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DELIVERIES AT MATERNITY WARD AT EVANDER DISTRICT HOSPITAL IN THE MPUMALANGA PROVINCE

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Public Health in the field of Hospital Management

APRIL 2014

NANANA GLORY HLATYWAYO STUDENT NUMBER 403873

DECLARATION

I, Nanana Glory Hlatywayo, declare that this research report is my own work. It is being submitted for the degree of Master Public Health in the field of Hospital Management at the University of the Witwatersrand, Johannesburg. It has not been submitted before any degree or for any examination at this or any other University.

Nanana Glory Hlatywayo

DEDICATION

This research is dedicated to my family, my mother Evelyn Makaringe who gave life to me, my husband Collin who has been with my kids when at school attending classes. A special dedication to my three boys Phumulani, Siyabonga and Sakhile who gave support to me when busy with my studies.

I also dedicate to my maker, creator who is God who made this research to be completed.

ACKNOWLEDGEMENT

Sincere thanks are extended to all my colleagues in the Evander District Hospital, who contributed to the successful completion of this study. The assistance of the following deserves a special acknowledgement:

- My Supervisor Dr D. Basu and Dr Jayati Kusari
- The Head of Department of Health-Mpumalanga Department of Health for allowing me to conduct the investigation;
- The ward clerk Mr K Mokhatla who always provided me with information
- My personal assistance Miss Thembalihle Mazibuko for assisting in collection of the data required
- Miss Reatha Venter an information officer for always providing me with the required information

ABSTRACT

Background: The South African Department of Health stipulated that district hospitals must provide comprehensive package of preventive, promotive, curative and rehabilitative reproductive health services for women that requires medical and special resources, not found in the health centres and clinics (Department of Health, 2002). The Evander District (ED) Hospital, a district hospital situated in the Govan Mbeki Sub-district in the Mpumalanga Province provides both in-patient (36 beds in maternity unit and four nursery beds) and outpatient services. The Hospital Maternity Unit has recently been criticised by the Mpumalanga Department of Health for high rate of CS (30%), and perinatal mortality rate (40 per 1000). But, the Hospital never analysed the data collected routinely to develop an understanding of the challenges faced by the Unit. The Unit staff complained about inadequate resources as one of the reasons. The Hospital has introduced a Cost centre in the Maternity Unit for efficient management of resource allocation for the Unit. This study analysed the routinely collected data from the Hospital Information System and Maternity Unit Cost centre for assessing the maternity services currently rendered by the Evander District Hospital.

Aim: To described the deliveries at the Evander Hospital over a period of 6 months from 01st January 2011 to 30th June 2011.

Methodology: It was a cross sectional study that reviewed the records from Hospital Information System (all antenatal cards and Obstetric files of the women who delivered at the labour ward during the study period) and Maternity Unit cost center. The variables used for the study included number and type of deliveries, socio-demographic and clinical profiles of patients, maternal and perinatal complications and outcomes. In addition, costing information collected during the same period. Descriptive and inferential statistics were used for analysis. Permissions were obtained from the Mpumalanga Department of Health and University of the Witwatersrand 'Human Research Ethics Committee (Medical) before commencement of the study.

Results: A total of 1,081 deliveries were performed at the Evander Hospital over six-month period. The highest number of deliveries was NVD (67.44%), followed by caesarean sections (31.82%).

The majority of the women who delivered came from poor socio-economic class and mostly single and black, which is a reflection of the characteristics of the catchment population of the Evander Hospital. Teenage pregnancy rate was quite high (20%). The majority of the subjects were primipara (41%). Although most of them (91.3%) of them were booked, only 14% had stipulated number of antenatal visits (4 or more visits) and 7.4% of booked mothers, did not have booking blood results, which was a missed opportunity. HIV was the most prevalent (33, 31.3%) medical conditions, which is similar to the HIV prevalence reported in antenatal sero-prevalence survey in South Africa. Only 17% had planned and scheduled CS. Very few patients had post-partum complications indicating well managed third stage of labour. There was no maternal death during this period. All patients were discharged home.

More than 17% (n=185) subjects had low birth weight babies (less than 2500 g), which is just above national average of 16%. The median Apgar score among children delivered at Evander Hospital was 9. Interestingly, the Apgar scores of babies of subjects who had operative deliveries were significantly lower than those who had non-operative deliveries. Most of the babies were born alive. Stillbirth rate (7 per 1000 live births) was significantly lower than South African national average 17.8 per 1000 live births.

The total medical cost for the maternity ward for the six months studied amounted to R 4,584,466, the average monthly cost being R 76,407.67. The most expensive items were drugs and pharmaceuticals and least expensive being the medical consumables.

Conclusion: This study was the first of its kind to be done in this Hospital and the Health District. The study identified gaps where management of pregnant women in the Evander Hospital could be further improved through improved booking, planned deliveries and thereby reducing low birth weight rates and still birth rate. This would assist the Hospital Management to develop appropriate measures to reduce unnecessary CS being done, NVD being delivered in the hospital rather than using CHC, and strengthening referral system and strategies to reduce HIV and AIDS incidence. In addition, further study is necessary at the PHC facilities in the Sub-district to identify determinants for high rate of teenage pregnancy.

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GLOSSARY OF TERMS

AIDS: Any HIV positive woman who fulfils the AIDS defining criteria.
Antepartum Haemorrhage: Any vaginal bleeding occurring after 28 weeks of pregnancy.
Adolescent: any woman who is aged from 10-19 years (WHO, 2007).
Booked mother: A woman who has attended two ante natal visits at least two weeks before giving birth at which booking bloods have been taken (WHO, 2009).
Delivery attended by skilled health professional: Number of deliveries attended by skilled health care personal (HST, 2009).
District Hospital: A level one hospital rendering primary health services.
Pregnancy induced hypertension: Any woman who develops a systolic blood pressure more or equal to 140 mm of Hg and a Diastolic blood pressure more or equal to 90 mm after 20 weeks of pregnancy and resolving at 3 moths postpartum.
Diabetes Mellitus: An abnormal glucose tolerance test, or a high random sugar (> 11 mmol) or a high fasting sugar (> 8 mmol) during pregnancy are the cut-offs for diagnosis of DM.
Preterm labour: Delivery occurring before 37 completed weeks or birth weight of the baby less than 2500 g.
Preterm rupture of membranes: Spontaneous rupture of membranes and drainage of liquor occurring before 37 completed weeks.
Postdates: Delivery occurring after expected date of delivery (40 weeks) or birth weight of the baby more than 3400 g.
Postpartum haemorrhage: Blood loss after vaginal delivery is more than 500 mls and after a Caesarean section is 1000 ml. Also if a woman requires blood transfusion after delivery irrespective of amount of blood loss. Also if Haematocrit levels drops to below 15% of the baseline level.
Unbooked mother: A mother who did not attend an antenatal clinic at all or has attended less than two ante natal clinics within the required period (WHO, 2009)

LIST OF ABBREVIATIONS

ANC	Ante Natal Care
APH	Antepartum haemorrhage
BBA	Born before arrival
CHC	Community Health Centre
CS	Caesarean section
DM	Diabetes mellitus
ED	Evander District
FSB	Fresh still births
HIV	Human immune deficiency virus
HIS	Hospital information system
HOP	Head on perineum
IUD	Intra uterine death
LBW	Low birth weight
MDG	Millennium development goals
MMR	Maternal mortality rate
MSB	Macerated still births
NCCEMD	National committee of confidential Enquiries into Maternal Death
NCCS	NCSS software
NND	Neonatal deaths
NVD	Normal Vaginal Delivery
PHC	Primary Health Care
PIH	Pregnancy induced hypertension
PMTCT	Prevention from mother to child transmission
PNC	Post Natal Care
PTL	Preterm labour
PPH	Post partum haemorrhage
PROM	Pre rupture of membranes
SA	South Africa
WHO	World Health Organization

CHAPTER 1
INTRODUCTION

The purpose of this study was to describe the deliveries at the Evander Hospital, a district hospital in the Mpumalanga Province. This introductory chapter will cover the background to the study, statement of the problem, its and objectives and an outline of subsequent chapters.

1.1 BACKGROUND

South African health system embraces the District Health System model which includes mobile and fixed primary health clinics, community health centres, district hospitals and other health care facilities such as private health practitioners. Within the District health System, district hospitals provide the first level of outpatient and inpatient care for patients who have been referred by their primary care providers. District hospitals usually provide 24-hour care and are integrated into district health system to provide and to support range of services. There are more personnel with more advance training (such as general medical practioners and advanced midwives) in district hospitals than peripheral clinics Health problems that cannot be managed by district hospitals are then referred to regional hospitals, which in turn refers to tertiary and central hospitals (Department of Health, 2002). In 1992, the World Health Organization (WHO) has defined and described the District Hospital (Table 1.1).

Table 1.1 Ten features of a well functioning District Hospital

An essential component of the health district;
Provides certain Level 1 hospital services that cannot usually be delivered at a clinic or health centre
Has the following clinical departments: emergency, care, medicine, surgery, obstetrics, paediatrics, psychiatry and outpatient services;
Provides a 24 hour service and has more than 30 beds;
Provides in-service training and support to PHC services and facilities in the district;
Ensures the maintenance of good clinical standards in the district;
Provides comprehensive (preventative, promotive, curative and rehabilitative) care, and is an integral part of all district health programmes;
Staffed by generalist doctors who receive support from secondary and tertiary level hospitals;
Should render primary level services to the local surrounding population, such as immunisation, growth monitoring and STD treatment (preferably through a separate PHC centre or OPD within the grounds of the hospital); and
Has the capacity to interact with the community and with other sectors.

WHO, 1992

The South African Department of Health stipulated that district hospitals must provide comprehensive package of preventive, promotive, curative and rehabilitative reproductive health services for women that requires medical and special resources, not found in the health centres and clinics (Department of Health, 2002).

1.2 EVANDER HOSPITAL

The Evander (ED) Hospital, situated in the Mpumalanga Province, provides primary level of Obstetric care to the population of Govan Mbeki Sub-district in Mpumalanga with a catchment of 350,000 (Statistics South Africa, 2009). This Hospital has 150 approved beds with 113 usable beds including 36 beds in Maternity unit and four beds in the Nursery. The Hospital also renders a 24-hour casualty and an operating theatre services. General medical practitioners from a

range of clinical disciplines provide the general medical care (Level 1) rendered by the Hospital. Three referral community health centers (CHC) and four clinics in the Govan Mbeki Sub-district refers patients to this Hospital.

Maternity out-patient clinic at the Evander Hospital provides routine antenatal check-up to all booked pregnant women. Additionally, Maternity in-patient ward renders the following services Ante-partum, Intra-partum and Post-partum care, Family planning and Nursery. The Evander Hospital has an average of 176 deliveries per month, of which 70% are normal vaginal deliveries (NVD), 30% caesarean sections (CS) and few assisted vaginal deliveries. The bed utilization rate at Evander Hospital Maternity ward ranges between 80% and 86%. The staff establishment for the Unit includes one doctor, five advanced trained midwifes and three auxiliary nurses

1.3 JUSTIFICATION FOR THE STUDY

The reduction of maternal mortality depends on the provision of quality maternal services (Jahn, Kowalewski & Kimatta, 1998). According to Penn-Kekana and Blaauw (2001), maternal and perinatal outcomes in South Africa are poor as compared to many countries with similar GDP. Amongst the eight district hospitals in the Gert Sibande District in Mpumalanga, Evander Hospital has the second highest caesarean section rate of 30%. This was coupled with an increased number of deliveries within the facility. A high caesarean section rate and an increased utilization of maternal services at Evander hospital increased the cost for running the hospital in general. This was a matter for concern, especially as the Hospital is currently under financial constraints. The Unit staff complained about inadequate resources as one of their challenges for effective service delivery. However, Evander Hospital never analysed the data collected routinely to develop an understanding of the challenges faced by the Unit. The Hospital has introduced a Cost centre for the Maternity Unit for efficient management of resource allocation for the Unit. This study would analyse the

routinely collected data from the Hospital Information System and Maternity Unit Cost centre for assessing the maternity services currently rendered by the Evander District Hospital. The findings of the study will be used to improve the existing services.

1.4 RESEARCH QUESTION

What are the profiles of patients, their pregnancy and delivery outcomes who delivered at the Evander Hospital during six-month study period (1st January 2011 to 30th June 2011)? What are the medical costs incurred at the maternity unit during this period?

1.5 STUDY OBJECTIVES

1.5.1 BROAD OBJECTIVE

To describe the profiles of patients, their pregnancy and delivery outcomes who delivered at the Evander Hospital during six-month study period (1st January 2011 to 30th June 2011) and to determine the medical costs (laboratory tests, blood and blood products, pharmaceuticals and medical stores items) for these deliveries at Evander Hospital during this period?

1.5.2 SPECIFIC OBJECTIVES

1. To describe the total number of deliveries and their types (NVD, CS and assisted deliveries) during this study period.
2. To describe profiles of patients who delivered during this study period (a) socio-demographic profile (b) obstetric profile (c) maternal and perinatal complications (d) maternal and perinatal outcomes

3. To ascertain medical costs (laboratory tests, blood and blood products, pharmaceuticals and medical stores items) of services rendered in the Maternity Unit

1.6 SUBSEQUENT CHAPTERS

So far, the background to the research has been discussed. Then, research question and objectives were defined in this first chapter. A brief outline of following chapters is described below.

Chapter Two: Literature Review: The purpose of the literature review is to review pertinent literature and to discuss concepts related to deliveries in the Maternity Unit of district hospitals in South Africa and elsewhere.

Chapter Three: Research Methodology: The chapter describes the research methodology, study design, setting and scope and data management techniques used in this study

Chapter Four: Presentation of Results: This chapter deals with an analysis of the data collected for this study relating to its aims and objectives.

Chapter Five: Discussion: The findings from the review of the literature are incorporated in this chapter with the results obtained from the analysis in order to address the aims and objectives of the study.

Chapter Six: Conclusions and Recommendations: This constitutes the last chapter of the report and derives conclusions from the research related to the objectives of this study, makes recommendations and advocates areas for future research in the field of services rendered at a district hospital maternity unit.

CHAPTER 2
LITERATURE REVIEW

In this chapter, relevant literatures into hospital maternity services with particular reference to public hospitals are discussed. In addition to published literature, information from various unpublished sources is also reviewed.

2.1 MATERNAL HEALTH

The World Health Organization (WHO) has acknowledged the importance of maternal care and listed it as part of its Millennium Development Goals (MDGs).The fifth goal is mainly focused on maternal health (WHO, 2004). After the introduction of the MDGs, significant progress has been made in reduction of child and maternal mortality, it appears unlikely that the target will be met in many countries by 2015 particularly those from sub-Saharan Africa (UNO, 2008).

Reproductive and child health care in South Africa has been identified as priority programs which are monitored through the MDGs. After democratic election in 1994, the new constitution of the Republic of South Africa was adopted. According to clause 27.1 of the constitution, everyone have the right to have access to health care services that includes reproductive health (South Africa, 1996). Subsequently, South Africa developed a comprehensive reproductive health policy to ensure good quality maternity services, but unfortunately this did not have a full impact in improving maternity services (Cooper, Morroni, Orner, et al, 2004). In line with that, a committee was set up by the Department of Heath to enquire about maternal death [National Committee for Confidential Enquiry into Maternal Death (NCCEMD)]. The NCCEMD (2005) indicated that the commonest causes of maternal deaths were related to Human Immune deficiency virus (HIV) infection, Hypertension, Antepartum haemorrhage (APH), Postpartum haemorrhage (PPH), Ectopic pregnancies, Embolism, Acute collapse and Pre-existing medical conditions. The NCCEMD (2008) made recommendations to be

implemented to reduce maternal deaths in South Africa. In 2012, the Minister of Health had appointed a team of medical specialists (Anaesthesiologist, Obstetrician and Gynaecologist, Paediatrician and Family Physician) and nurses (Midwife, Paediatric and Primary health care) in each of the 52 health district to improve maternal and child Health (Department of Health, 2011a).

Bulabao & Ross (2002) found that in developing countries maternal health programme was seriously deficient in rural areas. Rural women are disadvantaged especially regarding the treatment of emergency of emergency obstetrics conditions. The study suggested moving beyond policy reform to strengthening implementation of services and to better staff training, health promotion and increased financial resource as part of the solution. Maternal health services in South Africa are relatively bad compared to other upper-middle income countries. The Maternal Mortality Ratio of 310/100000 and an estimated perinatal mortality rate of 40/1000 are poor considering the fact that 95.1% of women attendant ANC and 83.7% of women delivered in a medical facility (Penn-Kekana & Blaauw, 2001).

2.2 FACTORS INFLUENCING MATERNAL HEALTH

There are number of factors influencing maternal health such as, socio-demographic profile, booking status, obstetrical profile, place of delivery (WHO, 2005).

SOCIO-DEMOGRAPHIC PROFILE

Certain demographic profiles such as teenage, single women, low educational status and unemployment and women living in developing countries have been associated with higher risk of maternal mortality and morbidity (WHO, 2005). For example, adolescent and teenage pregnancy is known to entail a number of risks. A study done in Burkina Faso reported a high rate of adolescent pregnancy

(157 and 64 per 1000 adolescents in rural and urban areas respectively) and high rate of mortality and morbidity among them (Amnesty International, 2009).

OBSTETRIC PROFILE

Past medical history, ante-partum diseases, high gravidity are often associated with higher risk of maternal mortality and morbidity (WHO, 2005). However, regular antenatal check up can significantly reduce these risks. It was suggested that the antenatal care (ANC) should be able to identify these risk factors and manage them accordingly to prevent maternal deaths and good fetal outcome. In England, it is believed that good and early (12 weeks) initiation of antenatal care provided a foundation for a good pregnancy outcome and births (United Kingdom Health commission, 2008). In South Africa, the NCCEMD (2008) recommended good adherence to standard protocols during antenatal check up as an important way to assist in the reduction of maternal deaths. A study done in England reported that the unbooked women experienced poorer pregnancy outcome compared to the booked women. The booked mothers were likely to have lower incidences of preterm deliveries (PTL), low birth weight (LBW) babies, FSB, and postpartum haemorrhage (PPH) (Tucker, Ogutu, Yoong, et al, 2010). In Nigeria, Owolabi, Fatus, Kuti, et al (2008) found higher CS rates among unbooked mothers compared to booked mothers. Ramsewak, Narayansingh, Thomas (1997) found in Trinidad the lack of antenatal check up resulted in women delivering babies before arrival to the hospital [Born before arrival (BBA)] which resulted in high perinatal mortality. They recommended that the women who had previous history of born before arrival (BBA) should be identified as a high risk pregnancy and preventive measures should be taken. In South Africa, there is a real progress observed in the antenatal attendance coverage from 2001 (76.6%) to 2009 (100%) (Department of Health, 2009). However, the effect of booking status on maternal and perinatal outcomes was not studied at the health facilities in South Africa.

PLACE OF DELIVERY

The deliveries attended by skilled health personnel is an important indicator for maternal health, as the type of medical assistance provided during delivery has an impact on morbidity and mortality (WHO, 2005).

Maternity services in Australia have demonstrated a capacity to provide safe and cost effective services in which the outcome is good which compares favourably with international settings. The Australian primary maternity service model include maternity services provided by trained midwives and qualified doctors to ensure the most effective and good journey through pregnancy to early parenthood for all women with uncomplicated pregnancies. This primary maternity service model in Australia ensures a sound quality and safety framework. This model for maternity services also provides a tool for the risk assessment methodology that can be used for training and guidelines to minimise harm and improve safety to the mother and the baby (Centre for Epidemiology and Research, 2010). Similarly in the United Kingdom (UK), the Department of Health suggested that successful maternity services should provide individualized, flexible, women focused care and support which is supported by guidelines and fixed protocols.

Maternity services and neonatal care should include effective transfers and treatment of women and their babies with complications. The sufficient numbers of staff appropriately qualified must be available to provide care at all levels, as staffing is the most contentious issues in providing maternity services because it underpins the quality of maternity service (United Kingdom Health commission, 2008)

In South Africa, the majority of the deliveries are expected to happen in Midwifery Obstetrics Unit at the community health centres and district hospitals whereas complicated deliveries should happen at regional and tertiary hospitals

(Department of Health, 2002). The district hospitals are expected to be staffed by skilled health professionals such as medical doctors and advanced midwives (Department of Health, 2002). The proportion of deliveries attended by the skilled health personnel in South Africa was 76.6% in 2001 which increased to 94.3% in 2009, target being at 100% by 2015 (Statistics South Africa, 2009). According to the South African Demographic and health survey (SADHS), the proportion of women who delivered in institutional health facilities has increased from 76.6% in 2001 to 94.1% in 2009 indicating improvement in access to health care facilities by the women (Department of Health, 2009).

2.3 COST OF MATERNAL HEALTH SERVICES

There are only few studies, which have documented maternity services especially in developing countries. The costs associated with these services are often not calculated resulting in poor reproductive 2007).

Full cost of a clinical unit includes direct costs, overhead costs, and indirect costs (a share of costs indirectly incurred to provide the service). Direct costs can be traced directly to the cost-centres and these will include medical and non-medical staff salaries and goods imputable to a single operation. Overhead costs will concern general services such as administration, housekeeping, power and heat. Indirect costs regard the utilisation of services by other units such as pathology tests and ancillary services such as kitchen, maintenance, laundry, telephones (Garattini, Guilianni and Pagano, 1999).

In a study done in Singapore, Hospitals had the highest cost for the maternity ward. The average unit cost was the highest in the maternity ward in-patient at the USD 141.39. A study conducted in five district hospitals in South Africa (Olukoga, 2007) found considerable variation in the unit cost of inpatient days in these hospitals. The total average cost for the maternity inpatient days at Harrismith Hospital at the time of study calculated on personnel, equipment,

materials, drugs, utilities and buildings was USD $105.48.. Another study conducted in a community health centre in Soweto found the cost of a normal delivery to be R 228.24 (Broomberg, et al, 1993). Both of these studies were not clear about the type of costing used for these studies. A recent study reported the average combined cost of ward and theatre fees, drug and surgical equipment for an uncomplicated CS in a private hospital in South Africa is about R 15,431 based on average length of stay of four days (Buchanan, 2005).

CHAPTER 3
METHODOLOGY

The methodology for this study was selected on the basis of its aims and objectives. In this chapter the following were discussed: setting, scope, and study design and research tools.

3.1 STUDY DESIGN

This was a descriptive study and used quantitative methods to describe deliveries in the maternity ward at Evander Hospital. The study made use of all secondary data which was collected during the period of the study. Sources of data included review of antenatal cards and obstetric files of all women who delivered at the labour ward during the study period.

3.2 STUDY SETTING

The Hospital is situated in Govin Mbeki Municipality in Gert Sibande District in the Mpumalanga Province (Figure 3.1). This Hospital is one of the 8 hospitals in Gert Sibande District and provides level 1 care to the population of Govan Mbeki Sub-district This Hospital has a catchment of 350,000 (Statistics South Africa, 2009.

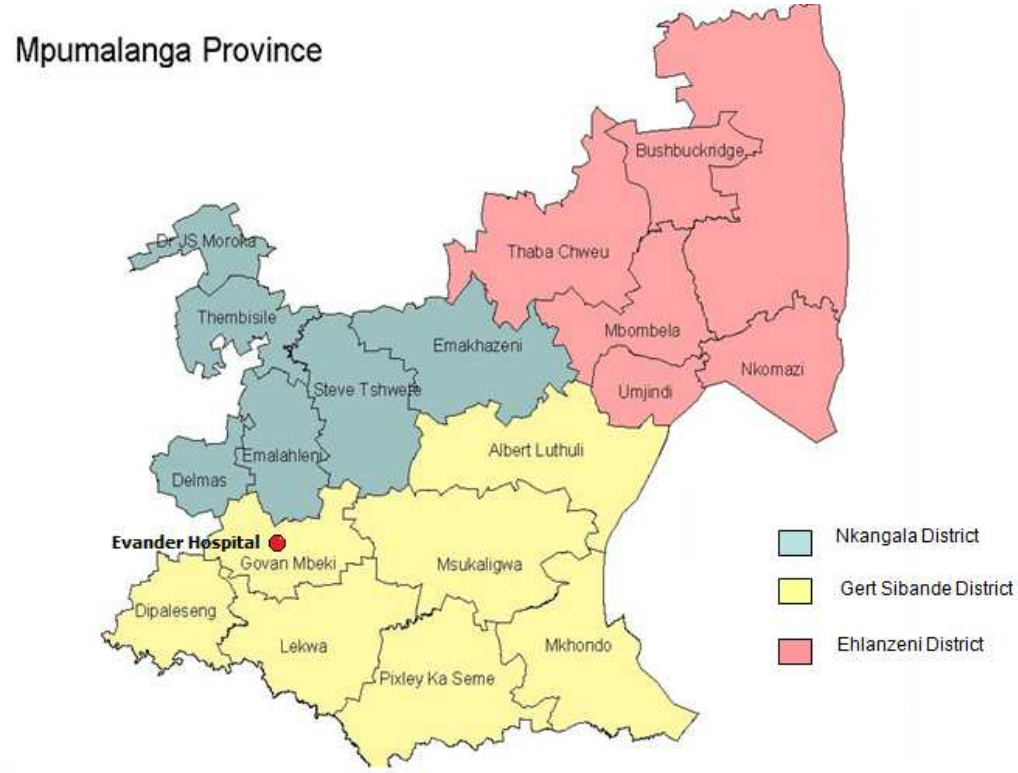


Figure 3.1: Map of Mpumalanga Province showing Evander Hospital

The Hospital serves the community of Embalenhle, Charl Cilliers, Secunda, Trichard, Leandra and lebogang, Evander and Kinross (Figure 3.2). There are 3 community health centres that serve as the down referrals for the hospital. In addition, there are 6 PHC clinics. These PHC clinics are running from Monday to Friday, and the community health centres are working for 24 hours. All these PHC clinics and CHCs refer patients that need to be seen by doctors at Evander Hospital.

POPULATION AREA SERVED

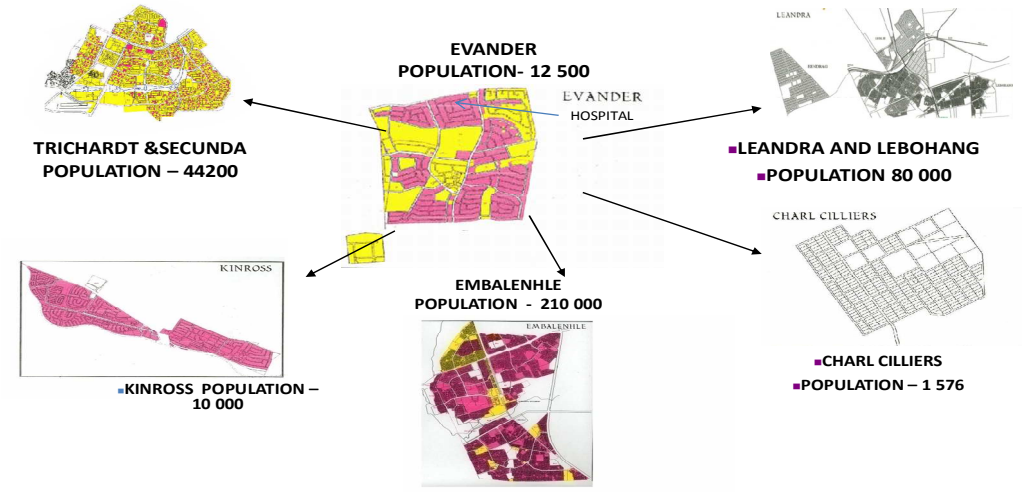


Figure 3.2: Catchment area of Evander Hospital

Evander Hospital

The Hospital has 150 approved beds with 113 usable beds in following wards:

- Paediatrics: 24 beds
- Medical wards: 36 beds
- Surgical wards: 36 beds
- Maternity: 36 beds and Nursery 4 beds.

The Hospital also renders a 24-hour casualty and an operating theatre services besides OPD clinic and Wellness clinic. General medical practitioners from a range of clinical disciplines provide the general medical care (Level 1) rendered by the Hospital.

Maternity out-patient clinic at the Evander Hospital provides routine antenatal check-up to all booked pregnant women. Additionally, Maternity in-patient ward

renders the following services: Ante-partum, Intra-partum and Post-partum care, Family planning and Nursery. The Evander Hospital has an average of 176 deliveries per month, of which 70% are normal vaginal deliveries (NVD), 30% caesarean sections (CS) and 1% assisted vaginal deliveries. The bed utilization rate at Evander Hospital Maternity ward ranges between 80% and 86%. The staff establishment for the unit includes one doctor, five advanced trained midwifes and three auxiliary nurses.

3.3 STUDY PERIOD

It was a six months from the 1st of January 2011 to 30th June 2011. This period of six-month were chosen as this period includes (a) the end of a financial year (1st of January 2011 to 31st March 2011) and (b) the beginning of a financial year (1st of April 2011 to 30th June 2011).

3.4 STUDY POPULATION AND SAMPLING

The study population was all women who delivered in the maternity ward at Evander Hospital during the January – June 2011 period. Inclusion criteria were those deliveries done from January to June 2011. It was a periodic convenience sampling. All women who delivered during the study period were included in the study. Deliveries done before and after the above-mentioned period were excluded from the study. There were 1081 deliveries during the six-month period. All records of women who delivered during the study period were included.

3.5 DATA MANAGEMENT

3.5.1 SOURCES OF DATA

Data used for this study is routinely collected by the Hospital. Information related to the deliveries were obtained from the Labour ward register. Profiles of these

patients were Patient's information were sourced from the Hospital Information System. Costing data were sourced from the Maternity Cost Center.

3.5.2 STUDY INSTRUMENTS

The data used for this study was extracted from the Hospital Information System and Maternity Cost center to the Microsoft Excel using the tools designed for the study (Appendix B). The study variables are listed in Table 3.1.

Table 3.1 List of variables

Objective	Variables	
1.	Deliveries	Number of deliveries per categories (NVD/ CS/ Assisted delivery/ Breech)
2.	Socio-Demographic profile	Age, Marital status, Ethnicity, Employment, Education status
	Obstetric profile	Parity and Gravida Booking status, and Booking blood status Number of visit Past obstetric history Antenatal medical diseases (such as Pregnancy induced hypertension, Diabetes mellitus, Cardiac) Ante partum diseases (such as Antepartum haemorrhage, Pre-rupture of membranes, Post-dates
		Birth weight and Apgar score
	Complications	Maternal (Ante-partum/ Intra-partum (Preterm labour/ Prolonged labour/ Laceration)/ Post-partum (Sepsis/ Haemorrhage)
		Perinatal (birth asphyxia)
	Outcomes	Maternal (Discharge/ Transferred/ Death)
		Perinatal (Discharge/ Transfer/ Still-birth/ neonatal death)
3	Expenditures	Laboratory test, Blood and blood products, Pharmaceuticals, medical stores,

3.5.3 DATA COLLECTION

The data was extracted from sources mentioned in Section 3.5.1 into MS excel

based data collection tools designed for this study (Appendix B). Each patient data was given a unique identifier number. Data was edited to check for duplicate records, miscoded values and missing values/information or out of range values. In case of incomplete data, where possible, records were checked manually to ensure that all the information required was obtained and entered on the database. Backup of data was done on multiple sets of diskettes and kept/locked safely in different places. Data had been stored onsite as well as offsite.

3.5.4 DATA ANALYSIS

The data was analyzed using NCSS statistical software (NCSS, 2007). Following statistical analysis was used:

- Descriptive statistics for continuous variables with normal distribution (such as age) included: mean and standard deviation.
- Descriptive statistics for continuous variables with non-normal distribution included: median and inter-quartile range.
- Descriptive statistics for categorical variables with non-normal distribution (such as ethnicity) included: count and proportion
- Inferential statistics (Chi-square test, t-test or Mann-Whitney's U test) was used to compare the women in relation to their mode of deliveries.

Statistical significance was used at p-value of 0.05

3.6 ETHICS

The permission to conduct this study had been obtained from the Mpumalanga Department of Health Research and Ethics Committee (Appendix A). Approval from the "Human Research Ethics committee (Medical)" of the University of Witwatersrand (Appendix B) was sought. Patients' names and hospital numbers was not included in the data sheet. Confidentiality was maintained at all times when collecting data, capturing and reporting. Records that link the study number and the patient number were kept in a locked cupboard to ensure

confidentiality

CHAPTER 4
RESULTS OF THE STUDY

This chapter deals with the analysis of the data collected for this study relating to its aims and objectives. The results obtained from the analysis of data were described in this chapter.

4.1 FREQUENCY OF DELIVERIES

Table 4.1 shows that out of the 1 081 deliveries done at Evander Hospital over six-month period, the highest number of deliveries were NVD (67.44%, n= 729). This was followed by caesarean sections with (31.82%, n=344). There were very few assisted deliveries. Five patients had CS and hysterectomies due to rupture uterus.

Table 4.1 Mode of mode of deliveries during study period

Mode of delivery	Frequency n (%)	Monthly average
NVD	729 (67.44%)	122
Breech	2 (0.19%)	0
Forceps	1 (0.09%)	0
CS	344 (31.82%)	57
CS Hysterectomy	5 (0.28%)	1
Total	**1081 (100%)**	180

4.2 SOCIO-DEMOGRAPHIC PROFILES

4.2.1 ETHNIC DISTRIBUTION

The majority of the subjects were black (1004, 93%), few whites (41, 4%), Asians (22, 2%), and Coloured (14, 1%) (Figure 4.1).

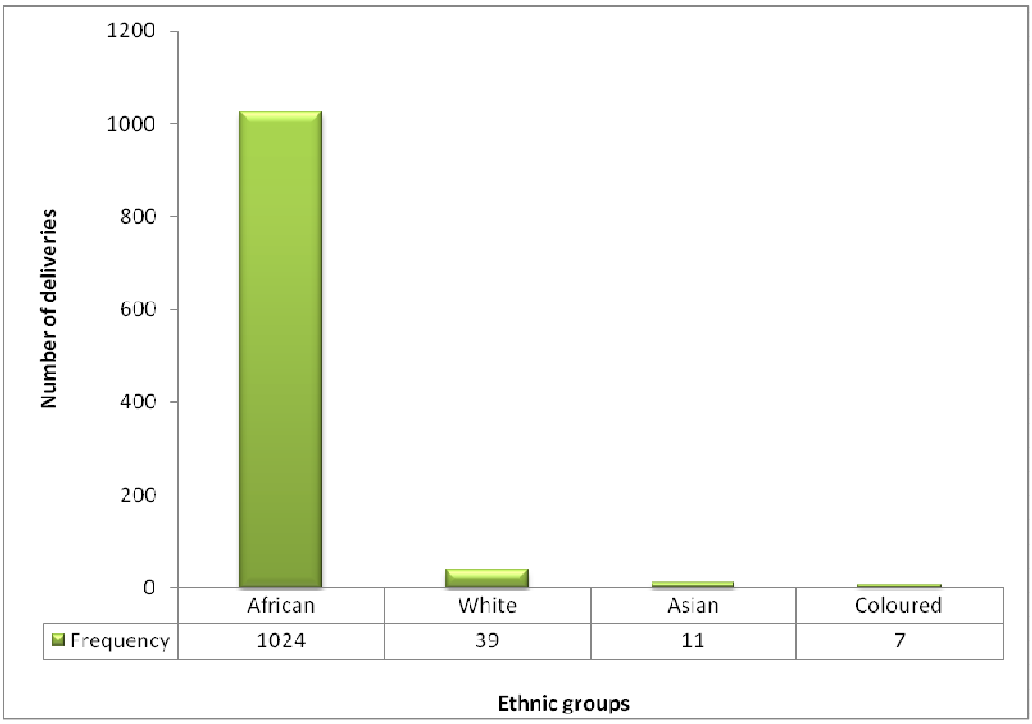


Figure 4.1 Distribution of deliveries according to ethnic groups

4.2.2 AGE

The median age of the subjects was 24 years (Inter-quartile range 21 to 30). The minimum and maximum age was 13 and 46 years respectively. The 18-22 years age group had the most deliveries (311, 29%). The 23-27 years age group recorded the second highest number of deliveries (285, 26%), followed by the 28-32 years age group (190, 18%). The 43+ years age group accounted for the least number with the overall of 9 (0.8 %) deliveries recorded (Figure 4.2). Two-hundred fifteen (20%) of them were teen-agers.

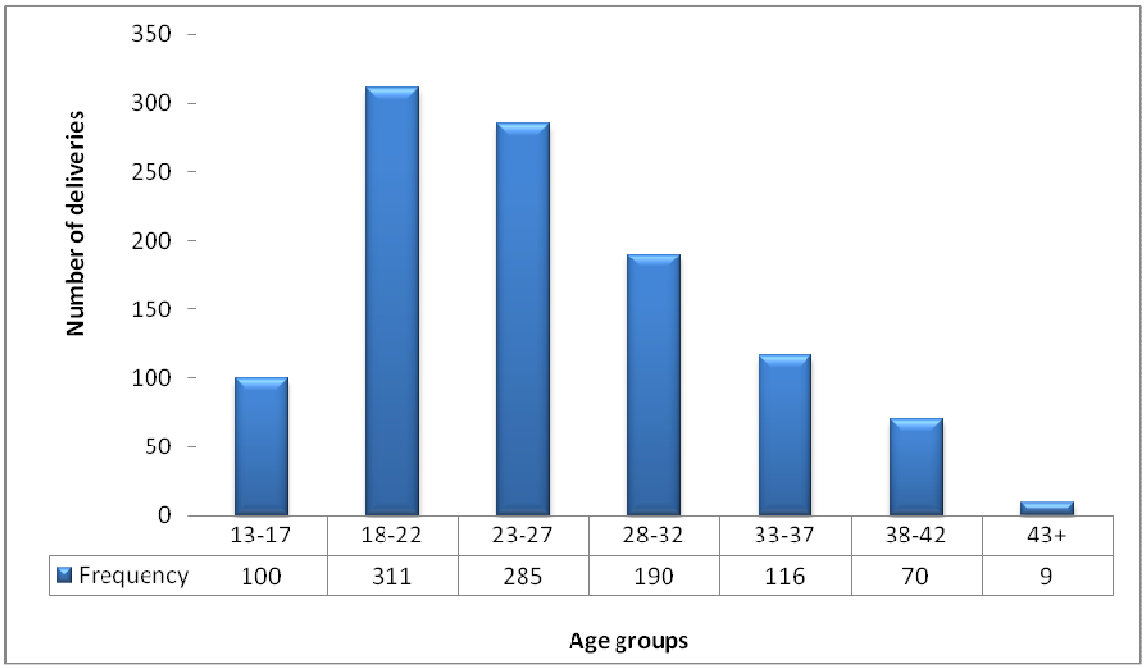


Figure 4.2 Distribution of deliveries according to age groups

Tabular illustration of age distribution by ethnic groups gives a more understandable indication of the relationship between age and ethnic group. Teenage pregnancies were more common among the black subjects (100, 10%), in comparison to other ethnic groups.

Table 4.2 Distribution of deliveries according to age groups and by ethnic groups

Age in years	Ethnic groups				
	Black	Asians	Whites	Coloureds	Total
13 - 17	100	0	0	0	100
18 - 22	291	9	7	5	312
23 - 27	265	9	17	4	295
28 - 32	181	1	11	4	197
33 - 37	109	2	6	1	118
38 - 42	49	1	0	0	50
43+	9	0	0	0	9
Total	**1 004**	**22**	**41**	**14**	**1 081**

4.2.3 MARITAL STATUS

The majority of the subjects were single (n=946, 88%) and few were married (n=35, 12%). The single subjects (median = 24) were significantly younger than married subjects (median = 30) (Mann Whitney's U test, p<0.0001).

4.2.4 LEVEL OF EDUCATION

A total of three level of education were considered in the study. Table 4.3 shows that the majority (98.8%, n=1068) of women had passed grade 9-12 and without any tertiary education. Only one (0.1%, n=1) women passed grade 4-5.

Table 4.3 Frequency distribution of education and employment status

Demographic characteristic	Frequency	%
Education level		
Grade 4 - 5	1	0.1
Grade 6 - 8	12	1.1
Grade 9 - 12	1068	98.8
Employment status		
Yes	71	6.6
No	1 010	93.4
Total	**1 081**	**100**

4.2.5 EMPLOYMENT STATUS

Table 4.3 further examined the frequency of employment status of the subjects. The majority (n=1,010, 93%) of women were unemployed while the remaining few (n=71, 7%) were employed.

4.3 OBSTETRIC PROFILE

4.3.1 PARITY

Figure 4.3 describes the parity of the subjects. The majority (n=445, 41%) of them were primipara (n= 445, 41%), while 1.5% of them were grandimultipara (5 or more children).

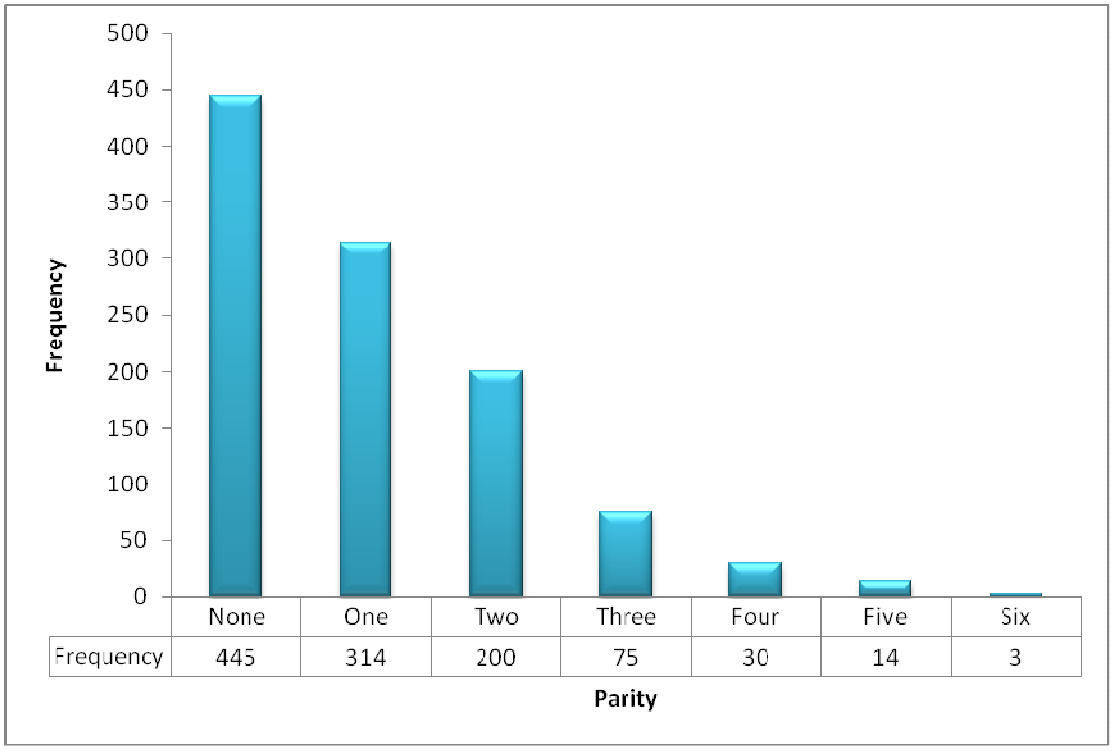


Figure 4.3 Parity of the subjects

4.3.2 BOOKING STATUS

Table 4.4 outlines the frequency distribution of booking status of the subjects. The majority (n=987, 91.3%) of them were booked while only (n=94, 8.7%) were not booked.

Table 4.4 Booking status and Booking blood results

		Frequency	%
Booking status	Booked at PHC Clinic	985	91.1%
	Booked by General Practitioner	2	0.2%
	Unbooked	94	8.7%
Total		**1081**	**100%**
Booking Blood Results	Yes	913	85%
	No	168	15%
Total		**1 081**	**100%**

Table 4.4 further gives detail comparison on the booking blood results. Most of them (n=913, 85%) had booking blood results and the remaining (n=168, 15%) did not have the booking blood results. However, it is important to note that not all booked mothers had the booking blood results (74, 7.4%).

4.3.3 NUMBER OF ANC VISITS

The frequency of ANC visits is described in Figure 4.4. Only 141 subjects (14%) had stipulated number of antenatal visits (4 or more visits). Eight hundred and forty five subjects (78%) had between 1 and 3 ANC visits, whereas 94 (8.7%) had no antenatal visit.

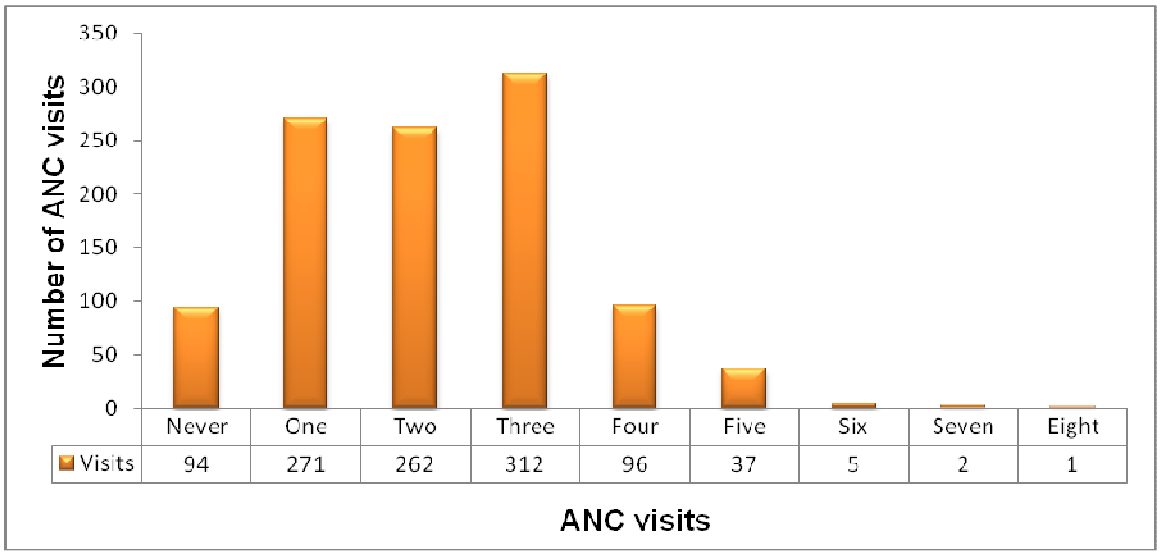


Figure 4.4: Frequency distribution of ANC visits

4.3.4 MEDICAL AND OBSTETRICS DISORDERS IN PREGNANCY

Three hundred and fifty nine (33.2%) of subjects had some medical disorders in pregnancy. HIV was the most prevalent (33, 31.3%). Fourteen of them (1.3%) had Pregnancy Induced Hypertension (PIH). Five of them had other medical disorders such as asthma, epilepsy.

Table 4.5 Medical and Obstetric disorders in pregnancy

	Frequency	%
MEDICAL DISORDERS		
PIH	14	1.3%
HIV	338	31.3%
TB	2	0.2%
Others	5	0.5%
Total	**359**	33.2%
OBSTETRIC DISORDERS		
APH	1	0.1%
Pre-term labour	1	0.1%
Total	**2**	0.2%

Only one subject (0.1%) had antepartum haemorrhage and other one had pre-term labour.

4.3.5 OPERATIVE PROCEDURES

CAESAREAN SECTIONS

Three hundred and forty nine CS were performed during this period (Table 4.6). Among these patients, five patients had hysterectomy for ruptured uterus. The majority of the patients had emergency CS (n=256, 73%), whereas 93 (17%) had planned and scheduled CS.

Table 4.6 Operative procedures

	Frequency	%
CS		
CS (elective)	93	26.6%
CS (emergency)	251	71.9%
CS (emergency) and hysterectomy	5	1.4%
Total	**349**	100%

In terms of indication for CS, the majority of the elective CS (62, 665) were done for previous CS and 15 (16%) were done for Cephalo pelvic disproportion (Figure 4.7). For emergency CS, fetal distress contributed to 42% (108) followed by Cephalo pelvic disproportion (39, 15.2%) and prolong labour (31, 12.1%), Abnormal presentation (27, 10.5%) and Previous CS (25, 9.7%).

Table 4.7 Indication of caesarean section

	Elective	Emergency	Total
Cephalo pelvic disproportion	15	39	54
Prolong labour	1	31	32
Failed induction	0	3	3
Failed forceps	0	1	1
Pelvic fracture	1	0	1
Rupture uterus	0	5	5
Previous CS	62	25	87
PIH	0	3	3
APH	0	4	4
Warts	2	1	3
Post maturity	2	1	3
Bad obstetrics history	1	0	1
Cord prolapse	1	2	3
Fetal distress	4	108	112
Abnormal presentation	3	27	30
Twins	1	6	7
Total	**93**	256	349

Bilateral Tubal Ligation

Sixty-five bilateral tubal ligations were performed during the six months of the study.

4.3.6 INTRAPARTUM AND POSTPARTUM COMPLICATIONS

Cord around the neck was present in 7 cases and four patients had cord prolapse. Three patients had retained placenta and 17 patients had post-partum haemorrhage.

4.3.7 MATERNAL OUTCOME

There was no maternal death during this period. All patients were discharged home.

4.4 PERINATAL PROFILE

4.4.1 BIRTH WEIGHT

The median birth weight was 3000 g (Inter-quartile range 2700 g to 3350 g) (Figure 4.5).

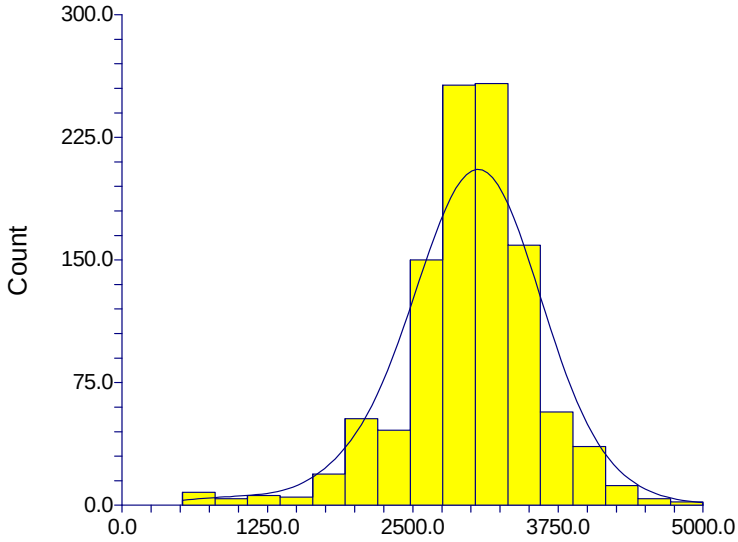


Figure 4.5 Birth weight

Tabulation of birth weight showed that the majority of the subjects had birth weight above 2500 g to 3500 g (754, 69.8%) (Table 4.8).

Table 4.8 Birth weight of babies delivered at Evander Hospital

Birth weight in grams	Frequency	%
500-1000	12	1.1
1001-1500	7	0.6
1501-2000	33	3.1
2001-2500	133	12.3
2501-3000	363	33.6
3001-3500	391	36.2
3501-4000	110	10.2
4001-4500	23	2.1
4501-and above	9	0.9
Total	**1 081**	**100**

4.4.2 APGAR SCORE

The Apgar score among children delivered at Evander Hospital ranged from 0 - 10. The median Apgar score was 9 (Inter-quartile range 9 to 9).

4.4.3 PERINATAL OUTCOME

Most of the babies were born alive (1048, 97%) (Table 4.9). Few had macerated still birth (MSB) (6, 0.6%) and fresh still births (2, 0.2%). One baby had congenital malformation.

Table 4.9 Perinatal outcome

	Frequency	%
Alive	1073	99.2%
FSB	2	0.2%
MSB	6	0.6%
Total	**1081**	100%

4.5 COMPARISON BETWEEN DIFFERENT MODES OF DELIVERY

The obstetric and perinatal profiles were compared between operative (CS) and non-operative (NVD and instrumental) deliveries.

4.5.1 SOCIO-DEMOGRAPHIC PROFILES

The subjects who had operative deliveries (median 25, IQR 21 to 31) were significantly older than those who had non-operative deliveries (median 24, IQR 20 to 30) (Mann Whitney's U Test, $p = 0.01$). However, there were no significantly differences between the two groups in terms of marital status (Chi-square test, $p = 0.14$), education (Chi-square test, $p = 0.84$). Interestingly, there was a significant association between mode of delivery and ethnicity (Chi-square test, $p < 0.01$), proportionately more white subjects has CS than non-white subjects.

4.5.2 OBSTETRICS PROFILES

There were no significantly differences between the two groups in terms of parity (Mann Whitney's U Test, $p = 0.21$), booking status (Chi-square test, $p = 0.28$), number of ANC visits (Mann Whitney's U Test, $p = 0.51$), obstetric disorders (Chi-square test, $p = 0.74$), medical disorders (Chi-square test, $p = 0.8$),

4.5.3 PERINATAL PROFILES

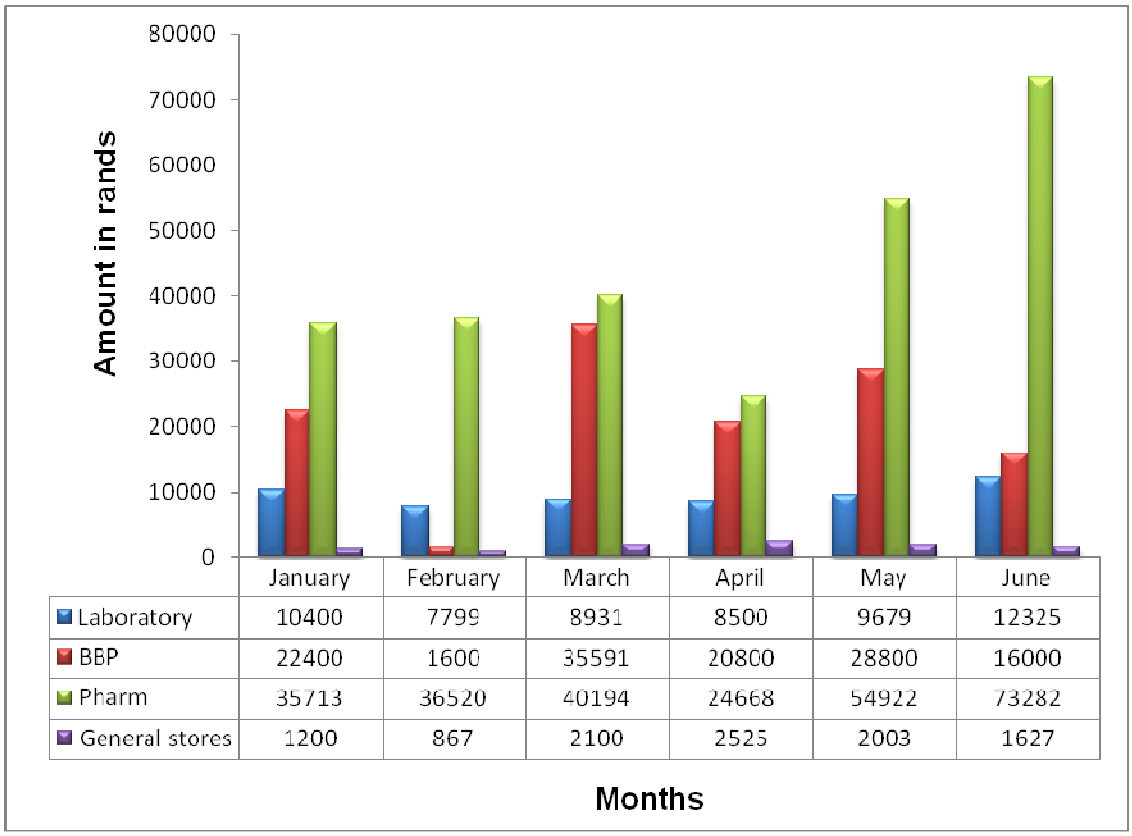
The birth weights of subjects who had operative deliveries (median 3100g, IQR 2800 g to 3500 g) were significantly higher than those who had non-operative deliveries (median 3000 g, IQR 2700 g to 3300 g) (Mann Whitney's U Test, $p < 0.01$). On the other hand, the Apgar score of babies of subjects who had operative deliveries (median 9) were significantly lower than those who had non-operative deliveries (median 9) (Mann Whitney's U Test, $p < 0.01$). However, there was no difference in perinatal outcome between the two groups (Chi-square test, $p = 0.37$).

4.6 MEDICAL COST

The medical cost associated with the Maternity unit consists of: (a) Laboratory (b) Blood and Blood products (c) Pharmaceuticals and (d) consumables (such as gloves, bandages).

4.6.1 LABORATORY TESTS

Total laboratory cost for the Maternity unit during this period was R 57,634.80, the lowest being in March (R 8,931) and highest in June (R 12,325) (Figure 4.6). The average monthly laboratory expenditure was R 9605.80.



	January	February	March	April	May	June
Laboratory	10400	7799	8931	8500	9679	12325
BBP	22400	1600	35591	20800	28800	16000
Pharm	35713	36520	40194	24668	54922	73282
General stores	1200	867	2100	2525	2003	1627

BBP-Blood and blood products, Pharm- Pharmaceuticals

Figure 4.6 Medical cost

4.6.2 BLOOD AND BLOOD PRODUCTS

The expenditure for blood and blood product is described in Figure 4.6. The total amount of R 125,191 was utilised for blood and blood products during the study period, the lowest being in February (R 1,600) and highest in March (R 35,591). The average monthly cost was R 20,865.17.

4.6.3 PHARMACEUTICALS

The total amount of R 265,299 was spent on pharmaceuticals for the period of six months. The lowest amount was spent in April (R 24,668) and the highest amount was spent in June (R 73,282). The average monthly cost was R 44, 216.50.

4.6.4 MEDICAL STORES

The total amount spent on medical store items was R 10,322, the lowest and highest being February (R 867) and April (R 2,525). The average monthly cost was R 1,720.33.

4.6.5 TOTAL EXPENDITURE

The total medical cost for the maternity ward for the six months studied amounted to R 4,584,466, the lowest and highest being in June (R 103,234) and February (R 46,786) (Figure 4.7). The average monthly cost was R 76,407.67.

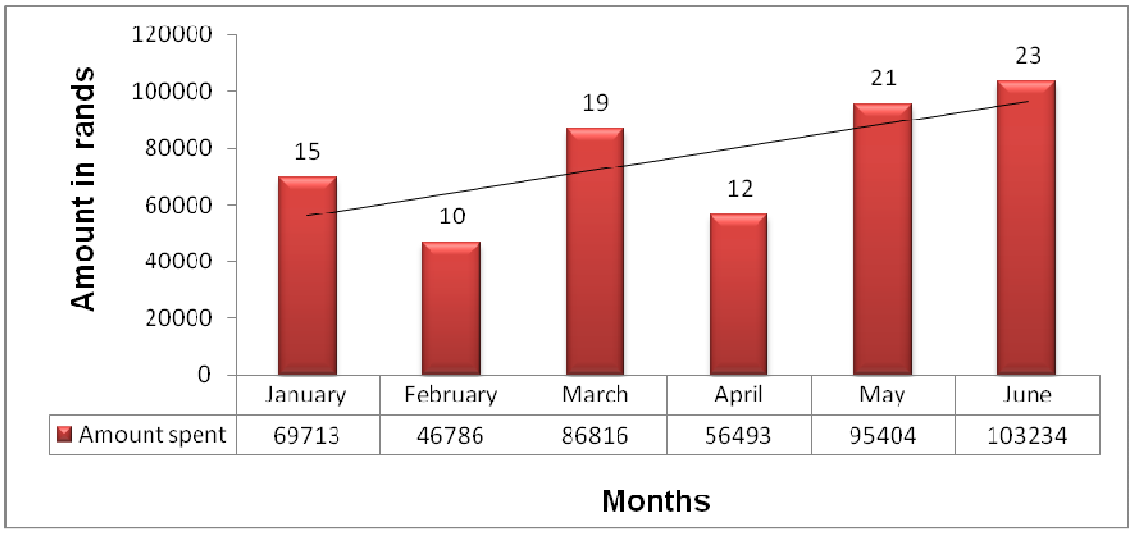


Figure 4.7 Total medical costs

CHAPTER 5
DISCUSSIONS

In this chapter, the results obtained from the analysis of the data were discussed and compared with those from other published studies.

5.1 INTRODUCTION

The setting of the study was the Evander Hospital, a district hospital in Govern Mbeki Municipality in the Gert Sibande District of the Mpumalanga Province. This study was done in order to assess the deliveries at the Evander Hospital Maternity unit during a six-month study period (January – June 2011). No study had been conducted at the level of a district hospital in the Mpumalanga Province to look at the deliveries at a district hospital maternity unit.

A periodic sample was used (6 month) and the entire study population was included for analysis. Therefore, no sampling was done. A sample size of 1081 would be reasonable to generalise the findings of the study in the context of a district hospital in Mpumalanga province.

5.2 MODE OF DELIVERY

There are 4 CHCs and 7Clinics in the Govern Mbeki Municipality which refer their patients to Evander Hospital which provides 24-hour care and are integrated into district health system to provide and to support range of services. Health problems that cannot be managed by district hospitals are then referred to secondary level which in turn refers to tertiary facilities (Department of Health, 2002). In 1992, the World Health Organization (WHO) has defined and described the functions of a district Hospital (WHO, 1992). However, in reality, these CHCs do not offer 24 hour services resulting in many women referred at the Evander Hospital and this resulted in the hospital having had a lot of NVD (729, 67.4%). A

well-functioning PHC system would not only benefit patients but also a key to improvement of maternal health services in District hospitals. The Hospital has fewer instrumental deliveries (3, 0.3%). One of the concerns were 5 hysterectomy performed for ruptured uterus, which should have been avoided.

5.3 SOCIO-DEMOGRAPHIC PROFILE

Maternal health is to a greater extent influenced by such factors as socio-demographic profile, booking status, obstetrical profile and place of delivery (WHO, 2005). The majority of the women who delivered at the Evander Hospital came from poor socio-economic class. The majority of were women had only passed grade 9-12 (98.8%, n=1068), had no post school education and were unemployed (n=1,010, 93%) and black (1004, 93%), which is a reflection of population of the Gert Sibande District (Statistics South Africa, 2009).

In addition to that, most of them were single and unemployed. Therefore, these women were solely dependent on public health facilities for their deliverers. According to WHO demographic profiles such as teen-age, single women, low educational status, unemployment and being a women living in a developing country have been associated with higher risk of maternal mortality and morbidity (WHO, 2005). For example, adolescent and teenage pregnancy is known to entail a number of risks. A study done in Burkina Faso reported a high rate of adolescent pregnancy (157 and 64 per 1000 adolescents in rural and urban areas respectively) and high rate of mortality and morbidity among them (Amnesty International, 2009) This study confirmed 20% of the subjects were teenagers (19 years and younger).

5.4 OBSTETRIC PROFILES

The description of deliveries by parity indicates some common demographic pattern. The majority of them were primipara (n= 445, 41%), while 1.5% of them

were grandimultipara (5 or more children).

Although the majority (n=987, 91.3%) of them were booked, only 141 subjects (14%) had stipulated number of antenatal visits (4 or more visits) which is of concern. Another concern is the booking blood results. Fifteen percent of the subjects (n=168) did not have the booking blood results. However, it is important to note that 7.4% (74) booked mothers, did not have booking blood results, which was a missed opportunity.

HIV was the most prevalent (33, 31.3%) medical conditions, which is similar to the HIV prevalence reported in antenatal sero-prevalence survey in South Africa (Department of Health. 2010).

The majority of the patients had emergency CS (n=256, 73%), whereas only 93 (17%) had planned and scheduled CS. The Unit should attempt to reverse this and perform more elective CS. For example, fetal distress, which constituted one of the main indications for emergency CS could be avoided by performing non-stress tests. Another avoidable factor could be CPD through clinical pelvimetry performed at 37 weeks by experienced clinicians (Cronje and Grobler, 2003). The subjects who had operative deliveries were significantly older than those who had non-operative deliveries, although there were no significantly differences between the two groups in terms of parity. Interestingly, no vacuum delivery was conducted during the study period. It might be due to lack of expertise among the staff to conduct vacuum delivery. Therefore, attempts should be made to train the nursing and medical staff to conduct vacuum delivery which might assist to reduce the emergency CS rate in this hospital.

Few patients had retained placenta and post-partum haemorrhage, indicating well managed third stage of labour. There was no maternal death during this period. All patients were discharged home.

5.5 PERINATAL PROFILE

More than 17% (n=185) subjects had low birth weight babies (less than 2500 g), which is just above national average of 16% (Department of Health, 2011b). The birth weights of subjects who had operative deliveries were significantly higher than those who had non-operative deliveries.

The median Apgar score among children delivered at Evander Hospital was 9. Interestingly, the Apgar scores of babies of subjects who had operative deliveries were significantly lower than those who had non-operative deliveries. However, there was no difference in perinatal outcome between the two groups.

Most of the babies were born alive. Stillbirth rate (7 per 1000 live births) was significantly lower than South African national average 17.8 per 1000 live births (Department of Health, 2011b).

5.6 MEDICAL COST

The total medical cost for the maternity ward for the six months studied amounted to R 4,584,466, the average monthly cost being R 76,407.67. The most expensive items were drugs and pharmaceuticals and least expensive being the medical consumables.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

In this chapter, the results obtained from this study were assessed in relation to the aims and objectives of the study, so that appropriate conclusions can be drawn. The limitations of the study are listed. Based on the findings of the study, appropriate recommendations and suggestions for future research are included.

6.1 CONCLUSIONS RELATED TO THE AIMS OF THE STUDY

This was a descriptive retrospective study that looked at broad issues pertaining to the deliveries at the maternity unit of a district hospital in a semi-rural district in the Mpumalanga Province during six months study period from January to June 2011.

6.1.1 DESCRIPTION OF THE TOTAL NUMBER OF DELIVERIES AND THEIR TYPES DURING THIS STUDY PERIOD

A total of 1,081 deliveries were performed at the Evander Hospital over six-month period. The highest number of deliveries were NVD (67.44%, n= 729), followed by caesarean sections (31.82%, n=344). There were very few assisted deliveries. Five patients had CS and hysterectomies due to rupture uterus.

6.1.2 DESCRIPTION OF THE PROFILES OF PATIENTS WHO DELIVERED DURING THIS STUDY PERIOD

The majority of the women who delivered came from poor socio-economic class and mostly single and black, which is a reflection of the characteristics of the catchment population of the Evander Hospital. Therefore, these patients are dependent on public health facilities for their deliveries and would not be able to

pay for their health care. Teenage pregnancy rate was quite high (20%).
The majority of the subjects were primipara (41%). Although most of them (91.3%) of them were booked, only 14% had stipulated number of antenatal visits (4 or more visits) and 7.4% of booked mothers, did not have booking blood results, which was a missed opportunity. HIV was the most prevalent (33, 31.3%) medical conditions, which is similar to the HIV prevalence reported in antenatal sero-prevalence survey in South Africa. Only 17% had planned and scheduled CS. No vacuum delivery was conducted during the study period. Very few patients had retained placenta and post-partum haemorrhage, indicating well managed third stage of labour. There was no maternal death during this period. All patients were discharged home.

More than 17% (n=185) subjects had low birth weight babies (less than 2500 g), which is just above national average of 16%. The birth weights of subjects who had operative deliveries were significantly higher than those who had non-operative deliveries. The median Apgar score among children delivered at Evander Hospital was 9. Interestingly, the Apgar scores of babies of subjects who had operative deliveries were significantly lower than those who had non-operative deliveries. Most of the babies were born alive. Stillbirth rate (7 per 1000 live births) was significantly lower than South African national average 17.8 per 1000 live births.

6.1.3 MEDICAL COSTS OF SERVICES RENDERED IN THE MATERNITY UNIT

The total medical cost for the maternity ward for the six months studied amounted to R 4,584,466, the average monthly cost being R 76,407.67. Most expensive items were drugs and pharmaceuticals and least expensive being the medical consumables.

6.2 LIMITATIONS OF THE STUDY

The main limitation for the study was missing records from the Hospital information system. The researcher addressed this issue by manually searching patients' files to complete the missing information.

The study did not include an economic analysis. It only looked at certain medical costs (laboratory tests, blood and blood products, pharmaceuticals and medical stores items) of services rendered in the Maternity Unit. In addition, the medical cost calculated for the study relied on historical costs. There was no way to verify these costs and could not be attributed to individual patients.

6.3 RECOMMENDATIONS

6.3.1 FOLLOW-UP

This project is the first systematic study done at Evander Hospital. This study identified the areas where the health department needs to improve in the management of maternal health and management of women in labour. This would assist the Hospital management to develop corrective measures such as improved booking status, reduced emergency CS by increasing elective CS rate, and reduction of Still birth rate. The results of the study will be disseminated to the District Director, Provincial Chief Director and the Evander Hospital's senior management and the Maternity unit personnel.

The recommendation was made to the Hospital management to train the nursing and medical staff to conduct vacuum delivery which might assist to reduce the emergency CS rate in this hospital.

The report would be discussed at the Hospital maternal mortality and morbidity meetings and in future, monthly statistics will be presented at each mortality and

morbidity meetings to identify adverse outcomes and the factors that might be associated with these adverse outcomes. A follow up study will be done to evaluate the effects of remedial measures taken to address the challenges identified during the mortality and morbidity meetings.

6.3.2 FUTURE RESEARCH

Based on findings of this study, the researcher would like to suggest following future studies:

(a) There is a need to conduct a similar study using a qualitative method, where participants from the staff can be engaged in the form of interviews to ascertain the cause of high emergency CS rate and high still birth rate.
(b) A qualitative study to identify the determinants of teenage pregnancy.
(c) A costing study to ascertain the direct (medical and non-medical costs) attributed to individual patients.
(d) A full economic analysis might help to understand the efficiency of services rendered at the maternity unit of this Hospital
(e) The workload and capacity of CHCs to evaluate the referral system within the Sub-district.

6.4 SUMMARY AND CONCLUSIONS

This study was the first of its kind to be done in this Hospital and the Health District. The study identified gaps where management of pregnant women in the Evander Hospital could be further improved through improved booking, planned deliveries and thereby reducing low birth weight rates and still birth rate. This would assist the Hospital Management to develop appropriate measures to reduce unnecessary CS being done, NVD being delivered in the hospital rather than using CHC, and strengthening referral system and strategies to reduce HIV and AIDS incidence. In addition, further study is necessary at the PHC facilities in the Sub-district to identify determinants for high rate of teenage pregnancy.

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APPENDICES

APPENDIX A: ETHICS CLEARANCE CERTIFICATE AND LETTERS OF APPROVAL FROM MPUMALANGA PROVINCE

APPENDIX B: DATA COLLECTION INSTRUMENTS