

**FACTORS THAT CONTRIBUTE TO CURRENT CAESAREAN SECTION  
RATES IN SELECTED HOSPITALS IN NAIROBI, KENYA**

**BY**

**WANJOHI, GRACE WANGU**

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## DECLARATION

### Declaration by the Candidate

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**Wanjohi Grace Wangu**  
**SPH/PGH/1012/08**

### Declaration by Supervisors

This thesis has been submitted to the University for Examination with our approval as Moi University Supervisors.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**DR. SARAH ONYANGO,**  
Sexual and Reproductive Health Specialist,  
**NAIROBI-KENYA.**

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**DR. ALICE.S. LAKATI**  
Senior Lecturer,  
AMREF International University,  
**NAIROBI-KENYA.**

## ABSTRACT

**Background:** Over the past three decades, there has been a sustained increase in caesarean section rates around the world despite the fact that the World Health Organization has indicated that there is no justification for any region to have a caesarean section rate higher than 15% and amidst concerns of unfavorable perinatal and postnatal outcomes associated with caesarean section deliveries.

**Objective:** To assess the factors that contribute to the caesarean section rates in hospitals in Nairobi.

**Methods:** This was a cross-sectional survey in which all the women who delivered during the data collection period in three selected maternity units (Nairobi Women's Hospital, St. Mary's Mission Hospital and Pumwani Maternity Hospital) were requested to participate. A total of 513 pregnant women consented and were interviewed. The facilities were selected based on the National Hospital Insurance Fund (NHIF) categorization of hospitals in Kenya as: Category A (Government hospitals), Category B (Private and Mission) and Category C (Private).

A questionnaire was used to interview the women while medical charts were used to establish hospital days. Data was analyzed using the SPSS computer software. Descriptive statistics was done on all variables. Bivariate and multivariate analysis were performed to determine the factors that contribute to caesarean-section rates.

### **Study Findings.**

The mean age of the women was 26.5 years (SD±4.9). Significant associations were shown between age of the women and caesarean section rates ( $\chi^2=15.534, p=0.0001$ ), facility type (as defined by the NHIF categorization) and caesarean section rate ( $\chi^2=10.20, p=0.006$ ), previous caesarean section and caesarean section rate ( $\chi^2=274.3, p<0.001$ ), birth order and caesarean section rate ( $\chi^2=15.386, p=0.000$ ), age and type of section ( $\chi^2=8.29, p=0.04$ ) and employment status and type of section ( $\chi^2=10.4, p=0.006$ ). The recorded caesarean rates were: Private hospital 44%, Mission/Private hospital 25% and Public hospital 29%, Emergency caesarean section 20% and elective caesarean sections 10%. The most common indication for emergency caesarean section was fetal distress and that for elective caesarean section was a previous scar.

**Conclusion & Recommendations:** Factors that contribute to caesarean section rates are age, facility type, previous caesarean section and birth order.

The rates observed are higher than the World Health Organization recommendations of 5% to 15%. This study also concludes that it may be had to define an umbrella optimal CS rate for health institutions and thus recommends that such rates should be contextualized.

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**ABBREVIATIONS/ ACRONYMS**

AKUH	Aga Khan University Hospital
CD-	Caesarian Delivery
CS -	Caesarean Section
CSR-	Caesarean Section Rate
CDMR-	Caesarean Delivery on Maternal Request
DOA -	Date of Admission
DOD -	Date of Discharge
HIV -	Human Immunodeficiency Virus
NCC-	Nairobi City Council
NHIF-	National Hospital Insurance Fund
PTSD -	Post Traumatic Stress Disorder
TOL -	Trial of Labour
VBAC -	Vaginal Birth after Caesarean
VD -	Vaginal Delivery
WHO -	World Health Organization
PMTCT -	Prevention of Mother to Child Transmission

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## CHAPTER ONE

### INTRODUCTION

#### 1.0 Background Information

A caesarean section (CS) or C-section is a form of childbirth in which a surgical incision is made through a pregnant woman's abdomen and uterus to deliver one or more babies. It is usually performed when a vaginal delivery would put the baby's or mother's life or health at risk, although in recent times it has been performed upon request for births that would otherwise have been normal (smn.com.au). Depending on the indications for the section, there are two forms of caesarean sections. An elective caesarean section refers to a CS that is performed on a pregnant woman on the basis of an obstetrical or medical indication or at the request of the pregnant woman. The elective CS is therefore a "planned CS" (NIH, 2006). In contrast, a CS done during labour is termed as an emergency CS (NIH, 2006). Caesarean delivery on maternal request (CDMR) is a form of elective caesarean section where the conduct of childbirth via a CS is indicated not by a medical necessity or obstetrical indication but specifically the request of the pregnant woman (NIH, 2006). A Spontaneous Vaginal Delivery (SVD) on the other hand is defined as spontaneous in onset, low risk at the start of labour and remaining so throughout labour and delivery. The infant is born spontaneously in the vertex position between 37 and 42 completed weeks of pregnancy.

Over the past 25 years, there has been a sustained increase in CS rates around the world, with massive public interest and debate on both the causes and the appropriateness of this increase. (Konstantinus et al., 2008).

The World Health Organization (WHO) published guidelines in 1985 stating that caesarean section rates (CSR) should not exceed 15 percent, based on data from

developed countries suggesting that no additional benefits accrues to the perinates or the mothers when rates exceed this level(Cynthia and Sara, 2006). In 1994 WHO, published revised guidelines stating that CS rates should range between 5 and 15 percent, adding that rates lower than 5 percent can reflect women's lack of access to life saving care (Cynthia and Sara, 2006). The CS rate has increased in the USA from 20.7% in 1996 to 29.1 in 2004 and in England and Wales from 16% in 1995 to 21.5% in 2000. The trend is similar in less developed countries (Konstantinus et al.,2008). Multiple factors are thought to have contributed to the rise in CS rates including nutritional factors. Nutrition and lifestyle are known to be a cause of lifestyle diseases such as hypertension and diabetes which are maternal conditions that may necessitate a caesarean section. Increasing rates of induction of labour, increasing use of electronic fetal heart rate monitoring: fetal distress during labour a condition often resulting in a CS is more apt to be detected with the introduction of electric fetal monitors, provider and patient perception of the safety of CS versus the risks associated with instrumental vaginal delivery, defensive obstetric practice, patient demand and demographic factors such as age, social economic advantages, parity and ethnicity(O'Leary et al., 2007)

The results of a study conducted in Western Australia for the years 1984 – 2003 showed that maternal age influenced the mode of delivery. The rate of SVD increased in women younger than 25 years and decreased in women older than 30 years and there was a decrease in instrumental vaginal delivery for women in all age groups. The most marked changes in CS occurred in older women, with the proportion of elective CS doubling for women aged 30-39 years and increasing by 80% for women 40 years and older. The increase in elective CS was largest in women of low parity while there was a clear widening disparity between rates of elective CS in different social-economic groups. Women in advantaged socio-economic groups were three times more likely to

have an elective CS in 1990 – 2003 than in 1984 – 1988(O’Leary et al 2007). Although there have been improvements in surgical and anaesthetic techniques for CS over the past 30 years (resulting in a reduced risk of post-operative complications), CS is still associated with an increased risk of maternal mortality (O’Leary et al 2007) and morbidity (Turner et al.,2008).

In a study in which researchers analyzed data from a North Carolina maternal mortality surveillance system, univariate logistic regression confirmed that the likelihood of pregnancy related death was associated with having had a CS rather than a vaginal birth (unadjusted odds ratio 5.6) and after adjustment for confounding factors (eclampsia, pregnancy induced hypertension, heart disease, diabetes, old age and preterm birth), the odds of pregnancy related death remained significantly higher among women who had a caesarean section than women who had delivered vaginally (odds ratio, 3.9).

Overall, the rates of mortality attributable to pregnancy were approximately 36 per 100,000 caesarean section and 9 (nine) per 100,000 vaginal deliveries. Therefore it is estimated that caesarean section quadruple a woman’s risk of pregnancy related death (Lane, 2004).

The morbidity rates associated with CS are higher than with Vaginal Delivery (VD) because major surgery is involved, the chance of infection and complication is greater. The most common are endometritis, urinary tract and incision infections. Years after the publication of WHO guidelines, no consensus exists about optimal CSR (Cynthia and Sara, 2006) but obstetricians in many countries believe that the rates are too high and that the recent rise is not entirely justifiable on medical grounds alone (Pascal and Beatrice, 2001).

## 1.1 Problem Statement

Increasing rates of caesarean sections are a continuing concern for the obstetric and public health communities (Turner et al., 2008). Rates are higher in developed countries and in Latin America and the Caribbean but lower in other developing countries (Ana et al., 2007). The WHO states that there is no justification for any region to have a CS rate higher than 15%, signifying a serious case for concern in the majority of countries (Konstantinus et al., 2008). Caesarean sections performed appropriately and following an appropriate medical indication are potentially lifesaving procedures (Souza et al., 2010) and though it might be impossible to define an ideal caesarean section rate, obstetricians in many countries believe that the rates are too high and the recent rise is not entirely justifiable on medical grounds alone (Moffat et al., 2007).

Although there have been improvements in surgical and anaesthetic techniques for caesarean section over the past 30 years (resulting in a reduced risk of post-operative complications)(O Leary et al., 2007), caesarean section is still associated with an increased risk of maternal death when compared to vaginal deliveries(O Leary et al 2007).Indeed many studies(O Leary et al., 2007; Lane, 2004) have shown that a higher caesarean delivery rate is not necessarily associated with better perinatal outcomes and has even been associated with increased risk of fetal and neonatal mortality and neonatal morbidity, compared with spontaneous vaginal delivery(O Leary et al.,2007). Furthermore the risks of severe maternal morbidity and mortality associated with caesarean delivery are higher than those associated with vaginal delivery even after adjustment for risk factors (O Leary et al.,2007).

The public health concern is why there should be this upward trend in caesarean section rates with the additional risks and higher costs associated with this operation especially when there is no clear medical indication.

## **1.2 Study Justification**

In many developed countries, caesarean section rates have increased and attention has focused on strategies to reduce use due to concern that higher caesarean section rates do not confer additional health gain but may increase maternal risks, have implications for future pregnancies and have resource implications for health services. In developing countries on the other hand, lack of availability of or access to maternal health services and the corresponding underuse of caesarean section are part of a web of factors predisposing to high perinatal mortality (Ana et al.,2007).

This study will seek to establish the current caesarean section rates in selected hospitals in Nairobi, Kenya and the factors contributing to the observed rates.

This information may aid in informing both the design and implementation of appropriate local/facility-based and even national policies on this important aspect of maternal and child health.

## **1.3 Objectives**

### **1.3.1 Broad Study Objective**

What are the factors that contribute to the current caesarean section rates in selected hospitals in Nairobi, Kenya?

### **1.3.2 Specific Objectives**

1. What are the caesarean section rates of the selected maternity units?
2. What are the indications for elective and emergency caesarean sections?

3. What are the socio-demographic characteristics of women having caesarean section?
4. What is the relationship between the socio-demographic characteristics and caesarean section rates?
5. Is there a relationship between the socio-demographic characteristics and elective, emergency CS delivery and CDMR?



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Global Caesarean Section Rates and Trends

Caesarean section rates are higher in developed countries and in Latin America and the Caribbean but lower in other developing countries. The average rate of CS deliveries according to a study published in 2007 was 19% in Europe with highest rates in Italy (36%) and Portugal (30.2%) and lowest rates in Serbia and Montenegro 8% and Moldova 6.2%(Ana et al.,2007). In this study the average caesarean section rate in Asia was found to be 15.9%, China, Hong Kong and Lebanon presented the highest caesarean section rates in Asia with estimates of 40.5%, 27.4% and 23.3% respectively. Nepal and Cambodia's rate were lowest 1% followed by Yemen 1.5%. The region Latin America and Caribbean showed an average rate of 29.2% with national rates ranging from 1.7% in Haiti 39.1%, 36.7%, 31.3% and 30.7% in Mexico, Brazil, the Dominican Republic of Chile respectively (Ana et al.,2007). The average rate of caesarean section deliveries in Africa was recorded at 3.5% with the highest rates in South Africa (15.4%), Egypt (11.4%) and Tunisia 8%. Chad 0.4%, Madagascar, Niger and Ethiopia 0.6% show the lowest caesarean section rates in the world. Central African Republic, Burkina Faso, Mali and Nigeria all show rates below 2%.

A study in which demographic and health surveys performed at two different times in eight sub-Saharan countries were analyzed revealed that caesarean section rates were lower than 5% in all countries except Kenya (5.4% in 1993 and 6.7% in 1998) and that the rates were lower than 2% in Burkina Faso, Madagascar, Niger and Zambia (Pierre et al.,2003).

The results from this study are summarized in the table below:

**Table 1: Single live births by caesarean section in sub-Saharan Africa Countries in the three years before health survey, by place of mother's residence**

% (No) of births by caesarean section *				
Country	Year of Survey	Total	Rural areas	Urban areas
Burkina Faso	1992	1.1 (3612)	0.5 (3095)	4.7 (517)
	1999	1.1 (3534)	1.0 (3164)	2.5 (370)
Cameroon	1991	2.3 (2036)	1.7 (1238)	3.3 (798)
	1998	2.6 (2275)	2.3 (1665)	3.3 (610)
Ghana	1993	4.4 (2029)	2.9 (1468)	8.4 (561)
	1998	4.1 (1865)	2.8 (1400)	8.0 (465)
Kenya	1993	5.4 (3537)	4.1 (3086)	13.9 (451)
	1998	6.7 (3257)	5.7 (2653)	11.1 (604)
Madagascar	1992	0.9 (3467)	0.8 (3026)	1.5 (441)
	1997	0.7 (3727)	0.3 (3002)	2.3 (725)
Niger	1992	0.8 (4143)	0.6 (3490)	2.1 (653)
	1998	0.6 (4722)	0.3 (3977)	2.1 (745)
Tanzania	1992	2.6 (4935)	2.1 (3881)	4.6 (1055)
	1996	2.2 (4035)	1.5 (3304)	5.0 (731)
Zambia	1992	2.6 (3851)	1.4 (2043)	4.0 (1808)
	1996	1.6 (4331)	0.8 (2661)	3.0 (1670)

In countries designated by the United Nations as least developed, uniformly low caesarean section rates and high levels of maternal, infant and neonatal mortality are observed. In these 49 countries (34 of which are in Africa) the average CS rate is only 2% indicating a clear need to improve access to surgical obstetric care (Ana et al.,2007).

In Ghana, a publication of the WHO department of making pregnancy safer indicated that in 2003 3.7% of births were delivered through caesarean section. A substantial difference in accessing the caesarean section between urban and rural areas was observed. At sub-regional level, data in 2003 indicates that the caesarean section ranged from a low of 0.3% in upper east to a high of 13% in the capital city (WHO,2003). In a similar publication for Kenya data in 2003 indicated that 4% of births were delivered by caesarean section (WHO, 2003). In two surveys the caesarean section rate was highest in urban areas than their rural counterparts. At provincial level, the survey in 2003 showed that the rate ranged from a high of 10% in Nairobi to a low of 1.9% in Nyanza Kenya (WHO,2003).

The caesarean section rates have shown a sustained increase around the world over the past 25 years. The CS rate increased in the USA from 20.7% in 1996 to 29.1% in 2004 and in England and Wales from 16% in 1995 to 21.5% in 2000 (Konstantinus et al.,2008). In France the CSR rose from 6.1% in 1972 to 10.8% in 1981 and 15.5% in 1995 (Pascal and Beatrice,2001). In a study data was identified for 36 countries representing about 45% of the births in the developing world in the year 2000. This study showed that the national CS rate in Kenya dropped from 5.4% in 1991 to 4.1% in 1998. A study in the Aga Khan University Hospital, Nairobi showed an overall caesarean section rate of 20.4% in 1996, 25.9% in 2001 and 38.1% in 2004 in this facility (Wanyonyi et al.,2006).

## **2.2 Reasons for Caesarean Section Rates Increase**

Recent decades have seen major changes in mode of delivery in developed countries, with rates of caesarean section rising from 5% in the 1970s to more than 50% in some countries in the late 1990s. Multiple factors are thought to have contributed to the rise

in CSR including increasing rates of induction of labour, increasing use of electronic fetal heart monitoring, provider and patient perception of the safety of caesarean section versus the risks associated with instrumental vaginal delivery, defensive obstetric practice and patient demand(O'Leary et al.,2007).

### **2.3 Safety of Caesarean Delivery**

One factor that has favoured the liberalization of CS in clinical practice has been the perception of CS as a generally safe procedure despite the increased costs associated with it (Souza et al., 2010).

### **2.4 Caesarean Delivery on Maternal Request**

Caesarean section performed at patient request in the absence of a medical indication is a focus of considerable attention both for clinical and ethical reasons (Habiba et al., 2006). There are indications that maternal request is becoming increasingly relevant in situations where medical justification may not in itself be sufficient to recommend a caesarean delivery (Habiba et al., 2006). Worldwide, patient charters and rights groups have increasingly drawn attention to issues of informed consent and patient choice dominating the choice of delivery mode. In the United Kingdom (UK), the patient's charter and changing childbirth document stated that it was acceptable for a woman to request a caesarean delivery rather than vaginal delivery, even in the absence of absolute clinical indications (Julia et al.,1996). In Italy law must respect a woman's choice about her mode of delivery and as a result 4% of all women with uncomplicated pregnancies choose to deliver by elective caesarean section (Julia et al.,1996). The reported rates of Caesarean Delivery on Maternal Request (CDMR) range from 2.6% in Flanders to 26.8% in Western Australia (Habiba et al.,2006). In a Norwegian study, researchers found that 7.6% of caesarean section was made on maternal request

(Wiklund et al.,2008). Several studies suggest that 7% of women who have a caesarean section may have requested for it and this percentage is likely to be higher for women with a previous caesarean section (Moffat et al.,2007). Indeed, repeat caesarean deliveries are often cited as a major driver of overall CS trend and have been the subject of much investigation and debate (Konstantinus et al.,2008).

Repeat elective caesarean section is considered the most significant factor influencing Scottish caesarean section rates (Moffat et al.,2007). Between 60 and 93% of women undergoing Trial of Labour (TOL) in Britain and the USA succeed in giving birth vaginally. An expert advising group advocates that clinicians and women consider a TOL as the preferred option following one previous caesarean section (Moffat et al.,2007). There is now considerable evidence that a TOL after a single caesarean section is a safe option and should be preferred in the absence of specific contraindications. The risk of lower uterine segment rupture is estimated at 0.5% but rises to 1.5% after 2 or more caesarean section. To some women, these risks may not be acceptable (Julia et al.,1996). Another factor is the fear of failure. Despite the fact that approximately 75% of women achieve a vaginal birth after a single caesarean section delivery 56% of women in a survey cited the fear of undergoing an emergency caesarean section after enduring a long labour as their primary reason for requesting elective caesarean section delivery in this setting (Julia et al.,1996). One study suggested that 60% of women having repeat caesarean section may be unaware of alternative delivery options. (Moffat et al.,2007)

## **2.5 Fear of Childbirth**

It has been estimated that 6-10% of all pregnant women suffer from severe fear of childbirth (Roune et al.,2009). Fear of childbirth often lies behind the mother's request

for caesarean section and could if untreated lead to unnecessary caesarean section without medical indication. The reasons mentioned for fear of childbirth are fear of pain, of pelvic floor injuries, of losing the baby, of losing one's own life, of losing self-control and of being left without assistance during labour (Wiklund et al.,2008).

First time mothers requesting a caesarean section are of special interest since they have no experience of childbirth. Reasons for childbirth fear in this group could be a history of abuse or stories of complicated deliveries among female relatives and friends (Wiklund et al.,2008). These nulliparous women fear the unknown, pain and loss of control (Roune et al., 2009). In parous women fear arises from previous experiences. Studies have shown that emergency caesarean section, vacuum extraction and untreated or unbearable pain during labour can lead to Post Traumatic Stress Disorder (PTSD) and fear of childbirth in subsequent pregnancies (Roune et al.,2009).

## **2.6 The Physician Factor**

Several studies have highlighted the importance of the physician factor in the caesarean section decision and have shown that there is wide variation in the caesarean delivery rate among obstetricians independent of maternal and infant risk factors (Konstantinus et al., 2008).Physicians' attitudes can significantly influence or motivate patient's choice, a point which acquires prominence in the light of the evidence that a significant proportion of obstetricians in USA (46%) and of female obstetricians in London (31%) would favour a caesarean section for themselves or for their partners in an uncomplicated pregnancy(Habiba et al.,2006). Yet this view was shared by only 16% Scottish female obstetricians, 15% of female UK trainees, 2% of Norwegian and Flemish obstetricians and by only 1.4% of those in Netherlands (Habiba et al.,2006). That a proportion of obstetricians would prefer a caesarean section for themselves or

for their partner may reflect their perception of its overall safety or other advantages compared with vaginal delivery (Habiba et al.,2006).

There is also an evidence of an increased willingness of obstetricians to accept their patients' request for caesarean delivery in the absence of 'mitigating' circumstances (Habiba et al.,2006). In addition, there may be medical legal implications for the obstetrician involved (Turner et al.,2008) and consequently physicians have indicated that they would carry out a caesarean section in the absence of a medical indication for fear of litigation (Habiba et al.,2006).

When surveyed, 69% of consultant obstetricians in England and Wales indicated that they would perform an elective caesarean section on maternal request due to fear of litigation and pressure from the patients and approximately 50% of obstetricians in Israel were willing to perform a caesarean section on request in support of patient's autonomy (Habiba et al.,2006).However, compliance with patient's request for caesarean delivery has been criticized as the easy short cut, which exempts physicians from dealing with the anxiety associated with childbirth and providing proper counseling and support. Ultimately the 'choice' in favour of caesarean section might be disempowering to women (Habiba et al., 2006).

The physician personal financial incentives may influence the doctor's decision with regards to caesarean section on demand because doctors are paid more when they perform this surgical procedure compared to vaginal delivery (Habiba et al., 2006).

## **2.7 Type of Health Facility and Healthcare Financing**

Comprehensive privatization programs in many countries have not only encouraged a growth in private health insurance but also an increase in the provision of private health care facilities particularly in more lucrative services such as maternity care.

In Chile in 1992, 54,218 births were reported to the Ministry of Health to have occurred in diverse private establishments (Susan et al.,1997). Caesarean section rates in these private facilities tended to be much higher than those in public facilities. More than one-half of the private establishments had caesarean section rates of between 50 and 69.9 percent, and thirteen had rates of over 70 percent (Susan et al.,1997). Chile reported a national caesarean section rate of 37.2 percent in 1994 up from 27.7 percent in 1986 with the rates being 59% in 1994 in women covered by the private insurance schemes and 28.8% for those covered by the National Health Fund sector. This mirrored reported patterns among women with private insurance versus women with public or no insurance in Brazil and in the United States.

This data suggest that funding mechanisms may have a powerful influence on health service outcomes. This may have occurred partly due to the concomitant rise in use of private caregivers. A pregnant woman with private health insurance typically selects her personal obstetrician who sees her in his/her consulting rooms for prenatal care. He/she indicates where he/she works, one of which she selects for birth according to what she can afford whereas those funded by the National Health Fund or have no other funding attends the local health center during her pregnancy and is cared for by the midwifery and medical staff on duty at the local hospital when she goes into labour. A study conducted in the Aga Khan University Hospital, Nairobi showed a caesarean section rate of 27.1% in 1996, 30.8% in 2001 and 41.7% in 2004 among women managed by private obstetricians compared to 14.7%, 21.5% and 34.5% in women who were managed by the hospital staff (Wanyonyi et al.,2006).



The rise in the use of private care practitioners seems to partly explain the mechanisms by which shifts in health care financing may have affected caesarean section rates in many countries (Susan et al.,1997).

## **2.8 Benefits/Indications of Caesarean Section**

Although vaginal delivery is the physiological mode of childbirth it may be associated with significant short- and long-term complications, including neuropraxia of the pudendal nerves and direct trauma to pelvic floor and the anal sphincters (Turner et al.,2008). Pelvic floor injuries may cause pelvic organ prolapse and urinary and anal incontinence. There may be other maternal and neonatal complications associated with VD that can be costly and devastating for the woman and or infant (Turner et al.,2008).

In pregnancies complicated by fetal malpresentation, excessive fetal growth, high order multiple gestation (triplets or higher), fetal structural anomalies such as hydrocephalus, cord prolapse, placental abruption and viral infections (active herpes or infection with human immunodeficiency virus (HIV), caesarean delivery can be a lifesaving intervention for the fetus (Konstantinus et al.,2008). Women with other co-morbidities such as hypertension may benefit from caesarean section delivery(Souza et al.,2010).

Table-2 is a comparative study showing the indication of CS in a major public hospital in Northern Greece the period 2002 – 2006 (Konstantinus et al.,2008).

**Table 2: Indications for caesarean section over study period (2002-2006). Data are absolute numbers (and percentages) (Konstantinus et al.,2008)**

Indication	2002 (n=331)	2003 (n=361)	2004 (n=389)	2005 (n=356)	2006 (n=394)	Overall (n=1831)
Previous caesarean section	74(22.4)	95(26.3)	119(30.6)	147(41.3)	130(33.0)	565(30.9)
Non-reassuring or pathological fetal heart rate trace by cardiotocography	61(18.4)	53(14.7)	44(11.3)	24(6.7)	44(1.2)	226(12.3)
Dystocia	31(9.4)	54(15.0)	43(11.1)	29(8.1)	33(8.4)	190(10.4)
Malpresentation	29(8.8)	29(8.0)	31(8.0)	21(5.9)	32(8.1)	142(7.8)
Cephalopelvic disproportion	13(3.9)	22(6.1)	19(4.9)	22(6.2)	25(6.3)	101(5.5)
Pre-eclampsia/eclampsia	23(6.9)	12(3.3)	24(6.2)	18(5.1)	15(3.8)	92(5.0)
Prematurity	10(3.0)	16(4.4)	19(4.9)	20(5.6)	22(5.6)	87(4.8)
Multiple pregnancy	10(3.0)	15(4.2)	13(3.3)	22(6.2)	19(4.8)	79(4.3)
Intrauterine growth restriction	28(8.5)	10(2.8)	15(3.9)	8(2.2)	13(3.3)	74(4.0)
Placental abruption	9(2.7)	7(1.9)	10(2.6)	4(1.1)	10(2.5)	40(2.2)
Placenta praevia	7(2.1)	7(1.9)	9(2.3)	6(1.7)	9(2.3)	38(2.1)
Diabetes mellitus	6(1.8)	7(1.9)	3(0.8)	6(1.7)	8(2.0)	30(1.6)
Chorioamnionitis	13(3.9)	7(1.9)	2(0.5)	0(0.0)	1(0.3)	23(1.3)
Cord prolapse	2(0.6)	3(0.8)	0(0.0)	4(1.1)	6(1.5)	15(0.8)
Other maternal conditions	10(3.0)	12(3.3)	24(6.2)	16(4.5)	10(2.5)	72(3.9)
Other fetal conditions	1(0.3)	2(0.6)	7(1.8)	3(0.8)	7(1.8)	20(1.1)
Other	4(1.2)	10(2.8)	7(1.8)	6(1.7)	10(2.5)	37(2.0)

## 2.9 Disadvantages of CS

There have been improvements in surgical and anaesthetic techniques for caesarean section over the past 30 years (resulting in a reduced risk of post-operative complications), caesarean section is still associated with an increased risk of maternal death when compared to vaginal deliveries (O’Leary et al.,2007). Data from the 2000-03 *Report of Confidential Enquiries Into Maternal Deaths in the UK* reported a relative

risk of maternal death for caesarean section compared with vaginal deliveries of 2.8 (95% CI 1.9-4.4). Further although limited data from developed countries suggests improved perinatal outcomes associated with higher caesarean section rates, recent institution - level data from Latin America found overall and elective caesarean section rates to be positively associated with severe maternal morbidity and possibly mortality, as well as with fetal mortality and newborn morbidity (O'Leary et al.,2007). These data illustrate how a medical intervention that is effective when applied to an appropriately selected case can have significant adverse effects when applied in a low risk population (O'Leary et al.,2007). Women who have had a previous caesarean delivery have increased risks of uterine rupture, placenta praevia, placenta accreta and placental abruption in their next pregnancies (Konstantinus et al.,2008). The relationship between number of previous caesarean sections and the increased risk of placenta praevia-accreta has increased tenfold over the last 50 years which is thought to be related to the increasing caesarean section rates. Placenta accreta is associated with significant maternal morbidity including post-partum haemorrhage and peripartum hysterectomy (Pare et al.,2006). Caesarean birth has also been associated with increased risks of ectopic pregnancy, spontaneous abortion, preterm delivery, low birth weight, stillbirth and neonatal death in subsequent pregnancies (Konstantinus et al.,2008).

A caesarean section seems to be consistently more costly than a vaginal delivery across countries. According to International Foundation of Health Plans (2010) total average payments for vaginal births in the United States are \$ 8,435 whereas those for caesarean births are \$ 13,016. Similarly, in Switzerland, the total average payments for caesarean births are \$ 5,192, nearly 50% higher than those for vaginal birth (Chrisler,2012).

In a study to estimate the additional number of needed caesarean sections that would be required in countries with lower than recommended national rates, as well as number of excess caesarean sections in countries in which the procedure is arguably overused, and to understand the resource implications of the 'needed' and 'excess' caesarean sections using data on the caesarean section performed in 137 countries, accounting for approximately 95% of global births for that year, a total of 54 countries had CS rates below 10% (rated as underuse in this study) whereas 69 showed rates above 15% (overuse) while 14 countries had rates between 10% and 15%. It was estimated that in 2008, 3.18 million additional CS were needed and 6.2 million unnecessary sections were performed (Gibbons and Jose,2010). The cost of the global 'excess' CS was estimated at US\$ 2.32 billion, while the cost of global 'needed' CS was US\$ 432 million. Worldwide thus, CS that are possibly medically unnecessary appear to command a disproportionate share of global economic resources. CS arguably function as a barrier to universal coverage with necessary health services. 'Excess' CS can therefore have important negative implications for healthy activity both within and across countries (Gibbons and Jose,2010).

## CHAPTER THREE

### METHODOLOGY

#### 3.0 Study Setting

This study was conducted in Nairobi Province in Kenya. Three maternity units were selected to participate in this study. Pumwani Maternity hospital which is located in Eastern Nairobi, Kenya, is the largest maternity unit in East and Central Africa (Allfrica.com: Africa). It is located close to Mathare and Korogocho two of Nairobi's biggest slums (Allfrica.com: Africa). It is a public facility that is run by the Nairobi City Council. The hospital caters for low-income groups in Nairobi and its neighboring districts ([www.nairobicity.org/departments](http://www.nairobicity.org/departments)). It is a referral centre for Nairobi City Council (NCC) clinics and other units. The unit has a bed capacity of three hundred and fifty (350) and an average of fifty (50) babies are delivered daily in this unit ([www.nairobicity.org/departments](http://www.nairobicity.org/departments)).

St. Mary's Mission hospital is a faith-based hospital that is located in Langata in the Southern part of Nairobi. It has a two hundred and sixty (260) bed capacity, out of which ninety (90) are for obstetric and gynecological care.

Nairobi Women's Hospital, Hurlingham (NWH,H) is a 53 bed hospital. Incepted in March 2001, NWH, H is located on Argwings Kodhek road, Hurlingham, Nairobi and specializes in obstetrics and gynecology.

#### 3.1 Study Population

The study population included all consenting women who were admitted for delivery in the maternity units of the selected hospitals at the time the hospital approved the study. In St. Mary's hospital data was collected in the period 1<sup>st</sup> October 2010 – 28<sup>th</sup>

October 2010, in Nairobi Women's Hospital 9<sup>th</sup> February-8<sup>th</sup> March 2011 and in Pumwani Maternity Hospital 28<sup>th</sup> February 2011-28<sup>th</sup> March 2011.

### **3.2 Study Design**

The study was a cross sectional descriptive study carried out in three selected hospitals in Nairobi where the association of such factors as women's demographics and past obstetric history and the mode of delivery were examined.

### **3.3 Sampling Procedure and Data Collection**

Nairobi Province was selected purposively while the maternity units were selected based on the National Hospital Insurance Fund (NHIF) categorization of hospitals in Kenya.

The NHIF categorizes hospitals as: -

Category A - (Government hospitals)

Category B - (Private and Mission)

Category C - (Private)

Category A was represented by the Pumwani Maternity Hospital, Category B by St. Mary's Mission Hospital, Lang'ata and Category C by the Nairobi Women's Hospital, Hurlingham.

These maternity units were selected due to the relatively higher number of deliveries taking place in each one of them compared to other maternity units in similar NHIF categories in Nairobi. The government hospital and the private mission hospital acted as referral centres for other health facilities in their neighbourhood.

These hospitals also have working operation theatres and perform caesarean sections.

In this study all the women who delivered during the data collection period in the selected maternity units were requested to participate. A total 513 women consented and were interviewed.

### **3.4 Sample Size**

This was a cross-sectional survey in which all the women who delivered during the data collection period in three selected maternity units (Nairobi Women's Hospital, St. Mary's Mission Hospital and Pumwani Maternity Hospital) were requested to participate. A total of 513 women consented and were interviewed.

### **3.5 Data Collection**

Data collection for this study was conducted during the period between 1st October, 2010 and 31st March 2011 depending on when the units gave their individual approval for data collection. In each unit, data was collected for approximately one month.

The total number of deliveries, number of vaginal deliveries, number of elective and emergency caesarean sections was recorded daily on a data collection form denoted form 1a. (Appendix 1). The data was recorded by staff in the selected maternity units who were recruited and trained as data collection assistants. The women who consented were interviewed to establish their background information, obstetric history and the reason for the CS (if delivered through CS), and the data recorded on a different data form denoted Form 1b (Section 1)

The women who delivered through CS on request were interviewed to establish the reasons of choice for CS. This was done at least 24 hours after the operation.

The medical records/charts of the sampled women were also examined to further enhance the correctness of the data/information collected.

The records were also used to determine the hospital days for the women. The caesarean births were classified as elective or non-elective (emergency), where elective was defined as a CS (planned or unplanned) that was performed prior to the onset of labour. Non elective (emergency) was defined as a CS performed after the onset of labour, whether or not the onset of labour was spontaneous

Three times every week, a review was undertaken to ensure that all required data had been recorded onto the data collection tools in all the selected units. There was a total of 513 respondents.

The questionnaires were kept by the data collection assistants until the patient was discharged. The completed questionnaires were collected three times every week in each unit.

A template for data entry was developed using the coding used on the data collection tool, and data entered using SPSS.

Data was validated by randomly selecting a few questionnaires and comparing with what had been entered.

Any inconsistent data was corrected by reconfirming with the questionnaire

### **3.6 Inclusion/Exclusion Criteria**

1. All women who delivered in the selected maternity units at the time of study were eligible for the study.
2. The study excluded women who were very sick and those who did not consent to the study.



### **3.7 Quality Control**

The questionnaire was pretested in Kenyatta National Hospital (a public health facility), Mother and Child Hospital in Rongai Southlands Nairobi (a mission/private hospital) and in the Nairobi Hospital (a private hospital). No adjustments were done to the questionnaire as the respondents answered them as expected.

The data collection assistants were recruited from each of the participating units, taken through the data collection tool and participated in at least one day of data collection with the principal researcher after which a review was done to make any clarifications on the tool.

The principal researcher visited each of the units at least three times each week, checked on the completeness and consistency of the data collected on each questionnaire and carried out random comparison of information collected on the tool and information on the patient's records. Any questionnaires lacking in vital information were discarded.

### **3.8 Data Analysis**

The data collected was entered into the SPSS software and analyzed to depict how a dependent variable (mode of delivery) was affected by independent variables such as: social demographic parameters (age, marital status, occupation and education, parity) past obstetric history, medical condition, influence from others (e.g. spouse, doctor) and fetal condition.

Descriptive statistics was done on all variables. Bivariate and multivariate analysis were performed to determine the factors that contribute to caesarean section rates.

The findings were presented in form of text, tables, bar graphs and pie charts.

### **3.9 Ethical Consideration**

The research proposal was approved by the Moi University approving body – Institutional Research and Ethical Committee (IREC) and an approval letter issued. The approved proposal together with the IREC’s approval letter were presented to the relevant bodies in the selected hospitals to seek approval to carry out the study. All the hospitals gave approvals for the study.

The data collection assistants were recruited and trained from the staff of the selected maternity units to avoid any breach of patient confidentiality.

A consent statement outlining the study objective was administered out to each respondent to ensure a verbal consent was granted by each participant. The consent statement assured all respondents of confidentiality and once verified all the data collected was put in the custody of the principal researcher. The questionnaires were numbered and no participant’s names were included to ensure that the identity of the participant was strictly guarded all through data analysis and in subsequent publications.

The study findings will be shared to the participating hospitals who by form of writing indicated so while adhering to the Moi University guidelines of sharing study findings.

### **3.10 Study Limitations**

The study was carried out in an urban setting thus the findings may not be fully applicable to rural settings.

The data collectors though trained to reduce bias, the Interviewer bias could have affected the validity of the data [though training had been done to reduce bias].

## CHAPTER FOUR

### STUDY FINDINGS

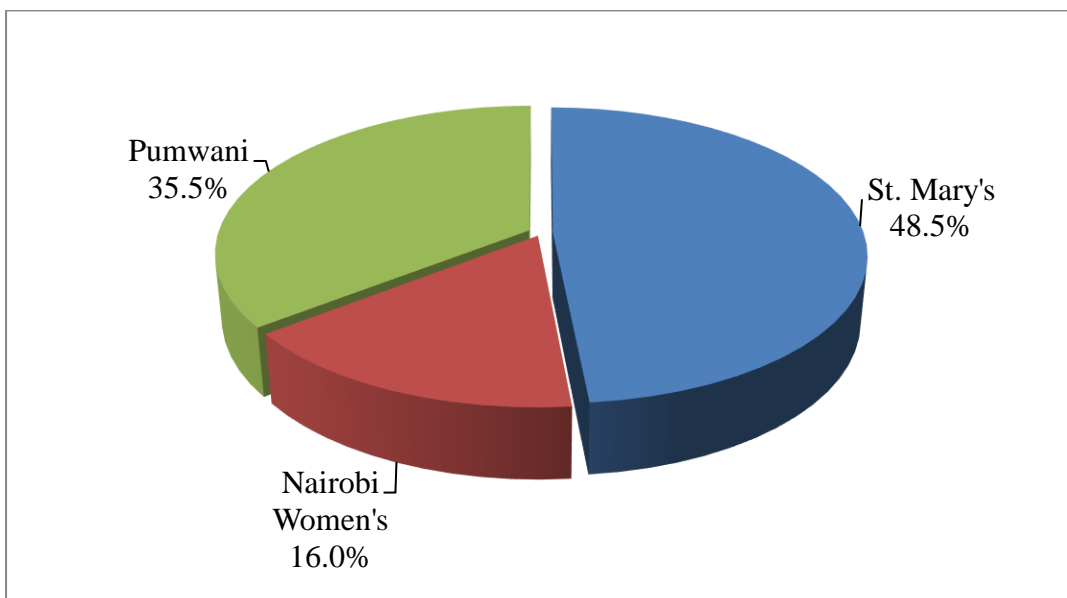
#### 4.0 Introduction

This chapter presents the study findings within sections organized according to the study objectives. The analysis of data collected from a total of 513 obstetric admissions presenting to three hospital maternity units showed the following:

#### Section A: Demographic Characteristics

##### 4.1 Distribution of Study Respondents

Out of the 513 respondents participating in this study, 249 (48.5%) were admitted to category B (Private/mission) facility, 182 (35.5%) were admitted to category A (Government/Public) facility and 82 (16.0%) at category C (private) facility (Figure 1).



**Figure 1: Distribution of study respondents by facility type**

##### 4.2 Social-Demographic Characteristics

Analysis of the main social - demographic characteristics of the mothers participating in the study are summarized in table 3 and showed the following:

### 4.2.1 Age

The average age of the mothers to all the maternity units was 26.5 years (SD  $\pm$ 4.9) and the age range was 16 to 44 years. The average age of admission within hospitals ranged from 25.7 years (SD  $\pm$ 4.6) at Pumwani hospital, to 26.3 years (SD  $\pm$ 4.5) and 28.5 years (SD  $\pm$ 5.3) at St Mary's and Nairobi women's, respectively. Table 3 shows the majority of participants across hospitals were aged between 16 and 29 years with upto to 24 years age band accounting for 37.6% and the 25-29 years age band accounting for 36.5% of the respondents.

### 4.2.2 Marital status

As shown in table 3, overall most (89.1%) women in the study reported being married. Similarly, at least 75% of women within each hospital were married. (Data not shown).

**Table 3: Socio-demographic characteristics of women recruited in the study**

Variable	Frequency	%
Age (n = 474)		
$\leq$ 24 yrs	178	37.5
25 – 29 yrs	173	36.5
30 – 34 yrs	89	18.8
35+ yrs	34	7.2
Education level (n = 491)		
None	11	2.2
Primary	112	22.8
Secondary	201	40.9
College	132	60.9
University	35	7.1
Employment status (n = 493)		
No employment	190	38.5
Self-employment	212	43.0
Formal employment	91	18.5
Marital status (n = 506)		
Single	48	9.5
Married	451	89.1
Other	7	1.4

### 4.2.3 Education level

Table 3 shows that only 2.2% of the participants in the study had not attended any formal education. The majority of participants across all hospitals reported having attained at least secondary (40.9%) or tertiary (34%) level education. Within hospitals, 48% of patients in the private/ mission facility had secondary education, compared to 38% in public/ government facility with similar education and 79% of admissions to private facility with tertiary level education.

### 4.2.4 Employment status

As shown in table 3 overall 43% of patients were self-employed, 38.5% were not formally employed. And 18.5% had formal employment. Similarly, within hospitals most patients reported being self-employed (between 33% and 43%), or not formally employed (between 29% and 42%)-table 5.

**Table 4: Socio-demographic characteristics of obstetric women recruited in the study facility wise**

		Facility category			Total N = 513
		Private/ mission N = 249	Private N = 82	Public/ government N = 182	
<b>Marital status</b>	Married	95%	77%	83%	88%
	Single	4%	13%	15%	9%
	Other	1%	10%	2%	3%
<b>Education level</b>	None	1%	1%	4%	2%
	Primary	16%	4%	38%	22%
	Secondary	48%	13%	38%	39%
	College/ University	35%	79%	9%	33%
	Not stated	0%	2%	11%	4%
<b>Employment</b>	Not formally employed	36%	29%	42%	37%
	Self employed	43%	33%	43%	41%
	Formally employed	20%	34%	7%	18%
	No response	1%	4%	8%	4%

### 4.3 Obstetric History

#### 4.3.1 Current Birth Order

At the time of this study 42.1% of the respondents were primigravidas, 35.6% were delivering their second child, 22.3% a 3rd and above child. (Table 5)

There was a notable decline of the number of respondents who were delivering the third and above children in all the hospital categories but the public hospital registered 29% of women delivering a third child and above while the mission and private hospital registered 20% and 19% respectively.

**Table 5: Obstetric characteristics of women**

Variable	Frequency	%
Current birth (n = 513)		
Vaginal	360	70.2
CS	153	29.8
Birth order (n = 506)		
First	213	42.1
Second	180	35.6
Third and above	113	22.3

#### 4.3.2 Mode of Previous Births

A total of 114 (22%) mothers reported having had at least one previous caesarean section delivery. Within, hospitals the prevalence of reported previous caesarean sections was as follows: 18% in private/ mission category, 21% in public/ government category and 38% in private category.

The caesarean section rate was lowest among primigravidae (22.1%) and increased in higher order births to between 27.4% and 40%). Table 6

**Table 6: Relationship between obstetric characteristics and current mode of delivery**

	Caesarean section	
	Yes	No
<b>Birth order</b>		
First	22.1% ( 47)	77.9% (166)
Second	40% (72)	60% (108)
Third and above	27.4% (31)	72.6% (82)
<b>Past delivery</b>		
Previous caesarean birth	93%	7%
No caesarean birth	12%	88%

#### 4.4 Section B: Caesarean Section Rates

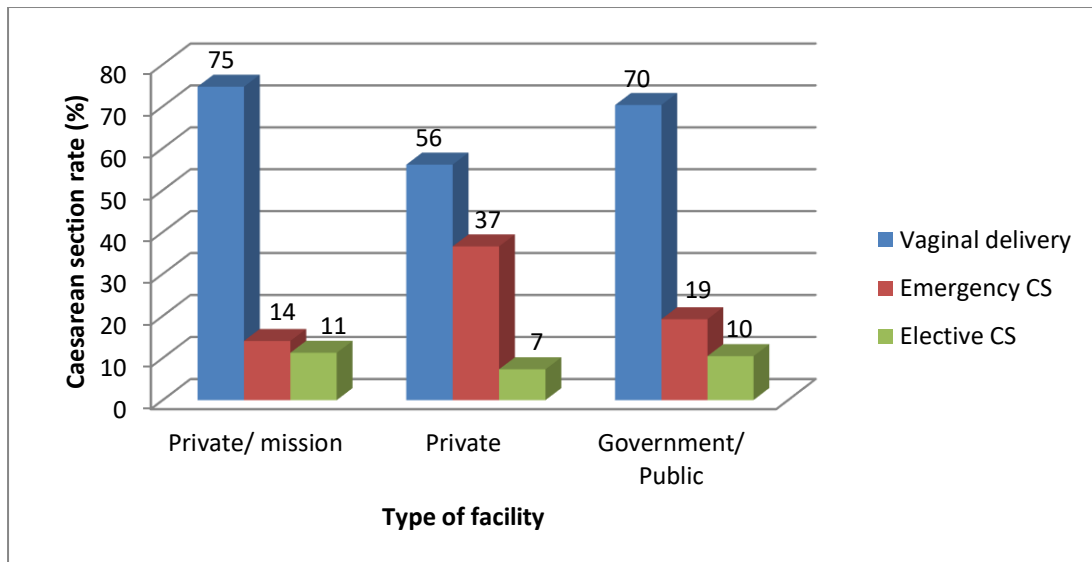
The overall caesarean section rate across all the three hospitals was 29.8% (table 7). The Private hospital had the highest CS rates at 44% while mission/ private had the lowest rate at 25.3%. The CS rate in the government/ public facility was 29.7%. Specifically, an emergency caesarean section was conducted in 19.5% of mothers compared to elective caesarean sections in 10.3% of the mothers who had CS. (table 7).

**Table 7: Caesarean section rates**

Mode of delivery	Frequency	%
Vaginal	360	70.2
Emergency CS	100	19.5
Elective CS	53	10.3

##### 4.4.1 Caesarean Section Rates by Hospital Category

As shown in figure 2 below the rate of emergency caesarean sections was consistently higher than elective sections in all facility categories.



**Figure 2: Caesarean section rate according to facility category**

#### **4.4.2 Relationship between Socio-demographic Variables and Mode of Delivery**

The relationship between the socio-demographic variables and mode of delivery are summarized in the table below.



**Table 8: Socio-demographic characteristics of respondents and mode of delivery**

Independent variable	Outcome		
	CS (n)	Normal (n)	Statistical test
Marital status			
Single	37.5% (18)	62.5% (30)	$\chi^2=1.652$ df = 1 P = 0.199
Married	28.6% (129)	71.4% (322)	
Age group			
≤ 24 yrs	20.2% (36)	79.8% (142)	$\chi^2 = 15.534$ df = 3 P = 0.001
25 – 29	32.9% (57)	67.1% (116)	
30 – 34	41.6% (37)	58.4% (52)	
35+	38.2% (13)	61.8% (21)	
Education level			
None	18.2% (2)	81.8% (9)	$\chi^2 = 9.537$ df = 5 P = 0.089
Primary	28.6% (32)	71.4% (80)	
Secondary	24.4% (49)	75.6% (152)	
College	34.8% (46)	65.2% (86)	
University	40% (14)	60% (21)	
Employment status			
No form of emp	22.6% (43)	77.4% (147)	$\chi^2= 7.554$ df = 3 P = 0.056
Self-	33.5% (71)	66.5% (141)	
employment	35.2% (32)	64.8% (59)	
Formal			
employment			

There was a significant association between ages of women and caesarean section delivery rates ( $\chi^2 = 15.534$ , df=3, p = 0.001). Table 8 shows that the rate of caesarean sections increased significantly with age from 20.2% in ≤24 years to between 38.2% and 41.6% in age groups above 29 years.

### Facility Type

As shown in table 9 below there was a significant association between the facility type and caesarean section rates.

**Table 9: Relationship between facility type and Caesarean Section rates**

Hospital type	Normal delivery (n)	Caesarean section (n)	Statistics
Mission/Private (M)	74.7% (18.6)	25.3% (63)	$\chi^2= 10.201$
Private (N)	56.1% (46)	43.9% (36)	Df = 2
Public (P)	70.3% (128)	29.7% (54)	P = 0.006

The association between the social demographic characteristics of the mothers and the type of caesarean section. Within women undergoing caesarean section only, a significant association was shown between age and type of section ( $\chi^2= 4.29$ ,  $p = 0.04$ ) and employment status and type of section ( $\chi^2= 10.4$ ,  $p = 0.006$ ).

**Table 10: Comparison of demographic factors among women undergoing elective and emergency CS**

	Type of section		$\chi^2$	P value
	Emergency	Elective		
<b>Age category (years)</b>				
16-25	75%	25%	8.29	0.04
26-30	62.5%	37.5%		
31-35	43%	57%		
36 and above	78%	22%		
<b>Marital status</b>				
Married	72%	28%	0.44	0.80
Single	64%	36%		
Other	67%	33%		
<b>Education</b>				
Primary	66%	34%	0.61	0.89
Secondary	61%	39%		
College/ University	68%	32%		
Not stated	70%	30%		
<b>Employment</b>				
No formal employment	81%	19%	10.4	0.006
Self-employment	52%	48%		
Formal employment	69%	31%		

### Relationship between Obstetric History and Caesarean Section rates.

The obstetric history of participants showed a strong association with caesarean section rates (Table 11). The caesarean section rate increased in higher order births. ( $\chi^2=15.386$ ,  $df=2$ ,  $p = 0.000$ ).

The majority of CS (93%) were conducted among mothers reporting previous CS deliveries ( $\chi^2= 274.3$ ,  $p =0.001$ )- table 11

**Table 11: Relationship between obstetric history and Caesarean section rates**

	Caesarean section		$\chi^2$	P value
	Yes	No		
<b>Birth order</b>				
First	22.1% ( 47)	77.9% (166)	15.386	0.000 df = 2
Second	40% (72)	60% (108)		
Third and above	27.4% (31)	72.6% (82)		
<b>Past delivery</b>				
Previous caesarean birth	93%	7%	274.3	< 0.001
No caesarean birth	12%	88%		

#### 4.4.3 Multivariable regression analysis of factors associated with caesarean section rates

Multi-level logistic regression was used to conduct multivariable regression due to the hierarchical structure of the data with deliveries nested within hospitals. The main independent variable was a categorical variable representing caesarean section rates: 0 = no caesarean section; 1 = caesarean section conducted. The demographic variables showing significant associations with caesarean section rates were then included in the model. The findings of the multi-level logistic regression model are shown in Table 12.

The slopes for education effect on caesarean section rate were positive but not statistically significant. Three patient factors were shown to have an independent and significant association with caesarean section rates namely patients age ( $p = 0.01$ ), previous Caesarean section ( $p < 0.001$ ) and current birth order which showed a negative slope with caesarean section rate ( $p < 0.03$ ).

After adjusting for the effect of previous CS, current age and education the CS rate increased by 0.12% (95% CI 0.04% to 0.19%) for each additional year of age. Similarly, the rate of caesarian sections among patients with previous CS deliveries was on average 5.1% higher among women with previous scars compared to those without previous scars after adjusting for the effect of age, current birth order and education.

**Table 12: Multilevel logistic regression analysis of patient factors associated with caesarean section rates in facilities within Nairobi**

Factor	Coefficient	95% Confidence interval		P value
Previous caesarean section	5.2	4.1	6.0	< 0.001
Age	0.12	0.04	0.19	0.001
<b>Current birth order</b>				
Second birth	-0.91	-1.7	-0.1	0.027
Third birth or above	-1.3	-2.3	-0.3	0.011
<b>Education</b>				
Primary	1.6	-1.4	4.6	0.29
Secondary	0.3	-2.6	3.3	0.84
Tertiary	0.6	-1.7	3.5	0.70

## 4.5 Indication for Caesarean Sections

### Emergency Caesarean Section

Fetal distress was the single largest reason for emergency CS (29% of respondents), followed by previous scar (21%) and poor labour progress (10%). Other reasons for emergency CS included breech presentation, antepartum haemorrhage, pre-eclampsia, cephalo pelvic disproportion, chronic illness, failed induction, cervical dystocia, cord prolapse and premature rupture of membrane.

**Table 13: Indications for Emergency Caesarean Section among women**

Reason	% Respondents n=100
Fetal distress	29%
Previous scar	21%
Poor progress	10%
Cephalo pelvic disproportion(CPD)	6%
Breech presentation	6%
Big baby	6%
Pre-eclampsia	6%
Antepartum Hemorrhage (APH)	5%
Cord prolapsed	2%
Chronic illness	2%
Cervical dystocia	1%
Premature rupture of membrane	1%
Weak(sick)	1%
Failed induction	1%

### Indication for Elective Caesarean Section

Previous scar was the most common reason for elective CS (73%). Other reasons included: prevention of mother to child transmission of HIV (PMTCT), no labour pain experience, bad obstetric history, breech presentation and cephalopelvic disproportion.

**Table 14: Reason for Elective Caesarean Section**

Reason for choice	% Respondents n=53
Have always had CS	73%
Afraid of pain	9%
Chronic illness	7%
Vaginal Birth will affect my sex life	5%
Other( PMTCT, baby too big)	4%
Past fetal death/deformity	2%

Most (83%) of the respondents having an elective CS indicated that they made the decision to do so themselves though the decision could have been rather circumstantial (most of the elective CS were medically indicated) while 17% did not. The women who chose to have an elective CS cited such reasons as: have always had CS (73%), afraid of pain (9%), chronic illness (7%), past fetal death /deformity (2%) and other –PMCT, baby too big (4%). All those who had another party make the decision for the elective CS for them sited the doctors. The reasons for the doctors choosing CS for them are summarized below.

**Table 15: Reason Caesarean Section was chosen**

	Frequency	Percentage
My chronic illness	1	11.1
All my previous deliveries were CS	6	66.7
Others	2	22.2
Total	9	100.0

## 4.6 Hospital Days

### 4.6.1 Comparison between Mean Hospital Days and Mode of Delivery

The surgical births were associated with longer hospital days (average of 4 days) as compared to VD (2.5 days). The average difference in hospital stay between the two groups was 1.5 days

#### **4.6.2 Number of Hospital Days by Hospital**

The private facility recorded a mean of 3.56 hospital days against 2.71 and 2.66 days for the mission/private and public facility respectively.

## **CHAPTER FIVE**

### **DISCUSSION**

#### **5.1 Introduction**

This chapter seeks to provide a summary of the key findings from the study and discussion. The study sought to establish the caesarean section rates of selected hospitals in Kenya, the indications for the caesarean sections (both elective and emergency), the socio-demographic characteristics of women having CS, and the relationship between the socio-demographic characteristics and the CS rates and the caesarean section type.

#### **5.2 Discussion**

##### **5.2.1 The caesarean section rates of the selected maternity units**

The overall caesarean section rate across all the three hospitals was 29.8 with emergency CS conducted in 19.5% of the women and elective caesarean section taking 10.3%.

The private hospital had the highest CS rate (44%), the public/government had 29.7% caesarean rate and the private/mission had a 25.3% caesarean section rate.

These rates are all well above what WHO recommends as an acceptable CS rate of 5% to 15%. This trend has been shown in other studies. The rate of CS deliveries according to a study published in 2007 was 19% in Europe with rates ranging from 36% and 6.2% between countries (Ana et al., 2007). In this study the average caesarean section rate in Asia was found to be 15.9% with rates ranging from 40.5% to 1%. The region Latin America and Caribbean showed an average rate of 29.2% with national rates ranging from 1.7% to 39.1% between countries (Ana et al., 2007). The average rate of caesarean section deliveries in Africa was recorded at 3.5% the rates ranged from 15.4% to 0.4%



between countries. A similar observation was made in a study conducted in the Aga Khan University Hospital, Nairobi where the CSR rose steadily from 20.4% in 1996 to 38.1% in 2004 (Wanyonyi et al.,2006).

The high CS rate in both the public and mission/private units could be explained by the fact that they acted as referral centres for other health centres in their neighbourhood. It would thus be difficult to reduce the caesarean deliveries in such hospitals with a considerable number of high risk pregnancies. The public and the private/mission units were also similar in that they did not limit their admissions to women who attended the antenatal clinics in these units but admitted any pregnant woman for as long as they had some proof of obstetric history (the antenatal clinic cards). It was observed that at times such women did not have such proof and only walked into delivery rooms when in labour thus these units found themselves having to do many emergency interventions such as caesarean sections.

The high CS rate in the private unit could have been due to many factors. The respondents in this category were generally more educated, had access to employment (formal or self-employment) thus were more likely to be more informed, more economically better placed to afford the more costly caesarean delivery and more liberated to make choices regarding their mode of delivery.

In Chile in 1992, 54,218 births were reported to the Ministry of Health to have occurred in diverse private establishments (Susan et al.,1997). Caesarean section rates in these private facilities tended to be much higher than those in public facilities. More than one-half of the private establishments had caesarean section rates of between 50 and 69.9 percent, and thirteen had rates of over 70 percent (Susan et al.,1997). Chile reported a national caesarean section rate of 37.2 percent in 1994 with the rates being

59% in 1994 in women covered by the private insurance schemes and 28.8% for those covered by the National Health Fund sector. This mirrored reported patterns among women with private insurance versus women with public or no insurance in Brazil and in the United States.

These data suggest that funding mechanisms may have a powerful influence on health service outcomes. A study conducted in the Aga Khan University Hospital, Nairobi showed a caesarean section rate of 27.1% in 1996, 30.8% in 2001 and 41.7% in 2004. Among women managed by private obstetrician compared to 14.7%, 21.5% and 34.5% in women who were managed by the hospital staff (Wanyonyi et al.,2006).

The observed caesarean section rates in this study are well above what many studies (Cynthia and Sara,2006; Pierre et al.,2003; Ana et al.,2007; WHO,2003 Ghana country profile; WHO,2003 Kenya country profile) have reported as the caesarean section rates in the sub-Saharan African countries. In countries designated by the United Nations as least developed and of which 34 are in Africa the CS rate is only 2% (Ana et al.,2007) indicating a clear need to improve access to surgical obstetric care since the proportion of births by CS has been proposed as a proxy indicator for measuring access, availability or appropriateness of medical care as well as monitoring changes in maternal mortality in developing countries. The caesarean section rates observed in this study are thus an indication of clear geographical and social-economic disparities in accessing obstetric care (American Journal of Obstetrics and Gynecology,2007) both within and across countries. A study indicated a CS rate of 11.1% in urban areas in Kenya in 1998 and 5.7% in the rural areas and an overall of CS rate of 6.7%. The same study indicated an overall CSR of 0.6% in Niger with 0.3% in rural areas and 2.1% in urban areas (Pierre et al.,2003).

In this study, an emergency CS was conducted in 19.5% of women while an elective CS was conducted in 10.3% of the admissions.

The rate of emergency CS was consistently higher than elective CS in all facility categories.

Most of the reasons leading to high emergency CS rate in the public and mission/private hospital include referral and admission of high risk, admission of walk-in patients among other reasons

The reasons for the high emergency CSR in the private facility are not clear and could have been due to other factors not considered in this study.

The public and private/mission hospital did not admit women funded by private health insurances and at the entrance of the maternity ward of the private/mission hospital, there was a notice declaring as much and indicating that all services had to be paid for in cash. The public hospital had a notice indicating that payment had to be paid in cash but they also did accept the National Hospital Insurance Fund (NHIF) cards for payment.

For the public facility, policy dictated that no non-medically indicated caesarean sections are performed and not a single non- medical elective CS was reported in this facility during the study. A previous study echoed a similar trend in CSR where an overall CSR of 17.8% was recorded and out of which 39% were elective and 61% were non-elective/emergency (Ana et al.,2007).

### **5.2.2 Indications for Elective and Emergency Caesarean Sections**

The indications of elective CS in this study ranged from previous scar(s), afraid of pain, chronic illness, postpartum sexual life, prevention of mother to child transmission (PMTCT), fetal deformity, bad obstetric history, breech presentation and cephalopelvic disproportion.

The reason/indications for emergency caesarean sections included fetal distress, previous scar, poor labour progress, cephalopelvic disproportion, breech presentation, big baby (excessive fetal growth), pre-eclampsia, antepartum hemorrhage, failed labour induction, cervical dystocia and cord prolapse.

The major indications for both forms of CS in this study are discussed below.

#### **Fetal Distress**

Fetal distress a term used to refer to a range of signs and symptoms in a pregnant woman before or during child birth that suggests that the fetus is not well, was the single largest indication of emergency CS. These signs and symptoms include decreased fetal movement, meconium in amniotic fluids, non-reassuring heart patterns and biochemical signs.

Fetal distress may be caused by abnormal position and presentation of the fetus, multiple birth, umbilical cord prolapses, placental abruption and uterine rupture. Indeed, fetal distress have had a major effect on trends in CSR in several countries (Pascal and Beatrice,2001). This may be due to the increasing number of antenatal visits and screening procedures during the last months of pregnancy and during labour. In this study it accounted for 29% of all emergency caesarean sections. In a study, fetal distress (non-reassuring/pathological fetal heart rate trace by cardiotocography (CTG)

accounted for 12.3% of primary indications for CS over a study period 2002-2006.<sup>4</sup> In yet another study the most common indications for non-elective delivery was suspected diagnosis of fetal distress (n=297; 30%) (Julia et al.,1996).

### **Previous scar**

Previous scar was the second most common indication for emergency CS (21%) and the most common indication for elective CS (73%). Indeed, repeat CS deliveries are often cited as a major driver of the overall CS trends and have been the subject of much investigation and debate (Konstantinus et al.,2008). Notably the public hospital registered the highest number of emergency CS due to previous scar, followed by the mission/private hospital. This could have been due to the fact that many women with previous scar even when given appointments to report to hospital for elective CS waited until they were in labour. This could be attributed to the perception of the relatively high cost of CS (these institutions cater for low income groups in Nairobi and its neighboring districts), the fact that any woman in labour could walk in and get admitted with no prior ANC visits in these institutions and lack of access to information (risks associated with VBAC): Conversely all the women with a previous scar in the private hospital reported promptly for their elective CS.

The findings of this study compare well with other studies. A study found out that 23% of public patients among Western Australian women requested for a caesarean section because they had had a previous CS (Julia et al.,1996), and that the most common secondary reason why women chose to have an elective CS was because of a reluctance to have a trial of scar (16.3%). In this study the most common medical indication for elective CS was more than 1 previous caesarean section (n=147; 23%) and 1 previous caesarean section with a secondary complication that prevented a save trial of scar

(n=67; 11%) while 1 or more previous CS (n=22) constituted part of the indications for non-elective delivery (Julia et al.,1996).

In another study the primary indication for CS was previous caesarean delivery (30.9%) and that in the period between 2002-2006 this was the only indication of CS whose rate significantly increased (+ 47.3%; p.002). In the USA the rate of vaginal birth after caesarean (VBAC) steadily increased from 1989 (18.9%) to (1996) 28.3% but has been decreasing each year thereafter (9.2% in 2004) amid concerns about maternal safety. In a study at AGUH,N, previous scar was the main indication for elective CS (Wanyonyi et al.,2006).

In this current study there was only one respondent who registered a vaginal current birth after a previous scar. Though VBAC is not without risks, there is a plethora of studies describing safe virginal birth after CS (Konstantinus et al.,2008) and that 75% of women undergoing TOL are likely to succeed (Julia et al.,1996) suggesting that lower caesarean delivery rates can mainly be achieved by attempting more VBAC and if we are to avoid self-perpetuation of the CS epidemic. The most emergent and severe risk during TOL is uterine rupture and although it affects only 0.5% to 0.9% of women attempting VBAC, it is an emergency situation with potentially serious injury to both mother and her infant (Obstet Gynecology; 116: 450 – 463). Another study however demonstrated that repeat CS did not completely protect against uterine rupture or perinatal death (Konstantinus et al.,2008).

### **Failure to progress in labour and cephalopelvic disproportion**

Another major cause of emergency CS was the diagnosis of failure to progress in labour while cephalopelvic disproportion and ‘big baby’ were both important indications for both emergency CS and elective CS. ‘Big baby’ and CPD as indications for elective CS

again indicates the increased intervention rates due to availability of fetal monitoring techniques especially in the last stages of pregnancy.

Why the incidence of failure to progress or cephalo pelvic disproportion was high despite the use of syntocinon (available in all the units) in this study is unclear. However, this could be due to the fact that the contracted female pelvis often described in the past decades have largely disappeared as a result of improving nutrition. It may be however the same improvement to nutrition that have resulted in increasing birth-weight shifting the problem from one of pelvic to fetal size (Division of reproductive health WHO,1996).

Another study reported clinically large baby with an estimated fetal weight (an ultrasound) of 4,000 as contributing 2% of elective CS.

### **Malpresentation**

Breech presentation where the baby enters the birth canal with the buttocks, or feet first as opposed to the normal head first presentation, was the only form of malpresentation reported in this study and was an important indication for both emergency and elective CS.

Caesarean section is the most common way to deliver breech baby but whether it confers significant advantages over vaginal breech delivery is currently the subject of many studies and remains an issue of great debate.

Turning the baby to avoid breech birth using such methods as external cephalic version should be offered as a primary option in the absence of contraindications (Julia et al.,1996).

A previous study indicated breech presentation of the fetus but otherwise suitable for trial of vaginal birth contributing to 8.8% of elective CS and 0.5% of non-elective CS. Malpresentation constituted an overall of 7.8% of the indications for CS in a comparative study shown showing the indications of CS in a major public hospital in Northern Greece in the period 2002-2006.

### **Prevention of Mother to Child Transmission (PMTCT)**

PMTCT was another important indication for elective CS in this study in all the three facilities (table 15).

There is an established 10-20% absolute risk of mother to child transmission of Human Immunodeficiency Virus (HIV) during labour and delivery (Decock,2000).

Two studies published in 1999 demonstrated that Caesarean delivery before labour and before the rupture of membranes (elective caesarean delivery) reduces the risk of mother to child transmission of HIV suggesting that infected women should be counseled regarding the benefits of elective CS.

The uptake of CS as a component of PMTCT in all the units (table 15) is a positive indicator of possible achievement of the millennium development goals as far as halting new HIV infections and reducing child mortality rates are concerned.

### **Maternal Choice**

Caesarean delivery on maternal request without any medical indication has recently been extensively discussed in the media and in scientific reports (Konstantinus et al.,2008). It has been suggested that increasingly, mothers are requesting CS to avoid the anxiety and pain of natural birth (9% of mothers in this current study indicated they chose an elective CS because they were afraid of pain. This trend is also partly due to



some evidence that suggests that planned caesarean birth might protect against urinary and faecal incontinence, pelvic organ prolapse and sexual dissatisfaction. (5% of mothers in this study chose an elective CS because vaginal birth would affect their postpartum sexual life further increasing its appeal. Previous surveys have found that almost 8% of all caesarean deliveries and almost 20% of elective caesarean deliveries were due to maternal requests (Konstantinus et al.,2008).Several studies suggest that around 7% of women may have requested for one(Moffat et al.,2007)while a Norwegian study found that 7.6% of the caesarean section was made on maternal request. In yet another study 27% of elective caesarean deliveries were performed solely as a result of maternal request making this the leading indication for elective surgery (Julia et al.,1996). In this current study 83% of the respondents who had a caesarean section indicated that they made the decision to do so themselves. In this current study however and as documented in other studies (Julia et al.,1996) there were secondary reasons why women chose to have an elective caesarean section. Such reasons included reluctance to have a trial of scar or breech vaginal delivery, underlying chronic illness, prevention of mother to child transmission, past fetal deformity/death and caphalo pelvic disproportion.

The degree to which maternal request has contributed to the high caesarean section rates in the units studied may not be discretely established especially in light of the association with socio-economic advantage, private medical insurance and patient's charters and rights. Clearly though this study and other studies (O'Leary et al.,2007) have shown that maternal pressure could significantly be influencing obstetric practice. The practice of acceding to maternal request for elective caesarean section raises considerable ethical debate as evidence is divided about its risks and benefits (O'Leary et al.,2007).

### **5.2.3 Social demographic characteristics of mothers having CS and their effects on CS rates.**

There was a significant association between ages of patients and caesarean section delivery rates ( $\chi^2=18.0$ ,  $P = 0.001$ ). The rate of caesarean sections increased significantly with age (Table 8). This association was seen even within patients undergoing caesarean section only ( $\chi^2=4.29$ ,  $P = 0.04$ ).

A significant association was also seen between employment status and type of section ( $\chi^2=10.4$ ,  $P = 0.006$ ). Women in formal employment and those in self-employment had significantly higher rates of elective sections (48% and 30% respectively) compared to unemployed (19%) of participants.

In a multivariable regression analysis of factors associated with caesarean section rates, three patient factors were shown to have an independent and significant association with caesarean section rates among them patients age ( $P=0.01$ ), there was weak statistical evidence of an association between level of education and caesarean rates with rates increasing with level of education ( $\chi^2= 9.2$ ,  $P=0.57$ ) but in a multivariable regression analysis the slopes for education effect on CSR were positive but not statistically significant (table 12).

A previous study reported a similar tendency in that women who requested caesarean section were more often older than women in other groups (mean age 33.9 years versus 30.8 years,  $P<0.001$ ) but in this particular study the proportion of women with a university education did not differ between groups(Wiklundi et al.,2008) and yet in another study a higher rate of caesarean section was associated with age 35 years or older comparing well with the findings of the current study(Pascal and Beatrice,2001). A study that examined trends of delivery during 1984-2003 in Western Australia

showed that most marked changes in caesarean sections occurred in older women with proportion of elective caesarean sections doubling for women aged 30-39 years and increasing by 80% for women aged 40 years and older (O'Leary et al.,2007). The high CS rate observed in the higher age group would probably be explained by the physiological and anatomical changes that take place as they age making successful VD less likely. These age groups are also likely to be associated with onset of chronic conditions that further complicate the pregnancy and reducing chances of VD.

Another study used a linked ethnographic and epidemiological approach to investigate the reasons many Brazilian women seek out caesarean section. They found that women with higher incomes and educational levels were more likely than their counterparts to have had a caesarean section. In addition, many lower and middle class women also sought medical interventions especially when they had more decision making power in their household(Chrisler,2012).

A relationship between social class and caesarean section has also been reported in the United States. According to a study, CS is more likely to be performed among middle and upper class women who actually have lower medical risks than poor women do. One obvious factor that would explain the strong relationship between social class and CS rate is the relatively high expense of a caesarean delivery(Chrisler,2012).

At the time of the current study a caesarean delivery at the public/government cost approximately Ksh 6,000 versus Ksh 3,400 for a normal delivery, while at the private hospital a normal delivery cost Ksh 34,000 versus a range of Ksh 133,000 – 148,000 for a CS depending on the package the patient opted for. The respondents in the private facility were comparatively highly educated, had access to employment (self or formal) thus probably had access to private health insurance and private practitioners (the

private hospital recorded the highest CSR (44%). Another previous study also indicated a clear widening disparity between rates of elective caesarean section in the different socio-economic groups. Women in advantaged socio-economic groups were three times more likely to have an elective caesarean section in 1999-03 than in 1984-88 compared with a 1.8-fold increase for women in the most disadvantaged group (O'Leary et al.,2007).

### **Obstetric History**

The obstetric history of participants showed a strong association with caesarean section rates. The CS rate was lowest among primigravidae (22%) and increased in higher order births ( $\chi^2=15.534, df=3, P=0.001$ ). The majority of CS (93%) were conducted among mothers reporting previous CS deliveries ( $\chi^2=274.3, P<0.001$ ). A multilevel regression analysis of factors associated with CS rate showed previous caesarean section ( $P<0.001$ ) and current birth order to have an independent and significant association with CS rate. The current birth order showed a negative slope with CSR ( $P<0.03$ ).

After adjusting for the effect of previous CS, current age and education, the CSR among patients with previous CS deliveries was on average 51% higher among patients with previous scars compared to those without previous scars (table 12).

Previous CS has been shown in a multitude of studies to be a major driver of CS rate in many countries in different parts of the world (Wiklund et al.,2008; Susan et al.,1997; Moffat et al.,2007; Habiba et al.,2006; Konstantinus et al.,2008; Julia et al.,1996).

This study noted that surgical births were associated with longer hospital days (average of 4 days) as compared to VD (2.5 days). The average difference in hospital stay between the two groups was 1.5 days. This denotes the longer recuperation period

associated with surgical births, leading to higher costs and to a higher risk of acquiring nosocomial infections.

The private facility recorded a mean of 3.56 hospital days against 2.71 and 2.66 for the mission/private and public facility respectively. This probably denotes the presence of interplaying factors such as social economic class, private health insurance and private obstetricians.

## **CHAPTER SIX**

### **CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 Conclusions**

This section seeks to present the conclusions of the study findings based on the stated study objectives.

##### **6.1.1 The Caesarean Section Rates of the Selected Maternity Units.**

From this study it can be concluded that the observed CS rates of 25.3% to 44% were above the WHO recommendations of 5% to 15%, the private facility registered the highest CS rate.

##### **6.1.2 Indications for Elective and Emergency Caesarean Sections**

While there were a number of indications for both elective and emergency caesarean sections observed, this study concludes that the major indications for both emergency and elective CS were fetal distress and previous scar.

##### **6.1.3 The Social Demographic Characteristics of Women Having Caesarean Section and Their Relationship to Caesarean Section Rates**

The age of the mother, previous caesarean section, birth order and the facility type all had a significant association with CS rates while age and employment had a significant association with the type of section.

From the high CSR observed across the three facilities it emerges that they it may be quite difficult to reduce the proportion of caesarean deliveries in referral hospitals (as was with the public and private/mission facility) with a considerable number of high risk pregnancies. This study therefore concludes that it may be hard to define an umbrella optimal CS rate for health institutions and thus such rates should be contextualized.

This study also concludes that other factors that were not studied in this particular research could have contributed to the high CSR especially in the private facility and this offers a subject for further research on factors contributing to CS rates in Nairobi.

## **6.2 Recommendations**

Based on the findings of this study the following recommendations are made;

### **6.2.1 Recommendations to the Facilities**

This study recommends that at facility level hospitals should design antenatal packages that include adequate information dissemination which supports non-directional counseling and from which women can make informed decisions which are the safest and best for them. Individual facilities should for instance define strategies to encourage women to choose to undertake a trial of labour after a single CS or with uncomplicated breech presentation of the fetus.

### **6.2.2 Recommendations for National Policies**

Various strategies should be developed at national level to regulate caesarean section use. National strategies such as consensus conferences, introduction of new guidelines at national level and feedback about hospital CS rates all would have beneficial effects especially if several of these components are combined in a general strategy.

### **6.2.3 Recommendations for Further Research**

This study recommends that further research should be carried out to find out: -

- CS rates in the rural Kenya and the factors contributing to these rates.
- Effects of health financing in Kenya on modes of delivery.
- If obstetricians in Kenya carry out non-medically indicated CS and if so why.

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## APPENDICES

### Appendix 1: Form 1 A - Caesarean Section Rates For The Maternity Units

**HOSPITAL CODE:** \_\_\_\_\_

*This form will be filled every morning for the period the study will be going on (i.e. to record the total number of births & CS deliveries of the previous day) by the data collection assistants in each unit.*

DATE	TOTAL NUMBER OF DELIVERIES	NUMBER OF VAGINAL DELIVERIES	NUMBER OF CS DELIVERIES		RECORDED BY	
			ELECTIVE CS	EMERGENCY CS	NAME	SIGNATURE
<b>TOTAL</b>						
<b>CS RATE</b>						

## **Appendix 2: Consent Statement**

Dear Participant,

Thank you for taking your time to participate in this study.

This study is being undertaken to establish the reasons why women opt to deliver through CS. The information obtained will be treated with utmost confidentiality and will be used for the study purposes only. You will not be required to write your names anywhere on the questionnaire thus identification of every participant is strictly guarded.

Participation in this study is however purely voluntary/optional.

Kindly proceed to answer the questions.

### Appendix 3: Form 1 B - Questionnaire

#### SECTION 1 RESPONDENTS BACKGROUND AND OBSTETRIC HISTORY

1.HOSPITAL CODE: \_\_\_\_\_

2.PATIENTS CODE NO: \_\_\_\_\_

3.PATIENTS AGE: (Yrs) \_\_\_\_\_

4.MARITAL STATUS:\_\_\_  1 Single   2 Married   
 3 Widowed   4 Others  Specify \_\_\_\_\_

5.EDUCATION LEVEL:  None .....1  
 Primary.....2  
 Secondary.....3  
 College.....4  
 University....5

6.EMPLOYMENT STATUS:  No form of employment.....1  
 Self employment.....2  
 Formal employment.....3

7.CURRENT BIRTH ORDER  1<sup>st</sup> .....1  
 2<sup>nd</sup> .....2  
 3<sup>rd</sup> .....3  
 4<sup>th</sup> .....4  
 Others .....5 (specify).....

**MODE OF PREVIOUS BIRTHS**

		1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>
<b>Vaginal Delivery</b>											
<b>Caesarean Section</b>	<b>Emergency CS</b>										
	<b>Elective CS</b>										

**8. CURRENT DELIVERY**

Vaginal Delivery \_\_\_\_ 1

Emergency CS \_\_\_\_ 2      Reasons 1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

Elective CS \_\_\_\_ 3 Reasons 1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

**9. Did you choose to give birth vaginally? – for women who delivered vaginally only**

Yes.....1

No .....2 (Explain) \_\_\_\_\_

**10. IMMEDIATE BIRTH OUTCOME:****a) For Baby**

Baby alive and well \_\_\_\_1

Complications for baby \_\_\_\_2 (specify) \_\_\_\_\_

**b) For Mother**

Mother alive and well \_\_\_\_1

Complications for mother \_\_\_\_2 (specify) \_\_\_\_\_

**11. DURATION OF STAY IN HOSPITAL**

Date of Admission (DOA) .....

Date of Discharge (DOD) .....

Hospital Days.....

**SECTION 2: TO BE COMPLETED BY WOMEN WHO HAVE AN ELECTIVE CS**

12. Did you choose to give birth through CS

 Yes .....1 No..... 2**If 'Yes' why?** Have always had CS ..... 1 Chronic Illness ..... 2 Afraid of pain ..... 3 Vaginal birth will affect my sex life. 4 Past fetal death/deformity.....5 Others (specify) ..... 6**If 'No' who suggested that you have a CS?** My Doctor..... 1 My Spouse..... 2 My Friend(s) ..... 3 Others specify..... 4**13. Why did they suggest you have a CS?** My chronic illness..... 1 It is less painful..... 2 Vaginal birth will affect my sex life... 3 Past fetal death /deformity..... 4 All my previous deliveries were CS... 5 My baby was very big..... 6 baby malpresentation..... 7 Others..... 8 (Specify) \_\_\_\_\_

**14. If you were to deliver another baby would you choose CS?**

Yes..... 1

No..... 2

**If 'Yes' why?**

Painless experience ..... 1

I was not anxious about the birth process ..... 2

I will have a fulfilling sex life..... 3

I have a chronic illness..... 4

I lost a baby in a previous vaginal delivery.... 5

Have always had CS..... 6

Others specify ..... 7

**If 'No' why?**

Pain after surgery ..... 1

I got complications .....2 specify \_\_\_\_\_

My baby got/had complications..... 3

My baby passed on .....4

It was very expensive .....5

I stayed too long in hospital .....6

I was very anxious before surgery..... 7

Others ..... 8 (Specify) \_\_\_\_\_



## Appendix 4: Approval Letter from IREC



MOI TEACHING AND REFERRAL HOSPITAL  
P.O. BOX 3  
ELDORET  
Tel: 33471/2/3

Reference: IREC/2009/130  
**Approval Number: 000454**

Grace W. Wanjohi,  
C/o AMREF Training Centre,  
MPH Programme 2008/09,  
P.O. Box 27691-00506,  
**NAIROBI.**

Dear Ms. Wanjohi,

### **RE: FORMAL APPROVAL**

The Institutional Research and Ethics Committee has reviewed your research proposal titled:

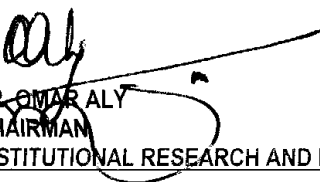
***"Factors that Contribute to Current Caesarean Section Rates in Selected Hospitals in Nairobi, Kenya."***

Your proposal has been granted a Formal Approval Number: **FAN: IREC 000454** on 31<sup>st</sup> May, 2010. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 30<sup>th</sup> May, 2011. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Yours Sincerely,

  
**DR. OMAR ALY**  
**CHAIRMAN**  
**INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE**



cc: Director - MTRH  
Dean - SOM  
Dean - SPH  
Dean - SOD



MOI UNIVERSITY  
SCHOOL OF MEDICINE  
P.O. BOX 4606  
ELDORET  
Tel: 33471/2/3  
31<sup>st</sup> May, 2010

**Appendix 5: Approval letter from Pumwani Maternity Hospital**

**PUMWANI MATERNITY HOSPITAL**

Tel: 02/6763291-4  
Fax: 02/6762965



P.O. Box 42849  
Code: 00100- GPO

PMH/DMOH/75/70/11

17<sup>TH</sup> JANUARY 2010

GRACE W. WANJOHI,  
C/o AMREF TRAINING CENTRE  
MPH PROGRAMME 2008  
BOX 27691 – 00506  
**NAIROBI**

**RE: APPROVAL OF RESEARCH ENTITLED “FACTORS THAT CONTRIBUTE TO CURRENT CAESAREAN SECTION RATES IN SELECTED HOSPITALS IN NAIROBI, KENYA” AT PUMWANI MATERNITY HOSPITAL**

The Pumwani Research and Ethics Committee is glad to inform you that your research proposal has been approved.


We wish you a fruitful data collection exercise.

We are looking forward to receive your research findings upon completion. This will add to our data base for future research reference and improvement of our institution.

Thank you.

**DR. B. WAMWANA**  
**For. MEDICAL SUPERINTENDENT**

## Appendix 6: Approval letter from St. Mary's Mission Hospital



**ST. MARY'S MISSION HOSPITAL**  
P.O. BOX 3409 – 00506 Nairobi  
Tel: 604235/38

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17<sup>th</sup> September 2010

Dr. Wanjohi, Grace Wangu  
SPH/PGH/1012/08  
School of Public Health  
Moi University/AMREF Programme  
AMREF Training Centre  
P.O Box 27691-00506  
**NAIROBI**

Dear Dr. Wanjohi

**RE: APPLICATION FOR PERMISSION TO CARRY OUT STUDY TITLED FACTORS THAT CONTRIBUTE TO CURRENT CAESEREAN SECTION RATES IN SELECTED HOSPITALS IN NAIROBI, KENYA.**

We write to acknowledge receipt of your application to use our hospital as a research site for your study on the above subject matter. We are also in receipt of a copy of the research proposal and copy of letter of formal approval by the Moi University IREC.


We have reviewed your proposal and found it to be current, relevant and appropriate. We are glad to inform you that you have been granted permission to carry out your study at our hospital during the proposed period as indicated in your write up.

This permission is granted on condition that during the period of your study you ensure that:-

1. All information you come across during your study will be treated as confidential
2. All information obtained will only be used for the intended purpose of this study
3. All questionnaires and entry tables will bear no patient names or hospital numbers
4. The study will not cause unnecessary delays or jeopardize patient care in any way
5. The study will not interfere with the smooth running of the hospital services

At the end of your study you will be requirement to submit to the hospital a copy of the final report of your research findings and recommendations.

Yours sincerely



Dr. Konya W.P  
**MEDICAL DIRECTOR**

For and behalf of St. Mary's Mission Hospital, Nairobi

cc. Consultant i/c Maternity Unit  
Nursing Officer i/c Maternity Unit

**Appendix 7: Time Frame**

The data collection took place between 1<sup>st</sup> October 2010 and March 31<sup>st</sup>, 2011 depending on when each of the units' research approval body gave approval.

St Mary's 1<sup>st</sup> Oct – 28<sup>th</sup> Oct 2010

NWH – 9<sup>th</sup> Oct 2011 to 8<sup>th</sup> March 2011

PMH-28<sup>th</sup> Feb 2011 to 28<sup>th</sup> March 2011