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The cost of clinical procedures performed in the maternity ward of Thebe District Hospital

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THE COST OF CLINICAL PROCEDURES PERFORMED IN THE MATERNITY WARD OF THEBE DISTRICT HOSPITAL

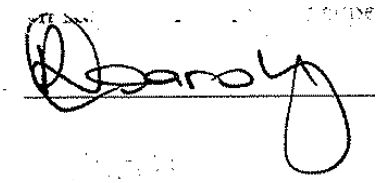
RPG MAAROHANYE

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

Johannesburg, 2011

DECLARATION

I, RPG Maarohanye, 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.



May 2011

DEDICATION

I dedicate this work to:

My wife, Singiswa for the support, inspiration and encouragement she provided to me during the course of my studies. She has really been a source of strength and my child, Gaopalelwe for being there for daddy, checking and monitoring on my homework and making sure that I perform to his satisfaction. His persistent and nagging question: "Daddy can I please go with you to school?" left me with no option but to strive not to deceive him. Therefore, I had no option but to reach this stage of my studies in pursuit for his guidance and motivation. Lastly, I wish to thank my mother and my late father for laying a solid foundation for my education. I will always remember their parental support and guidance. Making them proud is not an issue for discussion.

.

ACKNOWLEDGEMENT

Mr Motlatso Letshokgohla my supervisor, indeed your guidance and supervision pays testimony of your experience and dedication towards adding value to our National Health System in South Africa. Dr D Basu, this project would have been a dream without his guidance and encouragement. Your unwavering support has always been a source of strength and pinnacle of hope.

My sincere thanks to the following selfless and hardworking individuals: Fanyana Moloi, Seng Mofokeng, Dawn Wolmarans, for the kind support and assistance during the course of my studies. The staff in maternity ward at Thebe district hospital that assisted with the collection and collation of data during the report writing for this study. Their volunteering time and responses contributed to the success of this project.

The pharmacy staff at Thebe District Hospital and the contribution of the data capturers in my office cannot go unrecognised. Ms Manti Dhlamini and Ms Dinah Mthimkhulu the support staff in my office that have always made sure that they create a suitable environment for my studies and attended to all the logistics pertaining to travelling and subsistence matters.

ABSTRACT

Background: Maternity services in South Africa like in many developing countries remains a challenge. The high mortality and morbidity rates recorded in the confidential enquiries to maternal death (CEMD) reports in South Africa support a need for more studies to be done to improve maternal health services. Although clinical procedures are an integral part of the maternal health services, little is known about the current-status of clinical procedures performed in the maternity units of district hospitals and related resource utilisation. The apparently “free” maternity services at government hospitals involve substantial hidden and unpredicted costs, which is not quantified.

Aims of the study: To describe the cost of the specific clinical procedures performed at the maternity unit of Thebe District Hospital.

Methodology: This was a cross-sectional study design involving a retrospective record review of all maternity patient records for a one-month period in 2009. The month of September is mid-month for the financial year and was chosen as it is reflected a stable month in terms of financial performance. The costing aspect of this study was based on the National Health Reference Price List and UPFS. Data was analysed with NCSS software.

Results: The study found that NVD was the main clinical procedures, which is in line with the district hospital package. The CS rate was within acceptable norm but a significant number of BBA is of concern and would require further exploration. The majority of the patients who delivered at this unit are black, unemployed and had no medical aid. Most of them arrived by ambulance although it was not clear whether these patients were coming directly from home or were referred by PHC clinics and CHCs. There were no maternal and perinatal mortality and morbidity during the study period.

This study documented the direct cost of clinical procedures performed at a district hospital. The Human resources was the main cost driver. The calculated cost for this study was far lower than the costs prescribed in NHRPL for NVD and CS but higher than UPFS. This study highlighted the need for revising the UPFS.

Conclusion: The research findings will inform the resource needs for performing specified clinical procedures in maternity section at the Thebe District Hospital and will hopefully be used as a benchmark for maternity sections at all district hospitals in Thabo Mofutsanyana District and elsewhere. It has provided reasonable indications about the costs of each procedure and evidence can be used to determine the costs of each procedure in various district hospitals in the country and worldwide. It can further be utilised to do proper planning for our district hospitals in the province and develop the scientific criteria for resource allocation.

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GLOSSARY OF TERMS

Caesarean Section: a procedure in which a baby, rather than being born vaginally, is surgically extracted (removed) from the uterus. The term "section" in surgery refers to the division of tissue. What are being divided here are the abdominal wall of the mother as well as the wall of the uterus in order to extract the baby.

Clinical Procedures: procedures used for diagnosis, treatment and care.

Cost: the total money, time and resources associated with a purchase or activity.

Community Health Centre: a facility, which is open 24 hours a day, 7 days a week, at which a broad range of Primary Health Care Services are provided. It also offers accident & emergency and midwifery services, but not surgery under general anaesthesia.

District Hospital: a hospital at the first referral level that provides medical, surgical, maternity, psychiatric care and treatment for the sick or injured.

Episiotomy: is a surgical incision made in the perineum, the area between the vagina and anus. Episiotomies are done during the second stage of labour to expand the opening of the vagina to prevent tearing of the area during the delivery of the baby.

Forceps Delivery: is a delivery method whereby smooth metal instruments that look like a large spoons or tongs are curved to fit around the baby's head. They are carefully positioned around the baby's head and joined together at the handles. With a contraction and a woman's pushing, an obstetrician gently pulls to help deliver the baby. Some forceps are specifically designed to turn the baby round, for example, if the baby has its back to your back.

Inpatient Care: patients are admitted to hospital for at least one night for diagnosis, investigation or treatment. The admission will be referral or through the emergency room (casualty).

Level I Services: services which is within the skill base of general medical practitioners and do not require intervention of a specialist. These include simple surgery requiring a general anaesthesia (Caesarean Section).

Maternity Ward: a ward or unit within the hospital or Community Health Centre rendering maternity and obstetrics services.

Normal Vaginal Delivery: birth of a fetus through the vagina.

Primary Health Care: a set of prescribed services, generally falling within the skill of a professional nurse, technician, mid level worker, counsellor, midwife and emergency medical practitioners. These services may be first point of contact or for post discharge or post outpatient treatment.

Primary Health Care Clinic: a facility at which a range of Primary Health Care services are provided. It is open at least 8 hours a day Mondays to Fridays.

Public Hospital: a hospital delivering hospital services where the service provider is a government department. By definition the facility will not be for profit making

Regional Hospital: a hospital rendering specialist services that are beyond the normal scope of generalist medical practitioners.

Retained Placenta: a placenta that remains inside the womb after the birth of the baby. If not removed as soon as possible by a trained health worker, a retained placenta can cause heavy bleeding.

Vacuum Extraction: is a method of delivery whereby an instrument called the vacuum extractor (ventouse) that uses suction to attach a soft or hard plastic or metal cup on the baby's head. The cup is attached by tubing to a suction device. The machine is switched on and the suction cup becomes firmly applied to the baby's head by the vacuum. With a contraction and a woman's pushing, the obstetrician or midwife gently pulls to help deliver the baby.

1st-degree tears: are where the fourchette and vaginal mucosa are damaged and the underlying muscles are exposed, but not torn.

2nd-degree tears: are to the posterior vaginal walls and perennial muscles, but the anal sphincter is intact.

LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
BBA	Born Before Arrival
CEMD	Confidential Enquiry into Maternal Deaths
C/S	Caesarean Section
DHS	District Health Systems
FT	Full Term
HIV	Human Immunodeficiency Virus
IUGR	Intrauterine Growth Retardation
HR	Human Resources
LAP	Laparoscopy
MDGs	Millennium Development Goals
MOU	Maternal and Obstetric Units
NHRPL	National Health Reference Price List
PHC	Primary Health Care
PMTCT	Prevention of Mother to Child Transmission
PT	Preterm
TB	Tuberculosis
SROM	Spontaneous Rupture of the Membrane
UPFS	Uniform Patient Fees Schedule
WHO	World Health Organization

CHAPTER 1
INTRODUCTION

The purpose of this study was to describe the specific clinical procedures performed at the maternity unit of a district hospital in South Africa and to analyse the related costs of these procedures. This introductory chapter will covers the background to this study, statement of the problem, its aims and objectives and an outline of subsequent chapters.

1.1 BACKGROUND

Recently the maternal health care services have been receiving increasing attention all over the world. The high rates of maternal as well as infant and child mortality especially in developing countries emphasises the need to prioritise maternal and child health programmes in health systems of these countries.

The South African constitution recognises reproductive health as a fundamental right (Constitution of the Republic of South Africa, 1995). However, the inability of South Africa to meet the targets for the maternal and child health indicators, nutrition indicators, TB and HIV and AIDS indicators highlights the need for more studies on maternity services. In view of the current situation, the Provincial Departments of Health have also embarked on the development of maternal and child health services. The Free State Department of Health has embarked on a strong initiative to improve maternal health services in the Province. This study was conducted within that initiative.

1.2 STATEMENT OF THE PROBLEM

Maternity services and safe delivery of healthy children remains a challenge for the South African national health system. The district hospitals in South Africa offer Level 1 maternal health services. The clinical procedures done at the maternity units in district hospitals are usually not performed at the primary health care facilities (Community health centres and clinics), which therefore refer their patients to district hospitals. Moreover, due to geographical distance of regional hospitals, district hospitals often have to offer other clinical procedures in emergency situations, which are normally offered at regional hospitals. These clinical procedures are essential elements of maternal health services and improve the quality of care if performed timely and judiciously (WHO, 2009). However, performance of these clinical procedures requires skilled human resources (doctors and nurses), material resources (specialised medical equipments and consumables) and increased allocation of financial resources. The escalating costs of material resources are sometimes presumed as the reason for poor quality services. High morbidity and mortality rates including adverse events happening in the maternity wards are sometimes ascribed to shortage of skilled personnel and unavailability of material resources. However, no formal study has been done to systematically study the costs associated with these specific procedures.

1.3 JUSTIFICATION FOR THE STUDY

Public hospitals are currently overloaded within all disciplines and maternity services are one of the worse affected areas. Although clinical procedures are an essential part of maternal health services, these procedures are resource intensive and are often compromised in resource scarce environments. A formal study in this setting will hopefully assist in documenting the current status by studying clinical procedures performed in a district hospital and related resource utilisation. The study will focus on selected clinical procedures performed in the

maternity unit and hopefully bridge that gap by generating knowledge in this area to facilitate better planning.

1.4 STUDY OBJECTIVES

1.4.1 OVERALL OBJECTIVES

To describe the specific clinical procedures performed at the maternity unit of Thebe District Hospital, and the related costs.

1.4.2 SPECIFIC OBJECTIVES

- To describe the specific clinical procedures (normal deliveries, caesarean section, vacuum extractions, forceps delivery) at Thebe District Hospital maternity section during the study period.

- To describe the demographic and clinical profile of patients who had undergone these procedures during the study period.

- To determine the cost of these clinical procedures.

1.5 SUBSEQUENT CHAPTERS OF THE REPORT

The background to the research has been discussed and objectives defined in this first chapter. The following chapters are:

Chapter Two: Literature Review

The purpose of the literature review is to explain and discuss concepts related to the research and to search for solutions to the research problem.

Chapter Three: Research Methodology

The chapter describes the research methodology, methods and techniques used in this study.

Chapter Four: Presentation of Results

This chapter deals with an analysis of the findings and the study relating to its aims and objectives.

Chapter Five: Discussions

The findings from the review of the literature are integrated with the results obtained from the analysis in order to address the aims and objectives of the study

Chapter Six: Conclusion and Recommendations

This constitutes the final chapter of the report and draws conclusions from the research related to the aims of the study, makes recommendations and suggests areas for future research in the field of the cost of described clinical procedures in the maternity ward of a district hospital is South Africa.

1.6 SUMMARY OF THE CHAPTER

The introductory chapter covered the background to the study, the motivation for the research, and the objectives of the study and the statement of the problems. Lastly, it provided a summary of the subsequent chapters that make up this research report.

CHAPTER 2
LITERATURE REVIEW

In this chapter, relevant reports into measurement of costs of described clinical procedures in the maternity ward of a district hospital are discussed in the South African perspective. In addition to published literature, information from various unpublished sources is also reviewed.

2.1 MATERNAL HEALTH SERVICES

The World Health Organization (WHO) recently reported about the lack of progress in maternal health in the sub-Saharan African region, and expressed its concern that most countries would not be able to meet the targets of the Millennium Development Goals (MDGs) by 2014 (WHO, 2005). The risk of women experiencing serious complications or dying during pregnancy, childbirth or the puerperium continues to be high in sub-Saharan Africa (Munjanja, Majoko, Lindmark, 2008).

The experiences of women in this region are further compromised by the lack of capacity in the health facilities such as shortage of skilled health professionals, medical equipment, pharmaceuticals, and support services (such as laboratory services and transport) (Munjanja, et al., 2008). This situation has highlighted the need for more resources and the optimal utilisation of currently available resources. Focused and intensified studies on maternal health services are required to document this and to establish evidence-based practices in this part of the world.

The major final causes of maternal mortality and morbidity and the administrative and socio-economic factors which contribute to increased risk are well known in some countries like South Africa (Department of health, 2008). Over the past three decades, reproductive health focused research has documented

interventions which health systems can implement to reduce maternal mortality and morbidity. Eventually, all these interventions have to be delivered to women through programs, which are packages of routine tests, procedures, prophylactic regimes and treatments designed to take a woman safely through pregnancy (O'Mahony, Hofmeyr, Menon, 2009). Clinical procedures performed in maternity units are an essential component of maternal health services. Although many studies have been conducted on the clinical aspects of these procedures, no study has been done to formally study these procedures in the perspective of resource utilization associated with these procedures. The cost of these described procedures is calculated based on the studies cited in paragraph 2.3 and the formula used under the variables 3.5.2 in Chapter 3.

2.2 CLINICAL PROCEDURES USED IN MATERNITY

Maternity services are part of the comprehensive primary health care (PHC) package to be offered by all maternity units under level I Services in South Africa. The specific procedures practiced in a maternity unit of level 1 hospital are listed in the Table 1 below. In addition to these procedures, complex procedures such as caesarean hysterectomy that require specialist interventions are usually performed in regional hospitals (Department of Health. 2002).

Table 2.1 List of Clinical Procedures

Clinical Procedure
Normal Deliveries
Caesarean Section
Vacuum Extraction
Forceps Delivery
Removal of retained placenta
Episiotomy suture

Department of Health, 2002

Clinical indications and diagnosis (such as abnormal foetal position, obstructed and prolonged labour, and pre-existing diseases) of a patient is probably the most important factor associated with clinical procedures used in maternity. However, other factors such as booking status, age, patients' choice and the health provider's preference may also play an important role.

2.2.1 NORMAL DELIVERIES

In the majority of cases, the deliveries performed are normal vaginal deliveries which consume lesser resources. The proportion of normal delivery depends on levels of care, geographical location, type of health facilities (such as public or private). For example, a primary health care facility in South Africa (Diepkloof Community Health Centre) reported 57% normal deliveries, 3% born before arrival and remaining 30% referral to Chris Hani Baragwanath Hospital for further management (Broomberg and Rees, 1993).

Sometimes during the normal vaginal delivery, there is a need for additional procedures to be performed. These depend on the presentation of specified criteria. These include elective procedures such as episiotomy and emergency procedures such as perineorrhaphies: for perineal tear. Although episiotomies are sometimes described as protecting the pelvic muscles and possibly preventing future problems with urinary incontinence, it is not clear that the procedure actually helps (Cunningham, Leveno, Bloom, et al. 2009). Episiotomy rates vary according to profession and experience of health professionals. Doctors particularly with those with less years of experiences were found to perform more episiotomies (Low, Seng, Murtland, et al, 2000). Episiotomy rates were higher among white women (32.1%) than African American women (11.2%) in the USA. (Enkin, Keirse, Neilson, et al. 2000). In South Africa, episiotomies are done by medical officers and/ or midwives. The decision to perform this procedure is still largely dependent on health professionals.

2.2.2 CAESAREAN SECTION

Caesarean section (CS) rates are progressively increasing in many parts of the world. Although there are clear clinical indications for caesarean section (such as placenta praevia, HIV infection, contracted pelvis and, arguably, breech presentation or previous caesarean section), there are other factors such as the patients' preference which also play an important role (House of Commons Health Committee, 2003). The reported benefits of planned caesarean section include greater safety for the baby, reduced pelvic floor trauma for the mother, avoidance of labour pain and convenience (Lavender et al, 2009). This implies that that various non-clinical factors can be associated with the caesarean section procedure. It is also assumed that most of the clinicians see this as the most convenient procedure for them as it saves time and reduces the risk of adverse events (Wagner, 2000). However, the caesarean sections are resource intensive and are often associated with complications in resource poor settings (Enkin, et al. 2000). The CS is higher among women of higher socioeconomic status (22.9%), in comparison to women from lower socio-economic status (13.2%). The CS rates were also found to be high among white American women in comparison to women from other ethnic groups (Enkin, et al, 2000). In South Africa, the CS rate is high in private than public sectors. In the public sector, the rate is significantly higher among white (17%) in comparison to black patients (9%) (Matshidze, Richter, Ellison, et al, 1998).

2.2.3 FORCEPS AND VACUUM DELIVERY

Operative vaginal delivery, a vital component of basic emergency obstetric care worldwide remains an integral part of the obstetrician's duties. It may take the form of instrumental deliveries, employing obstetric forceps and vacuum extraction to shorten the second stage of labour. It is believed that operational vaginal delivery may be performed as infrequently as 1.5% of deliveries in some countries, but it may also be as high as 15% in other countries (Adaji, 2009).

These procedures are less resource intensive but may be associated with more complications (Enkin, et al, 2000).

2.3 COST OF MATERNITY PROCEDURES

There are only few studies, which have documented the costs of clinical procedures in maternity services especially in developing countries. The costs associated with these procedures are often not calculated resulting in poor reproductive health, antenatal care, family planning and maternity care since no proper planning and allocation of resources are done without formal studies (Broomberg, et al, 1993).

Full cost of a clinical unit includes direct costs, overhead costs, and a share of costs indirectly incurred to provide the service (indirect costs). 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).

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 average unit cost for maternity patients in these hospitals was more than double the average cost for medical patients (US$ 65.62). 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. However, the study did not identify the reasons for the increased expenditure. It can be postulated that it may be due to clinical procedures performed in the maternity unit. 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 Caesarean section in a private hospital in South Africa is about R15 431 based on average length of stay of four days (Buchanan, 2005). In comparison the Uniform Patient Fees Schedule (UPFS) for full paying patients are R4100 (R1454 professional fee and R2654 facility fee) for NVD and R5618 (R1440 professional fee and R4178 facility fee)

Thomas, Manning, Holmes, et al (2007) studied the cost of in-patient care for HIV-infected and uninfected children in Chris Hani Baragwanath Hospital. They determined the costs from two sources:
The average daily hotel and labour cost for caring for these patients based on the patient day equivalent which is an estimate of the total daily cost to the hospital caring for an inpatient. It includes the annual direct costs incurred by the hospital, the cost of personnel (compensation for employees) and related indirect costs. They also calculated unit costs for pharmaceuticals, intravenous fluids, including blood products, laboratory investigations radiological investigations and other investigative or therapeutic measures. However, their study was for a short period (six weeks) and quiet resource intensive. Therefore, it is not always possible to replicate their model on a non-research setting. Basu and his colleagues (2010) suggested that an effective analysis of hospital performance requires the availability of both timely and accurate cost and clinical output data (Basu, Croce, Porazzi, et al, 2010). The South African National Department of Health recognised this challenge and has encouraged public health facilities to adopt and apply cost centre management to their facilities.

In the absence of accurate data, proxy indicators such as (UPFS or NHRPL) are often used. The UPFS indicators were designed many years ago and not updated recently. However, the NHRPL indicators are updated recently (Department of Health 2009). The costs prescribed in NHRPL for Normal vaginal delivery (NVD) and CS are R 7566 and R10639 respectively.

CHAPTER 3
METHODOLOGY

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

3.1 SETTING OF THE STUDY

The setting of the study was in the Maternity Unit of the Thebe District Hospital. Thebe District Hospital is a 100 bed hospital situated at the eastern part of the Free State in the Thabo Mofutsanyana District (Figure 3.1).

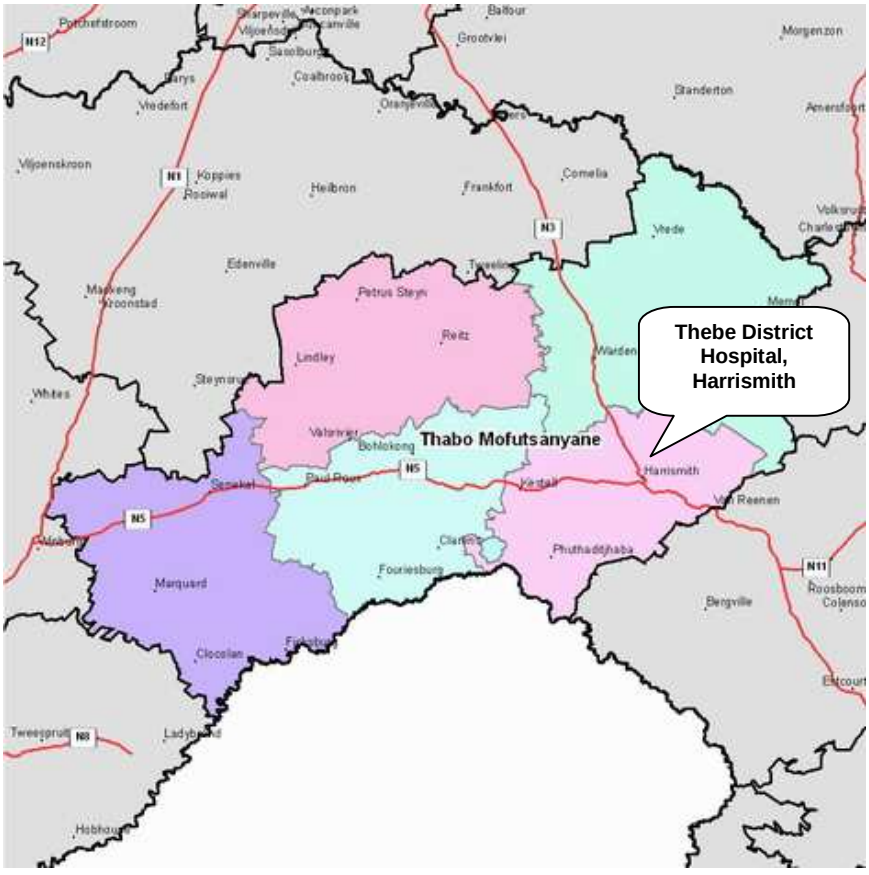


Figure 3.1 Thabo Mafutsanyana District

The Hospital offers Level 1 maternal health services. The Hospital serves an estimated population of approximately 101,000 people from Harrismith, Warden, Tshiame A, B & C, Diyatalawa, Van Reneen and the surrounding farming areas. The Hospital has 21 maternity beds divided into antenatal, delivery (labour) and post-natal beds. The Maternity Unit staff includes 13 professional nurses, seven nursing assistants, and four cleaners in addition to five doctors who also oversee the entire Hospital. The clinical procedures done at the Maternity unit are usually not performed at the Primary health facilities, which therefore refer their patients to this Unit. Moreover, the Regional Hospital (Manapo Regional Hospital) is 50 km away and therefore, the Unit has to offer other clinical procedures in emergency situations, which are normally offered at regional hospitals.

3.2 SCOPE OF THE STUDY

All records of maternity patients who had undergone the clinical procedures during the study period were reviewed. No primary data collection and no intervention were done as a part of this study.

3.3 STUDY DESIGN

A cross-sectional study design was used for this study. This involved retrospective record review of routinely collected information, which was extracted from Thebe District Hospital maternity registers, pharmacy and stores records.

3.4 STUDY POPULATION AND SAMPLING

Records of patients (103 patient files) who attended maternity section of the Hospital during one-month period (September 2009) were used for this study. The month of September was chosen as it reflected a stable month in terms of financial performance and management and deliveries performed at the maternity unit.

3.5 DATA MANAGEMENT

3.5.1 STUDY INSTRUMENTS

MS Excel based data-collection tools were designed for this study to extract data from Hospital Information System and clinical records of patients and other hospital records (Appendices 2).

3.5.2 VARIABLES

Data were collected on relevant variables including clinical procedures (such as normal deliveries, caesarean section, vacuum extractions, forceps delivery and removal of placenta), demographic profile of patients such as [age; patient classification according to uniform patient classification system (UPS), ethnicity] and clinical profile [such as gravidity, diagnosis].

Table 3.1 Study Variables

Objectives	Tools	Variables	Indicators
1	1	Clinical procedures	Type of procedures Number of procedures per type
2	2	Profile of patients Demographic Socio-economic Clinical profile Length of stay	 Age Ethnicity Occupation (employed/ Unemployed) Medical aid Hospital classification Final diagnosis (ICD-10 code) Mode of delivery Outcome (discharge/death/transfer) Length of stay
3	3	Costs	Unit cost per procedure & Total cost per procedure - Cost of pharmaceuticals - Cost of intravenous fluids - Cost of consumables - HR cost - Total cost

Costing

Unit cost for each patient was calculated from the following sources based on the methodology used by Thomas, et al (2007).

Pharmaceutical - From the Provincial Pharmacy Price List

Consumables - From 2009 Free State Province Tender List

HR cost - From HR department

The cost per procedure per patient was the sum of the following: pharmaceuticals, intravenous fluids, HR cost in terms of time spent with each patient.

Cost of a procedure for a patient will be calculated based on following formula:

Total cost (in Rand) $= \sum P*Z_1 + \sum C*Z_2 + \sum F*Z_3 \sum[(H*NA*Z_4) + (H*SN*Z_5) + (H*PN*Z_6) + (H*D*Z_7)$

Where P= number of pharmaceutical products used per type

Z_1 = unit price per pharmaceutical products used per type

C= number of units of consumables used per type

Z_2 = unit price of consumables used per type

F= number of intravenous fluid units of consumables used per type

Z_2 = unit price of intravenous fluid unit used per type

H= number of hours taken for the procedure

NA= number of nursing assistant involved in the procedure

SN= number of staff nurse involved in the procedure

PN= number of professional nurses involved in the procedure

D= number of medical doctors involved in the procedure

Z_4 = hourly salary of a nursing assistant

Z_5 = hourly salary of a staff nurse

Z_6 = hourly salary of a professional nurse

Z_7 = hourly salary of a medical doctor

3.5.3 DATA COLLECTION

The data for this study was routinely collected on monthly basis as a part of Hospital Information System. No primary data was collected specifically for this study. Data collection tools developed for the study (Appendix B) were used to extract the information from different sources within the Maternity unit, Finance and Human Resource Departments of the Hospital.

3.5.4 DATA ANALYSIS

Data was captured on MS excel spreadsheet and analysed with NCSS software (NCSS, 2007). Following statistical tests were used:

- Descriptive data analysis: Mean and standard deviations was used for continuous variables (such as age) when normally distributed and Median and inter-quartile range for others. Proportions were used for categorical variables (such as ethnicity and gender).
- Analytical statistics: T-test and one way analysis of variance were used for continuous variables and Chi-square test for categorical variables.

3.6 ETHICAL CONSIDERATION

The patients' identification was removed after extraction of the data from the Hospital Information System to maintain confidentiality. Permission to conduct the research at the Thebe District Hospital was granted by the acting head of department of the Free State Provincial Department of Health. The researcher also obtained approval from Wits University Human Research Ethics Committee (Medical) of the University of the Witwatersrand (M10627) (Appendix A).

CHAPTER 4
RESULTS

The results obtained from data analysis are described in this chapter.

4.1 CLINICAL PROCEDURES PERFORMED DURING THE STUDY PERIOD

One hundred and three clinical procedures were done in the Maternity Unit of this Hospital during the month of September 2009 (Table 4.1). Out of the 103 procedures, 77 (75%) were normal vaginal deliveries, 14 (13%) BBA's, 11(11%) caesarean sections, and one (1%) vaginal breech delivery. No instrumental delivery (forceps delivery and vacuum extraction) was performed during this period. Hence the total NVD was (77 + 14) = 92 (including BBA & Breech).

Table: 4.1 Clinical procedures performed during the study period

Clinical Procedure	**Total**	**Percentage**
NVD	77	75%
CS	11	11%
BBA	14	13%
Breech (Vaginal delivery)	1	1.0%
Forceps Delivery	0	0%
Removal of retained placenta	0	0%
Total deliveries	**103**	**100%**

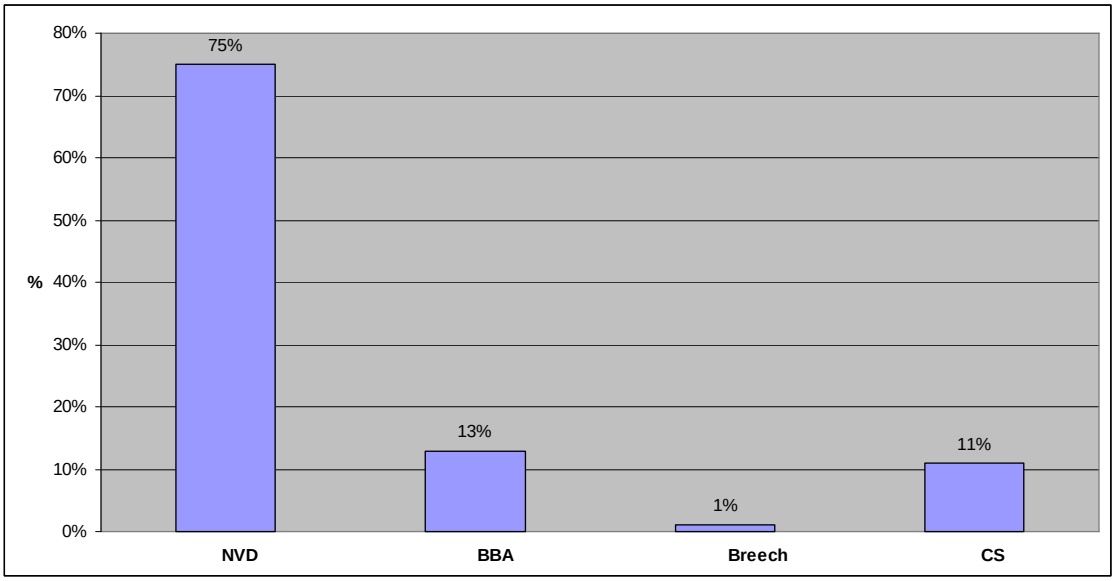


Figure 4.1 Clinical procedures performed during the study period (n=103)

Procedures performed on patients who had vaginal delivery are described in Table 4.2. Among the patients who had NVD, 39 (50%) had episiotomies and 13 (17%) had repair of perineal tear. Five (36%) patients with BBA also had repair of perineal tear. The number of perineal tears were not significantly different between NVD and BBA patients (Chi-square test, p =0.80).

Table 4.2 Addition vaginal procedures performed during the study period

	NVD	BBA	Breech	Total
Episiotomy	39		1	40
Repair of vaginal tear				
1st degree tear	12	3		15
2nd degree tear	1	2		3
Total	52	5	1	58

4.2 SOCIO-DEMOGRAPHIC PROFILE

4.2.1 AGE

Table 4.3 describes the distribution of subjects according to the different age groups (Figure 4.2). The majority of them 48 (47%) were between 20 and 25 years of age, 28 (27%) were 26-35 years, 18 (17%) were teenagers (15 to 19 years of age) and 9 (9%) were above 35 years.

Table 4.3 Age distribution of subjects

Age grouping	Total	Percentage
15-19 years	18	17%
20-25 years	48	47%
26-35 years	28	27%
Above 35 years	9	9%
Total	**103**	**100%**

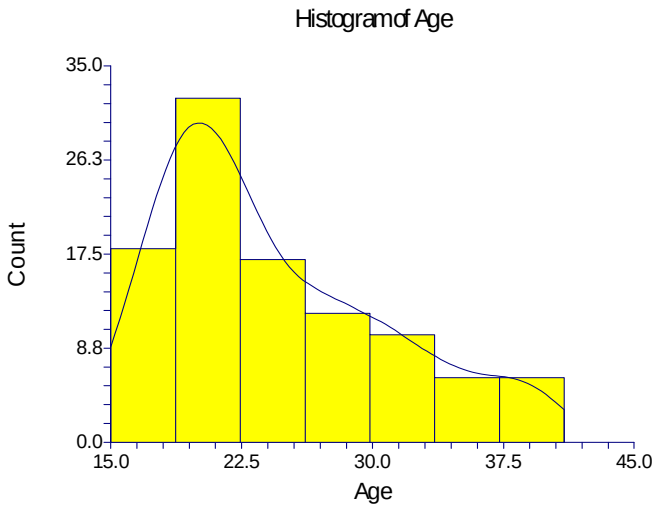


Figure 4.2 Age of the patients (n=103)

There was no significant association between age and mode of delivery (One Way Analysis of Variance, p = 0.22) (Table 4.4).

Table 4.4 Age and mode of delivery

The majority of them (47%) were between 20 and 25 years of age. There were eighteen (17%) teenagers (below 19 years of age). The majority of them delivered normally and two of them require CS. In addition, two of them delivered at home.

	NVD	BBA	CS	Breech	TOTAL
Median (IQR)	22 (19-27)	28 (21-31)	22 (18-22)	19	22 (19 -28)
Range	15-41	19-34	16-38		15 -41

4.2.2 ETHNICITY

Table 4.5 describes the ethnicity of the subjects. The majority of them 100 (97%) were black.

Table 4.5 Ethnicity of the subjects

Ethnic Group	NVD	BBA	CS	Breech	TOTAL
Black	77 (100%)	14	8 (73%)	1	100 (97%)
Coloured	0	0	2 (18%)	0	2 (2%)
Asian	0	0	1 (9%)	0	1 (1%)
Whites	0	0	0	0	0
Total	**77 (100%)**	**14(100%)**	**11 (100%)**	**1 (100%)**	**103 (100%)**

There was no significant association between ethnicity and mode of delivery.

4.2.3 MEDICAL AID AND EMPLOYMENT STATUS

None of the 103 (100%) of women belonged to any medical scheme.

Table 4.6 illustrates the frequency distribution of the employment status of the patients. Most of them 83 (80.3%) were unemployed. There were eleven (10%) who were employed and nine (8.7%) scholars.

Table 4.6 Employment status of the subjects

	NVD	BBA	CS	Breech	TOTAL
Unemployed	59 (76.6%)	12 (86%)	11	1	83 (80.3%)
Employed	10 (13%)	1 (7%)	0	0	11 (10%)
Scholar	8 (10.4%)	1 (7%)	0	0	9 (8.7%)
Total	**77 (100%)**	**14(100%)**	**11 (100%)**	**1 (100%)**	**103 (100%)**

There was no significant association between employment status and mode of delivery (Chi-square test, p = 0.88).

4.3 MODE OF TRANSPORT

Table 4.7 illustrates the mode of transport used by these patients to reach Hospital. The majority of them 66 (65%) were brought by ambulance.

Table 4.7 Mode of transport

	NVD	BBA	CS	Breech	TOTAL
Ambulance	48 (62.3%)	10 (71.4%)	7 (63.6%)	1(100%)	66(65%)
Self Referral (own transport)	29 (37.7%)	4 (28.6%)	4 (36.4%)	0	37 (35%)
Total	**77 (100%)**	**14 (100%)**	**11 (100%)**	**1(100%)**	**103 (100%)**

There was no significant association between transport and mode of delivery (Chi-square test, p = 0.88).

4.4 CLINICAL PROFILE

4.4.1 INITIAL DIAGNOSIS ON ADMISSION FOR DELIVERY

Table 4.8 illustrates the distribution of the initial diagnoses on admission for delivery. Most (82.5%) were admitted with labour pain. Fourteen (13.6%) were admitted for born before arrival (BBA), four (3%) with Intra Uterine Growth Retardation (IUGR) (4, 3%) and 12 (3%) with spontaneous rupture of membrane (SROM).

Table 4.8 Initial diagnoses on admission for delivery

	Total	**NVD**	**BBA**	**CS**	**Breech**
Labour pain	85 (82.5%)	73 (94.8%)	0	11(100%)	1(100%)
BBA	14(13.6%)	0	14 (100%)	0	0
IUGR	2(1.9%)	2 (2.6%)	0	0	0
SROM	2 (1.9%)	2 (2.6%)	0	0	0
Total	**103 (100%)**	**77 (100%)**	**14 (100%)**	**11 (100%)**	**1 (100%)**

4.4.2 GESTATIONAL AGE AT DELIVERY

Gestational age at delivery is described in Table 4.9. The majority of them had a full-term (FT) delivery. There was no significant association between gestational age at delivery and mode of delivery (Chi-square test, p = 0.50).

Table 4.9 Gestational age at delivery

Final Diagnosis	**Total**	**NVD**	**BBA**	**CS**	**Breech**
Full Term (FT)	99 (96.1%)	74(96.9%)	14 (100%)	10 (90.9%)	1(100%)
Pre-term (PT)	4 (3.9%)	3 (3.1%)	0	1 (9.1%)	0
Total	**103 (100%)**	**77 (100%)**	**14 (100%)**	**11 (100%)**	**1(100%)**

4.4.3 CLINICAL OUTCOMES

There was no maternal or perinatal mortality or morbidity during the study period.

4.4.4 LENGTH OF STAY

The length of stay of the subjects is described in Table 4.10 (Figure 4.3). There were significant association between the mode of delivery and Length of stay (One Way Analysis of Variance, p <0.001). The patients who had CS had stayed significantly longer than patients who had NVD.

Table 4.10 Length of stay

Length of stay (in days)	**Total**	**NVD**	**BBA**	**CS**	**Breech**
Median (IQR)	2 (1 -3)	2 (1-2)	2 (1-3)	3 (3-4)	4
Range	1 -10	1- 10	2- 8	1-6	

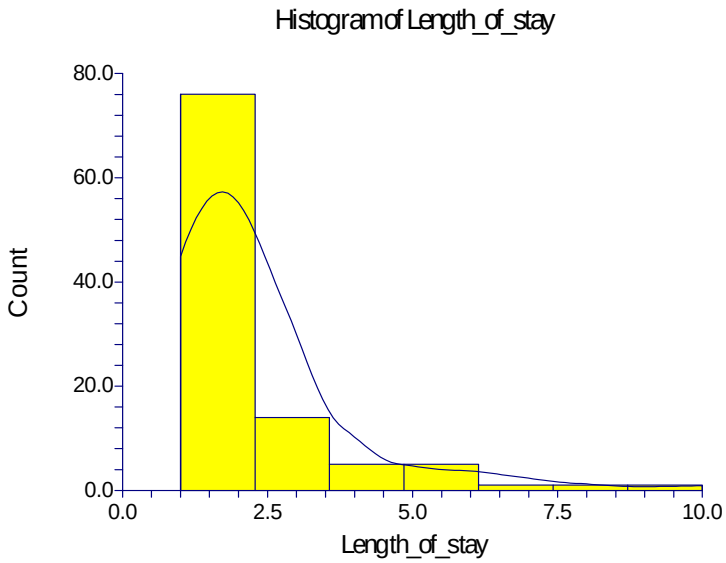


Figure 4.3 Length of stay in days (n=103)

4.5 DETERMINATION OF COSTS

The following section describes the cost of each clinical procedure performed in the Unit.

4.5.1 MATERIAL RESOURCES

The costs of pharmaceuticals and other products per patient are described in Table 4.11.

Table 4.11 Cost of material resources per patient

	Total	**NVD**	**BBA**	**C/S**	**Breech**
Pharmaceuticals cost per patient	R155.51 (R153.86-R217.50)	R159.23 (R155.51-R217.77)	R155.51 (R150.84-R221.09)	R155.51 (R155.51-R155.51)	R127.47
Consumables cost per patient	R1243.30 (R1029.34-R1616.68)	R1212.03 (R1029.34-R1437.41)	R1090.68 (R908.77-R1242.30)	R1616.70 (R1345.77-R1697.38)	R1388.01
Fluids cost per patient	R184.30 (R166.12-R208.43)	R181.14 (R166.12-R207.63)	R194.44 (R177.76-R210.29)	R208.43 (R118.18-R208.43)	R113.30
Total material cost per patient	R1624.21 (R1404.32-R1980.61)	R1606.38 (R1404.32-R1890.02)	R1509.11 (R1300.96-R1609.70)	R1980.64 (R1709.71-R2270.73)	R1628.00

Median (IQR)

The minimum and maximum pharmaceutical costs per patient were R99.43 and R550.00 respectively (Figure 4.4). There was no significant association between the mode of delivery and pharmaceutical costs (One Way Analysis of Variance, $p < 0.87$). The total pharmaceutical costs during this period were R 19,794.43.

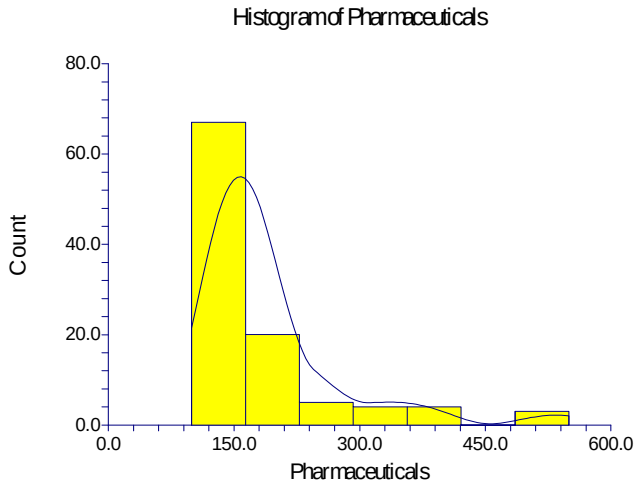


Figure 4.4 Pharmaceutical costs per patient

The minimum and maximum fluid costs were R95.06 and R333.10 per patient respectively (Figure 4.5). There was no significant association between the mode of delivery and pharmaceutical costs per patient (One Way Analysis of Variance, p =0.40). The total Fluid costs during this period were R 18,562.80.

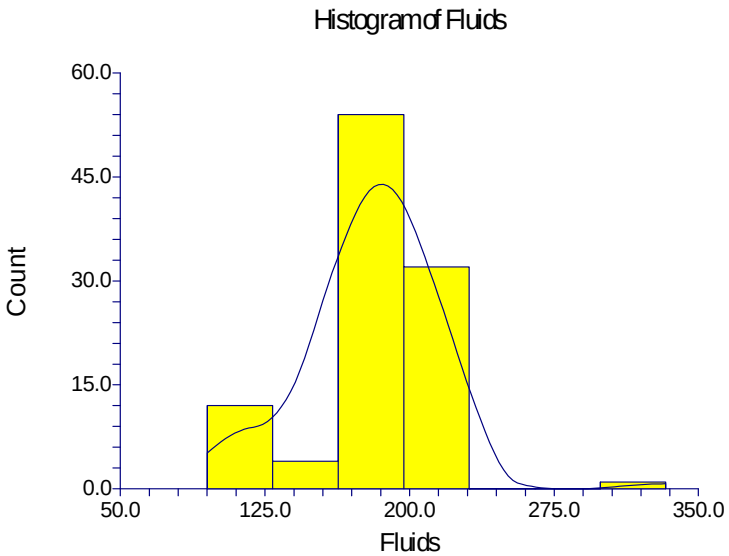


Figure 4.5 Fluid costs per patient

The minimum and maximum consumable costs per patient were R189.21 and R3099.22 respectively (Figure 4.6). There was a significant association between the mode of delivery and consumable costs per patient (One Way Analysis of Variance, p <0.03). The cost of consumable for CS patients was significantly higher than cost of consumable for patients with BBA. The total consumable costs during this period were R 136,792.54.

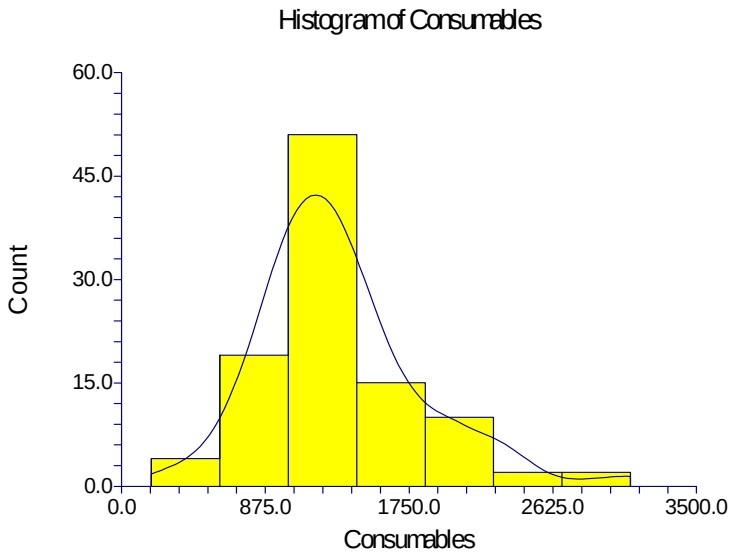


Figure 4.6 Consumable costs

The minimum and maximum material costs per patient were R485.57 and R3368.03 respectively (Figure 4.7). There was a significant association between the mode of delivery and consumable costs (One Way Analysis of Variance, p <0.03). The cost of material costs per patient for CS was significantly higher than material cost per patients for BBA. The total material costs during this period were R 175,149.77.

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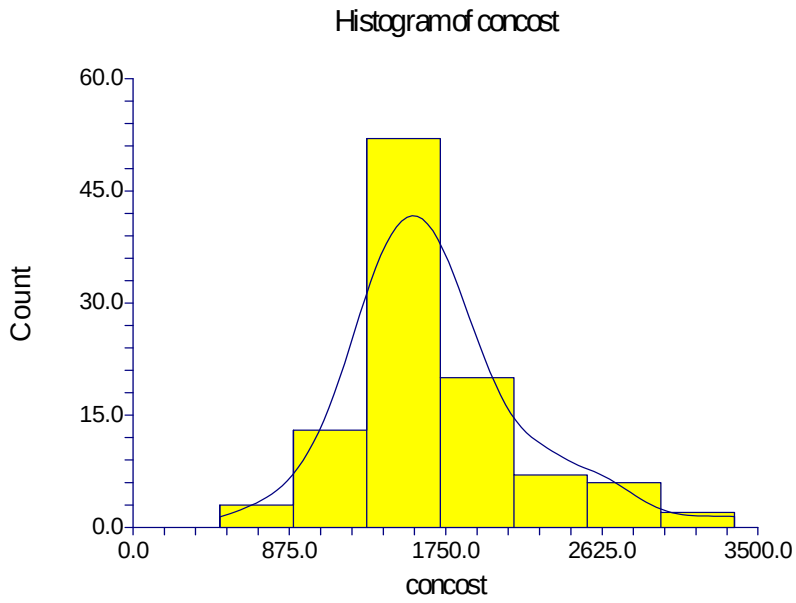


Figure 4.7 Material costs per patient

4.5.2 HUMAN RESOURCES COST

Table 4.12 describes the cost of Human Resources per patient for each procedure.

Table 4.12 Cost of Human resources per patient

Human Resources cost per patient	**Total**	**NVD**	**BBA**	**C/S**	**Breech**
Median and IQR	R2923.65 (R1964.65-R4830.63)	R2936.70 (R1964.80-R5047.20)	R2241.20 (R1457.73-R3791.00)	R4219.27 (R2422.80-R5755.20)	R1993.50

The minimum and maximum human resources costs per patient were R1036.80 and R10881.27 respectively (Figure 4.8). There was no significant association between the mode of delivery and human resources costs per patient (One Way Analysis of Variance, p =0.37). The total human resources costs during this period were R378, 309.80

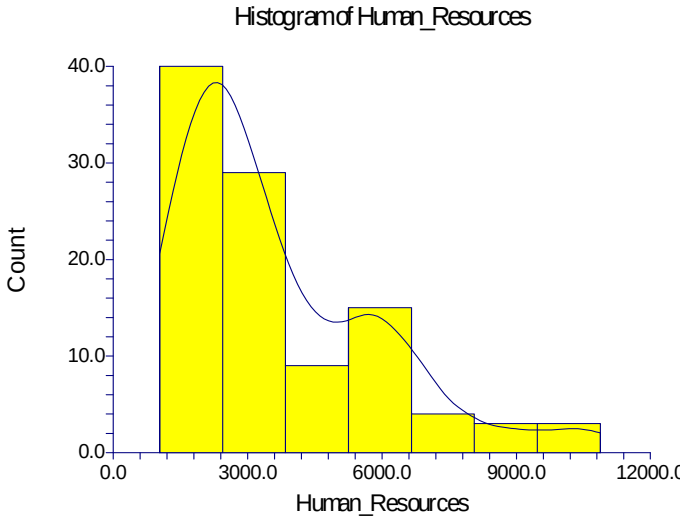


Figure 4.8 Human resources costs

4.5.3 TOTAL COSTS

Table 4.13 describes total cost per patient for each procedure.

Table 4.13 Total costs per patient

Total costs per patient	**Total**	**NVD**	**BBA**	**C/S**	**Breech**
Median and IQR	R2923.65 (R1964.65-R4830.63)	R4789.35 (R3733.70-R6749.62)	R3589.59 (R3412.88-R5389.88)	R6588.52 (R4812.30-R7464.91)	R3622.28

The minimum and maximum total costs per patient were R2382.87 and R12553.16 respectively (Figure 4.9). There was no significant association between the mode of delivery and human resources costs per patient (One Way Analysis of Variance, p =0.22). The total costs during this period were R553, 459.57

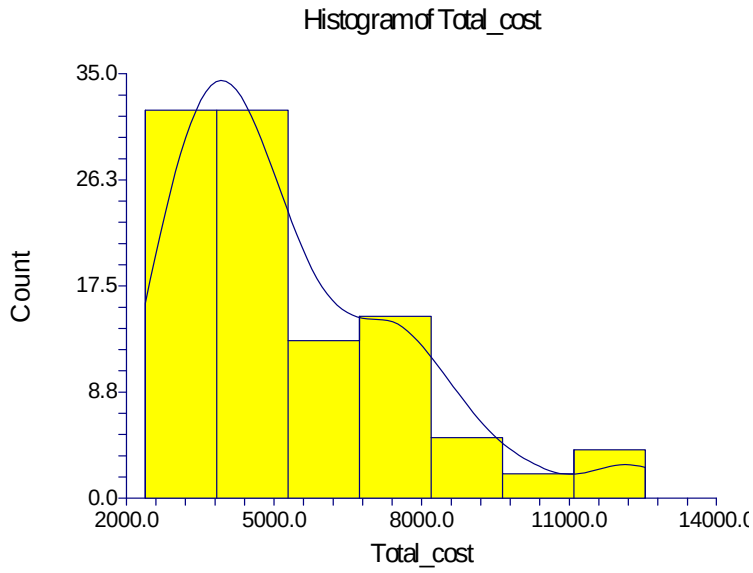


Figure 4.9 Total costs per patient

CHAPTER 5
DISCUSSION

This chapter refers to the analysis of the results presented in chapter four of this mini-dissertation. The results are interpreted and the findings highlighted in this chapter.

5.1 INTRODUCTION

This study was the first scientific evaluation of clinical procedures performed at a district hospital in the Free State Province. The study collected information all the patients during September 2009 who had clinical procedures at the Maternity Unit of the Thebe District Hospital.

5.2 DESCRIPTION OF THE PROCEDURES PERFORMED AT THE MATERNITY WARD

The findings of the study are that the NVD was the most used procedure followed by BBA's, caesarean section and breech presentation. These findings are similar to the study by Broomberg and Rees, 1993, conducted at Diepkloof community health centre in South Africa. In the same study it was reported that NVD accounted for 57%, 3% was BBA's and the rest of the cases were referred to Chris Hani Baragwanath Hospital. However, the rate of NVD in my study was slightly more accounting for 75 % of the procedures performed. The results depict a substantial number of women delivering through normal means which signifies a good amount of healthier women status in the area served by the hospital. The antenatal care delivered at the clinics and community health centres in the area can also be given credit for the services they are rendering.

However, the large number of BBA's standing at (13%) compared to the 3% rate of BBA's at Diepkloof community health centre was of concern. The findings may

probably as a result of the urban versus rural settings, antenatal services not being accessed by all communities in the areas served by Thebe hospital. Further study is required to interview these women to identify factors associated with the high rate of BBA. Only one breech was delivered during the study period and no instrumental deliveries were done. The result may be a reflection of the ability of personnel to provide quality services for management of maternity procedures at Thebe District hospital.

In addition to the routine procedures, additional procedures performed on specific women in order to complete the process of delivery. Episiotomy was performed on 40 patients who delivered vaginally including one who had a breech delivery. Repair of perineal tear were performed for 18 cases. Both cases of the 1st and 2nd degree tears normally depend on the condition that the patient presents with during labour, and the size and the position of the baby's head. These patients should have episiotomies to avoid perineal tear. Thirty five percent (5) patients with BBA had perineal tear. This danger should form part of health promotion activities to reduce perineal tear. The long term consequence of perineal tear would require further study. The cost implications of these additional procedures were not documented and a separate study might be useful to calculate inherent cost of the additional NVD procedures.

The CS rate at the unit (11%) was within the prescribed Free State Provincial norms and similar to the rate found in other studies (Matshidze, et al., 1998). Although there are clear indications of C/S as outlined in the literature review such as placenta praevia, HIV infection, contracted pelvis, and, arguably breech presentation or previous C/S, there are other factors such as patient's preference might also plays an important role like reported in other studies (House of Commons Health Committee, 2003).

5.3 SOCIO-DEMOGRAPHIC PROFILE

The demographic profile of each patient has been compiled as part of determination of the factors that influence reasons for the procedure performed and the choice thereof.

AGE

The majority of them (47%) were between 20 and 25 years of age. There were eighteen (17%) teenagers (below 19 years of age). The majority of them delivered normally and two of them require CS. In addition, two of them delivered at home. Majority of the patients that delivered during the study period we of normal child bearing age and are in line with the rest of the South African and international norms.

ETHNICITY

The population served by the Hospital is predominantly black who accounted for 97% of the patients in this study. The ethnicity reflects the general ethnic distribution according to the demographics of this area. There was no significant association between ethnicity and mode of delivery.

SOCIO-ECONOMIC CONDITIONS

Depicting the link to poverty gaps of the catchments populations, as all of them in the sample did not have access to medical aids and this can equally be linked to the mode of transport used to reach the Hospital resulting in BBA. Most of the patients were either unemployed or scholars. The South African public health facilities are mainly used by the unemployed and uninsured population. The findings of this study are consistent with this trend.

5.4 MODE OF TRANSPORT

Out of the total number of born before arrivals a considerable number of patients (29%) utilised their own transport, the majority depended on the ambulances to transport them to the hospital when they were in labour. There may be other factors such as poor ANC attendance, cultural issues and public transport infrastructure which impacts on the rate of BBA's especially for the patients that used their own transport. It is possible that ambulances too delayed to respond or, that women themselves delayed to call the ambulance or even, delayed to organise own transport to the Hospital. These delays might be the underlying reason for BBA. This clearly reflects the need for more Midwifery Obstetrics units within the primary health care setting in the catchment's area as most of the deliveries were normal and believed to be self-referrals either through own transport or an ambulance. The Hospital is the only facility within the area with a maternity unit and therefore all the deliveries happen there. This results in increase workload of the staff and inefficient utilization of resources. According to the findings the caesarean section rate is very good at 11% as it suggests that only those cases that deserved the procedure were considered.

5.5 CLINICAL PROFILE

The majority of the patients were admitted with labour pain 85 (82.5%), as expected in a Maternity unit. Most of the patients delivered at term 99 (96.1%), which is probably due to good antenatal care provided in this area. There were no maternal and perinatal mortality and morbidity during the study period, indicating good quality of services offered at this Unit.

5.6 RESOURCE UTILIZATION

The costs of the clinical procedures in this hospital were never documented before. Therefore, the resource allocation was not informed by any scientific way

rather based on the historic trends of allocating the resources. Over and above, the Unit was not treated as a cost centre on its own. This kind of practice probably resulted in the gross misallocation to the Unit resulting in sub-optimal functioning.

The main material costs per patient were related to the consumables (R1243.30) followed by Pharmaceuticals R155.51 and Fluids (R184.30). The Human resources was the main cost driver (median cost, R2923.65). The median total cost per patient for clinical procedures were R2923.65. Per patient cost of CS (R6588.52) was more than NVD (R4789.35) and BBA (R3589.59). This is understandable as C/Ss are procedures done in theatre and consumes more time, drugs, fluids and consumables. However, the lack of differences in material costs per patient between BBA and NVD is surprising. It would be expected the cost per BBA patient would be lower in comparison to the patient with NVD.

The calculated cost for this study was far lower than the costs prescribed in NHRPL for NVD (R 7,566) and CS (R10,639) and slightly higher than the UPFS for NVD (R4100) and CS (R5618). However, the cost of NVD in this study was significantly higher than the study conducted in a community health centre in Soweto R 228.24) (Broomberg, et al, 1993), even after adjusting for inflation. This study also highlighted the low tariffs charged under the UPFS.

Table 5.1 Comparative costs for NVD and CS

	NHRPL	UPFS	This study
NVD	R 7566	R4100	R6588.52
CS	R10639	R5618	R4789.35

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

In this chapter, the results are assessed in relation to the aim of the study, so that appropriate conclusions can be drawn. The limitations of the study are also articulated. Appropriate recommendations are made within the context of the findings of the study. Finally, suggestions for further research are presented.

6.1 CONCLUSIONS RELATED TO THE AIM OF THE STUDY

This was a descriptive study outlining the clinical procedures performed at the maternity unit of Thebe District Hospital in the Free State Province. Attempts were also made to determine the costs of these procedures based on direct costing method.

6.1.1 DESCRIPTION OF CLINICAL PROCEDURES

The findings of the study showed that the NVD was the main clinical procedures performed at the maternity unit of this Hospital, which is in line with the district hospital package for the procedures to be performed at the maternity unit of a district hospital; whereby only less complicated deliveries can be done and only serious complications referred to secondary hospitals. A large number of BBA was found in this study, which is of concern.

6.1.2 PROFILE OF PATIENTS

The majority of the patients who delivered at this unit are black, unemployed and had no medical aid. Most of them were in childbearing age, although there were large number were teenagers.

Most of them were brought by ambulance. However, it was not clear whether the patients who were brought by ambulance were coming directly from home or were referred by PHC clinics and CHCs.

The majority of the patients were admitted with Labour pain 85 (82.5%), as expected in a Maternity unit. Most of the patients delivered at term 99 (96.1%), which is probably due to good antenatal care provided in this area. There were no maternal and perinatal mortality and morbidity during the study period, indicating good quality of services offered at this Unit.

6.1.3 RESOURCE UTILIZATION

This study documented the direct cost of clinical procedures performed at a district hospital. The Human resources was the main cost driver. The main material costs were related to the consumables followed by Pharmaceuticals and Fluids. The CS (R6588.52) costs more than NVD (R4789.35) and BBA (R3589.59). This is understandable as C/Ss are procedures done in theatre and consumes more time, drugs, fluids and consumables. The calculated cost for this study was far lower than the costs prescribed in NHRPL for NVD and CS but higher than UPFS. This study highlighted the need for revising the UPFS.

6.2 LIMITATION OF THE STUDY

The study may have the following limitations:

- The data used is only for one month and may not reflect the situation for other months
- Unlike qualitative studies descriptive studies by their own nature do not seek to provide more information
- The incomplete patient records may have affected the quality of data collected
- Use of limited variables to do the cost calculations for the study

- Maternity services are a free service at public hospitals and therefore never costed before. Therefore, no comparative information is available from other health facilities.

6.3 RECOMMENDATIONS

The recommendations below are informed by the findings of the study. These were drawn by the researcher after a thorough analysis of the results.

6.3.1 USE OF FINDINGS OF THE STUDY

It is hoped that the Free State Department of health will use the findings of the study to allocate resources especially the budgets as part of their endeavour to strengthen maternity services as part of its initiative to improve maternal health services. The Free State Department of Health must develop plans on how to reach out to all the communities in the drainage area of their hospitals. Establishment of MOU's in their PHC settings to improve on the quality of maternity services rendered and possibly reduce the morbidity, maternal and child mortality.

6.3.2 EXPANSION OF THE STUDY TO OTHER HOSPITALS

It is recommend that similar studies be conducted in other district hospitals in the Free State and other provinces as there maybe differences on the kind of procedures performed based on the practices, needs and the circumstances in each area.

6.3.3 FURTHER RESEARCH

The researcher would like to suggest following study based on the findings of the study:

- A detailed costing study to include both direct and indirect costs for clinical procedures in the public hospitals.
- A qualitative study to develop an understanding about the factors, which might be associated with BBA.

6.4 SUMMARY AND CONCLUSION

This was the first study on clinical procedures performed in the maternity unit in a public hospital in Free State Province and possibly in South Africa. Few studies were done but not in this Province and more studies are still needed to explore this topic.

The study found that NVD was the main clinical procedures, which is in line with the district hospital package. The CS rate was within acceptable norm but a significant number of BBA is of concern and would require further exploration. The majority of the patients who delivered at this unit are black, unemployed and had no medical aid. Most of them arrived by ambulance although it was not clear whether these patients were coming directly from home or were referred by PHC clinics and CHCs. There were no maternal and perinatal mortality and morbidity during the study period. .

This study documented the direct cost of clinical procedures performed at a district hospital. The Human resources was the main cost driver. The calculated cost for this study was far lower than the costs prescribed in the NHRPL for NVD and CS but higher than the UPFS. This study highlighted the need for revising the UPFS. This research found conclusive evidence that is useful in determining the costs of clinical procedures performed in the maternity ward of a district

hospital. It has provided reasonable indications about the costs of each procedure and evidence can be used to determine the costs of each procedure in various district hospitals in the country and worldwide. It can further be utilised to do proper planning for our district hospitals in the province and develop the scientific criteria for resource allocation.

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APPENDICES

APPENDIX A:
ETHICS CLEARANCE CERTIFICATE AND LETTERS OF PERMISSION

APPENDIX B: DATA COLLECTION SHEET