester compared with other groups. Only 8.4 percent of women with six or more children reported initiating their first antenatal care visit in their first trimester, compared with women with few children.

Level of education was also significantly (X^2= 7.544; p = 0.23) associated with timing of first antenatal care. More than 24 percent of women with secondary or higher level of education reported initiating their first antenatal care visit in their first trimester, compared with 21 percent of women with primary or less education.

Similarly, socio-economic status was also found to be significantly (X^2= 96.265; p= 0.000) associated with timing of first antenatal care visit. The majority of women with a high API (59.8 percent) reported initiating their first antenatal care visit in their first trimester compared with women with a low (9.8 percent), medium (17.9 percent) and medium high API (25.3 percent).

4.6   Adverse birth outcomes by timing and frequency of antenatal, delivery site and background characteristics

Table 4.7 shows the relationship between birth outcomes and number of antenatal care, site of delivery and socio-demographic factors. The finding suggest that women with no antenatal care (28.6 percent) are more likely to have adverse birth outcomes compared with those attending in their first trimester (26.1 percent) and those attending in their second to third trimester (27.1 percent). However, the results were found not to be statistically significant (X^2= 0.163; p = 0.922).

43

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Table 4.7: The effect of antenatal care and socio-demographic factors on adverse birth outcomes

Variables	Adverse birth Outcome	
	N	%
ANC		
None	14	28.6
Less than four visits	59	26.1
Four or more visits	263	27.1
Gestation age at first visit		
None	14	33.3
First Trimester	213	23.6
Second and Third Trimester	107	37.0
Delivery Site		
Private Health Facility	46	54.8
Public Health Facility	275	29.2
Home Delivery	14	6.6
Race		
African	243	23.9
Other	93	41.0
Place of Residence:		
Rural	170	33.1
Urban	166	22.7
Highest Level of Education:		
Primary or Less	109	23.6
Secondary or More	227	29.0
Age:		
15-24	130	26.0
25-34	160	29.6
34-49	46	22.5
Marital Status:		
Never Married	142	26.2
Currently Married	185	28.9
Formerly Married	9	14.5
Parity		
1	128	30.0
2-3	143	29.2
4-5	48	23.2
6+	17	14.2
API		
High	4	7.8
Medium High	146	22.0
Medium	143	33.2
Low	43	43.9
N	336	27.0

The results show a significant relationship (X^2= 20.987; p= 0.000) between timing of first antenatal care visit and adverse birth outcome. Surprisingly, women attending antenatal care in their first trimester were more likely (37 percent) to have adverse birth outcomes compared with women reporting attending antenatal care in their second and third trimester (23.6 percent) as the timing for their first antenatal care visit.

Also of interest, more than 54 percent of women reporting private health facility as their place of delivery were significantly more likely (X^2= 80.167; p= 0.000) to have adverse birth outcome compared with women who delivered in a public health facility (29.2 percent) and at home (6.6 percent).

There was a statistically significant relationship (X^2= 27.446; p= 0.000) between race of the mother and birth outcome. Women of other races (41 percent) were more likely to have adverse birth outcome compared with African women (23.9 percent). Also women residing in urban areas (33 percent) were significantly (X^2= 16.633; p= 0.000) more likely to have adverse birth outcome compare to women in rural areas (22.7 percent). Women with secondary or higher education were more likely (29 percent) to have adverse birth outcome compared with women with primary or less education (23.6 percent). The results were statistically significant (X^2= 4.208; p= 0.040).

Interestingly, the results also show that a high proportion of women with a high API (43.9 percent) were likely to have adverse birth outcomes compared with women with a medium high (33 percent), medium (22 percent) and low API (7.8 percent). The results were found to be statistically significant (X^2= 40.460; p= 0.000).

About 30 percent of women aged 25 to 34 years were more likely to have an adverse birth outcome, compared with 26 percent of women aged 15 to 24 years and 22.5 percent of women aged 35 to 49. However, the results were found to be statistically not significant (X^2= 4.198, p= 0.123). There was a statistical significant relationship (X^2= 6.257; p= 0.044) between marital status and birth outcome. Women who were currently married (28.9 percent) were likely to have adverse birth outcomes compared with never married women (26.2 percent) and formally married women (14.5 percent).

There was a statistical significant relationship (X^2= 14.654; p= 0.002) between parity and adverse birth outcome. Women with less than four children were more likely to have an adverse birth outcome compared with women with four or more children.

Table 4.8 illustrates the results of the binary logistic regression (Odds Ratio with 95% CI) analysis for the adverse birth outcome determinants. Three variables explaining the occurrence of adverse birth outcome were retained in the multivariate analysis: timing of first antenatal care (none, second and third trimester and first trimester); delivery site (home, public health facilities and private health facilities), and race (African and other).

The Hosmer- Lemeshow goodness- of- fit test had a P value of 0.893 indicating that the model does not misrepresent the data. Number of antenatal care visits, residence, highest level of education, marital status, parity and API were excluded from the equation of the logistic regression as the significance of Hosmer- Lemeshow goodness- of- fit test was small (p= less than 0.005). As a result, the results presented in this table were all statistically significant.

Table 4.8: The odds ratios for adverse birth outcomes

Variable	Odds Ratio	
	Unadjusted	Adjusted
Timing of First Antenatal Care Visit		
None	1.00	1.00
First Trimester	0.00(0.00-0.00)	0.63(0.29-1.39)
Second and Third Trimester	0.00(0.00-0.00)	0.45(0.21-0.98)*
Delivery Site		
Private Health Facility	1.00	1.00
Public Health Facility	0.45(0.27-0.77)*	0.46(0.28-0.74)*
Private Home	0.08(0.04-0.18)*	0.07(0.03-0.15)*
Race		
African	1.00	1.00
Other	1.49(1.04-2.15)	1.51(1.08-2.10)

a= The dependant variable, adverse birth outcome, is coded 0 for the favourable birth outcome and 1 for the adverse birth outcome;

* p<= 0.05

The logistic regression results show that the probability of having an adverse birth outcome was 37 percent less (95%CI:0.289-1.387) for women reporting first trimester as their timing of first antenatal care visit compared with women reporting no initiation of antenatal care during their pregnancy, however, results were not statistically significant. Women who initiating antenatal care during their second and third trimester were 55 percent less likely (95%CI: 0.211-0.975) to have adverse birth outcome compared with women who never initiated antenatal care during their pregnancy.

The probability of having an adverse birth outcome was 54 percent less (95%CI: 0.28 to 0.73) for women reporting public health facilities as their place of delivery compared with women who delivered in private health facilities. While, women delivered at home were 93 percent less likely to have adverse birth outcome compared with women who delivered at private health facilities. The results also shows that women of other races were 1.506 more likely to report adverse birth outcome (95%CI: 1.082 to 2.098) compared with African women. The results were significant.

4.7   Summary

This chapter has presented the findings from the 1998 Demographic and Health Survey. The results have shown that socio-demographic factors have a significant effect on whether or not a woman will initiate and visit the antenatal care clinic. Interestingly, number of antenatal care visits had no statistical significant effect on birth outcomes. However, timing of first antenatal care was found to be significantly associated with birth outcomes of the pregnant woman. In addition, delivery site and race were found to have a statistically significant effect on birth outcomes.

CHAPTER FIVE

DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.   Introduction

This chapter discusses the main findings of the study. It starts by briefly summarizing the main findings by drawing on the conceptual framework used in the study. Characteristics of the respondents, number and timing of first antenatal care visits and factors affecting number and timing of first antenatal care are discussed. Furthermore, findings on adverse birth outcome and factors affecting the birth outcomes are also discussed. The chapter closes with some recommendations based on the discussion and conclusion.

5.1   Discussion

The study adopts Magadi (2003) framework in order to discuss the relationship between antenatal care attendance and adverse birth outcomes among pregnant women in South Africa. The theory states that socio-demographic factors and reproductive behavior indirectly affect birth outcomes through the use of antenatal care. In this study, the only socio-demographic factors that were found to be significantly related to birth outcomes were race. In addition, the study found that place of delivery was also a significant factor influencing birth outcomes.

Both race and place of delivery have a highly significant relationship with other socio- demographic factors. Poor people living in rural areas with less education are likely to be Black compared to other races in South Africa. Also, women delivered in public health facilities are likely to be African, poor, living in rural areas and with lower levels of education. As a result, the reasons for insignificance of these variables might be due to high correlations of race with other variables. The findings also showed significant results on the timing of first antenatal care visits and the number of antenatal care visits was found not to be significant. The reason for this might be the high correlation of these two variables. It is therefore argued that, results found in the study do reflect the conceptual framework used.

Most women in the study were between the ages of 25 to 34. years and were residing in the rural areas. More than half of them were married and were likely to have two to three children. Literature shows

48

that most people start families at age 25 to 34 years.(Chakraborty et al.2003, Mekommen and Mekommen 2002).

Also, most women had secondary education, however, had a social status classified under medium API. This means that the majority of women were residing in households that did not have access to piped water, electricity and flushed toilet. They are also unlikely to have a refrigerator, television, or a radio. South Africa has a high unemployment rate, which makes it become difficult for people with secondary education or less to find employment in the country (Case et al.2005). On the other hand, tertiary education is becoming increasingly expensive, particularly in South Africa, making it very difficult for the poor matriculated learners to access it, thus trapping them in the cycle of poverty.

The findings of this study showed that the number of antenatal care visits ranges from no visits to approximately 20 visits. The majority of pregnant women in South Africa visit the clinic more than four times, which was not surprising since the policy recommends four or more antenatal care visits per pregnancy. AbouZhar (1998) arrived at similar conclusion about the antenatal care attendance, and reported that more than 90% of women reported having visited the antenatal care facility at least once. This study also found that women are visiting the antenatal care more frequently. Previous studies did not arrive at the same conclusion (Khan et al. 2005; Buch et al. 2003; Fantahum et al. 2000). They found that the number of visit to the antenatal care clinic was low.

The study by Buch et al. (2003) was conducted at one health facility in KwaZulu-Natal, and thus, antenatal attendance behaviour was based on a particular community, with a particular culture and belief about health issues. The data from the DHS is based on national sample which allows for the control of extraneous factors. The other factors that could explain the differences in different study findings may be the fact that prenatal and child health care services are provided free in South Africa, unlike in some other developing countries. It is therefore expected that women will utilize accessible services, especially when they are given adequate knowledge on the importance of antenatal care (Dedicoat et al. 2003).

Variables associated with receiving antenatal care include education of women, age, marital status, ethnicity, parity and API. African women from rural areas with low socio-economic status did not frequently visit the antenatal care facilities. The findings corresponds with previous studies from other developing countries (Magadi et al. 2000; Abdel Hady and Yahia 2000; Nielses 2000, Mekonnen and

Mekonnen 2002). Though, in general antenatal care is accessible to South Africa, it might not be the case in rural and remote areas. Rural women are likely to be situated far from the health facilities, thus may need to travel long distances or pay travel costs, in cases where transport is available. As a result they are likely to delay or not visit the antenatal care facility due to these barriers.

Interestingly, the findings illustrate that women who reported having more than four antenatal visits were prone to having adverse birth outcomes. This is in contrast with what other research has found (Overbosch et al. 2002). According to Overbosch et al. (2002), expectant mothers with sufficient antenatal care generally have better pregnancy outcomes than those who lack such care, both in terms of their own health condition and that of their babies. The plausible explanation for this could be the fact that since in South Africa antenatal care clinics are largely accessible, those with pregnancy complications are therefore most likely to visit the clinics. This therefore means that the ANC programme at large is a success because it is managing to identify and monitor risky pregnancies.

The proportion of women who experienced adverse birth outcomes in South Africa was found to be high with 27 percent in total. Of these, caesarean section accounted for more than 15 percent. South Africa is the only country with more than the recommended 15 percent caesarean section deliveries compared to all sub-Saharan African countries, thus making it the highest number of caesarean section births in the region (Stanton and Holtz 2006).

A recently released publication on the high rates of caesarean section argue that most caesarean deliveries occur due the side effects of common labor interventions such as labor induction among first time mothers when the cervix is not soft and ready to open appears to increase the likelihood of caesarean birth (Childbirth connection 2007). Also, continuous electronic fetal monitoring has been associated with greater likelihood of caesarean section.

Interestingly, the study findings show that most caesarean deliveries occur in private health facilities compared to public health facilities. Other studies have found similar disparities between public and private sectors (Matshidze et al. 1998). According to Matshidze et al. (1998), non- clinical factors are likely to influence higher caesarean section rates in private health facilities compared to public health facilities. Authors argue that private physicians are performing unnecessary procedures to earn more money.

It has been argued that South Africa respects patients choice in the context of medically unnecessary cosmetic procedures such as wisdom teeth removals which are not medically necessary, assuming that the risks are fully explained to the patient, hence the choice of caesarean delivery. However, Matshidze et al. (1998) argue that in the case of caesarean section the risks are not fully explained and that woman might unreasonably and unnecessary influenced by their doctors' bias on women's ability to give birth on their own.

Following the caesarean section was the low birth weight of the child. Nationally, South Africa has a low birth-weight rate of nine percent. However, large percentage of births had missing data on birth weights, thus most birth weight are not documented. As a result, the findings here are likely to be underestimated. Sometimes mothers are not told the weight of their babies at birth, or babies are not weighed at birth. The rate of low birth weight might also be attributed to the high rates of preterm births as a result of high rates of caesarean deliveries; hence almost all preterm births have birth weight less than 2500 grams. Similar findings were observed in Latin America during their recent WHO global survey on maternal and perinatal health; where preterm delivery rates were highly associated with 10 to 20 percent of caesarean section rates (Villar et al. 2006). This concurs well with the results from the study where 15.5 percent of the adverse birth outcomes are associated with caesarean section

Findings from the logistic regression showed that women who initiated antenatal care early were less likely to have adverse birth outcome compared to women who are non attenders, however the findings were not significant, arguing that there is no significance difference on adverse birth outcomes between women with no antenatal care and those who initiated antenatal care early. Research findings have demonstrated that initiation of antenatal care reduces the levels of adverse birth outcomes (Fantahum et al. 2000; Khan et al. 2005; Chapman 2003, Nielses 2000; and Myer and Harrison 2003). The reason behind this may be attributed to the fact that women initiating antenatal care early are more likely to educated, have high API, live in urban areas and are likely to be other races other than Africans, thus also reporting high proportions of adverse birth outcome due to caesarean section incidences and low birth weights. Also the research findings shows that women who initiated their antenatal care late were significantly less likely to have adverse birth outcome compared with women with no antenatal care. These findings illustrate the effectiveness of the maternal health system of South Africa, as more adverse birth outcomes are prevented, even when the woman have presented late to the health facility.

Women of other races were more likely to have adverse birth outcomes compared to women of African origin. Preliminary results from the SADHS (1998) show that Whites, Indians and coloreds were likely to have low birth weights and high proportions of caesarean section deliveries compared with Africans (DoH 1999). Other South African studies have also reported significant associations between race and rates of caesarean section. Matshidze et al.(1998), previously reported a high prevalence of caesarean deliveries among the White women who delivered in private clinics (35 percent), exceeding the Brazilian caesarean deliveries records where the incidence of caesarean section has been described as an epidemic. Kenya statistics shows that the highest proportion of caesarean sections were among women from households of high socio-economic status (Magadi 2003).

This is in contrast with what other country statistics have illustrated. These studies have always shown that due to unavailability, affordability and accessibility of health services, poor, illiterate and rural dwellers are likely to report high adverse birth outcomes (Pattinson et al. (2005), Bale, Stoll and Adekokuno 2003). Nonetheless, these studies were based on public health facilities only, and did not include women from private health facilities where caesarean sections are bound to be high.

Matshidze et al. (1998) argue that there are two interacting processes at work: the physician's decision to intervene during childbirth and a woman's attitude towards assisted delivery. They argue that because poor African women are regarded as objects of 'scorn' by physicians working in modern hospitals, traditional stereotypes may continue to reinforce the belief that African women give birth easily.

However, the decision to intervene during labor is also influenced by maternal factors such as women's attitudes towards surgery and assisted labour and their ability to negotiate with clinicians. The ability to negotiate caesarean section procedure may then depend on the educational level, socio- economic status and demographic factors such as race, which might therefore create differences in caesarean section rates. For example affordability of fee- for services reimbursement of doctors might have led to an increase in medical interventions during delivery, and therefore an increase in caesarean section deliveries in the social groups that are likely to afford it.

Findings on racial differences in low birth weights were also similar with other studies conducted in South Africa. Bachmann et al. (1996) found that coloureds are more likely to have low birth weights compared to Africans, while the preliminary results from the 1998 SADHS also shows the same

pattern, with Asians being the highest of them all. This is a cause of concern and may reflect poorer nutrition or other maternal factors such as drug abuse, tobacco and alcohol consumption by these race groups (Bachmann et al.1996).

The majority of women delivered their infants in public health facilities and a small percentage delivered at home. Women who delivered in private health facilities were significantly more likely to have adverse birth outcomes compared with women who delivered in public health facilities and even at home. There is a significant association between the choice of health facility and the socio-demographic characteristics of the woman. As mentioned above than women who reported having an adverse birth outcome were likely to be educated, medium- high API, living in urban areas and more likely to be non-African. These women are also likely to afford private health facility compared to poor, uneducated and rural women.

Though, the proportion of births delivered at home was small, they were also more likely to have adverse birth outcome compared with those delivered at public health facilities. One of the plausible explanations for this might be that women in rural areas might have difficulties in accessing services in emergency situations because of lack of transport. As a result there might find themselves delivering at home due to lack of transport to the health facilities at night.

5.2   Recommendations

South Africa has a relatively strong national policy on safe motherhood; however, the country must make sure that these efforts are translated into high quality, accessible services and programs that could be implemented at the local level. Nevertheless, it may be safe to say that South African Department of Health has been successful in terms of reaching the target group on antenatal care attendance. However, more effort is still needed to reach the remaining small percentage in rural areas that still do not make use of antenatal and delivery health care services.

While the Department of Health maternal strategies has reached the majority of women for the implementation of maternal health policies, the analysis show that women who are educated, with better socio economic status and women living in urban areas, especially non Africans has been assumed to have adequate knowledge, which allows them to make better decisions about their maternal health, however, are found to have high adverse birth outcome compared to their counter parts.

South Africa should adopt the international antenatal care strategy where women are expected to attend the minimum of four focused visits for low risk women. This might encourage pregnant women to come early as they would be aware that coming early for antenatal care does not mean that they would come more often. Furthermore, the purpose of each visit will have to be explained to the pregnant mothers so that they would be aware of the importance of each visit.

Government need to put programmes in place that ensures adequate information to allow women to make informed decisions, especially with regard to caesarean section deliveries. In addition, programmes are needed to educated women on the disadvantages of using drugs, alcohol consumption, and lack of good nutrition during pregnancy and delivery. These should reach all racial groups in South Africa, without any social status bias. This will ensure that other races, other than Africans are able to access this information and take decisions based on adequate information, thus lowering the risks of unnecessary caesarean section and low birth weights.

Although women in South Africa demonstrate adequate knowledge of the importance of delivering in health facilities, strategies must be put in place to cater for those women in deep rural areas who are not able to access help at night from their homes. One of the suggestions might be to ensure that women with these characteristics are admitted in health facilities prior to labor so as to reduce home deliveries.

5.3 Conclusion

The study has shown that antenatal care attendance in South Africa is high and that there is no significant relationship between antenatal care attendance and adverse birth outcome. The study has contributed to informing policy into intensify their maternal health education to all women in South Africa, even those with high socio economic status.

In the context of South Africa, where HIV/AIDS infection rate is increasing, the majority of pregnant women are likely to be infected with the virus. Also with the increased availability of Prevention of Mother to Child Transmission Programmes in the country, it becomes more necessary that pregnant women present themselves early for the education and testing of HIV and for the administration of antiretroviral treatment to prevent mother to child transmission. In addition, treatment of other sexually transmitted diseases is more effective if the infection is detected earlier, especially in pregnant woman. For further research, it is suggested that there is a need for future studies to focus on the effect of antenatal care services on prevention of mother to child transmission programs.

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