FACTORS ASSOCIATED WITH CESAREAN DELIVERY AT JARAMOGI OGINGA ODINGA TEACHING AND REFERRAL HOSPITAL, KISUMU-KENYA. A RETROSPECTIVE STUDY FOR THE PERIOD 2011-2020.

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A Thesis Submitted In Partial Fulfilment Of The Requirements For The Award Of The Degree Of Master Of Public Health At Jaramogi Oginga Odinga University Of Science And Technology

DECLARATION

I hereby declare that this thesis is my original work and has not been submitted for any academic award in any other institution of higher learning.

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DEDICATION

This proposed thesis is dedicated to my wife Asha, and children Abass, Rahma, Mubarak and Faiza, for their perseverance and support while I was working on this project.

ABSTRACT

The district health information system (DHIS2) of 2020, reported the rate of CS deliveries at Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) at 21.6%, more than WHO ideal rate for caesarean section deliveries of 10-15%. This descriptive study investigated sociodemographic factors of pregnant women, medical and non-medical factors related to both the pregnant women and the hospital system that influence CS deliveries at JOOTRH in Kisumu County. A cross-sectional descriptive study design was employed were a stratified sampling technique was used to select a sample of 385 files from the 10,055 CS deliveries done in JOOTRH in the period 2011 to 2020, from which data was collected using a pre-designed form. Collected data was entered into computer spreadsheets, and SPSS software used to analyze it. Participant characteristics were summarized using descriptive statistics, and further inferential analysis done using Chi-square to detect association between various variables with indication for CS delivery, using SPSS v23 (α=0.05). Findings were further illustrated using tables and figures. The average CS rate for the period of the study was 19%, lowest in the 2013 (16.87%) and highest in year 2020 (21.63%). Of the demographic factors, only education (p= 0.018), employment (p=0.015), and mode of payment for CS ($p=0$.048) were significantly associated with CS indication. This study found no significant role for general medical history (p = 0.163), ANC attendance (p = 0.413), but a strong association with obstetric factors (p < 0.001), the greatest being a previous CS scar (31.4%). The findings of this study thus present evidence of increased CS rate, and identifies some associated factors, which allows for focused interventions. Kisumu County Government and the Ministry of Health should come up with polices and guidelines on how to control the increase of CS rate at JOOTRH, while strengthening good referral practices that will allow most deliveries at lower-level facilities across the county, which could be emulated in other parts of the country and beyond. This may include policies and guidelines on trial of labour after caesarean section (TOLAC) and vaginal birth after caesarean section (VBAC).

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LIST OF ACRONYMS

ACOG	America College of Obstetrics and Gynaecologists
CGK	County Government of Kisumu
CPD	Cephalous-pelvic disproportion
CS	caesarean section
DHIS 2	District health information system 2
EFM	electronic foetal monitoring
JOOTRH	Jaramogi Oginga Odinga Teaching and Referral Hospital
JOOUST	Jaramogi Oginga Odinga University of Science and Technology
KDHS	Kenya Demographic Health Survey
PROM	Premature rapture of membrane
SGD	Sustainable Development Goals
VBAC	vaginal birth after caesarean section
WHO	World Health Organization

DEFINITION OF TERMS

Dystocia	Difficult birth, typically caused by a large or awkwardly positioned foetus, small maternal pelvis or by the failure of the uterus and cervix to contract and expand normally
Eclampsia	Seizures occur during pregnancy or shortly after giving birth. It is characterized by high blood pressure and excess protein in urine during pregnancy.
Multiparous	Having given birth two or more times.
Nulliparity	The condition in a woman of never having given birth (regardless of outcome).
Placenta abruption	When the placenta partial or completely separates from the uterine lining.
Placenta previa	When the placenta covers the opening in the mother's cervix.
Primigravidae	A woman who is pregnant for the first time.

CHAPTER ONE: INTRODUCTION

1.1 Background

Caesarean section (CS) is a surgical procedure that is made on a women's abdomen and uterus to deliver her baby whenever abnormal conditions complicate the pregnancy and labour, threatening the life or health of the mother or the baby (Bano *et al.*, 2015). It has been reported that CS delivery was performed in the early century due to different reasons that include removing the infant from the dead mother for separate burial (Begum *et al.*, 2009). The first authenticated and documented case of a successful CS delivery took place in Wittenberg, Germany in April 1610 although the patient (mother) died after 25 days due to infections, while the child lived for 9 years (Dongen, 2009).

With the advancement of medicine and the discovery of antibiotics, the procedure has become safer and more acceptable. With the achievement of healthcare development and decrease of maternal mortality the procedure has increased in most countries, but the drivers for this trend are not well understood, thus several factors and theories are thought to be contributing to the increase, including a decrease in vaginal birth after caesarean section (VBAC), increased prevalence of high-risk pregnancies and cultural practices (He *et al.*, 2016).

Several known conditions necessitate CS. According to Vogel *et al.* (2015), reasons for CS are best classified using the Robson criterion that allows standardized comparison of data across countries and time points. It categorizes all deliveries into 10 groups based on five obstetric parameters, that includes; obstetric history (parity and previous caesarean section), the onset of labour (spontaneous, induced, or caesarean section before onset of labour), foetal lie (cephalic, breech or transverse), number of neonates, and gestational age (preterm or term). However, according to Newlin *et al.* (2015), cases of missing data, and miss-classification of women, are some of the challenges on its use. With documented reports of increasing rates of caesarean deliveries all over the world, in 1985 the world health organization (WHO, 2022) assembled a panel of reproductive experts in Brazil that issued a statement , “there is no justification for any region to have a rate higher than 10-15%”, although the range is debatable it serves as a guideline for policy makers in assessing the progress in maternal and infant health, monitoring of emergency obstetric care and

resource use (Vogel *et al.*, 2015). The steady increase of the CS rates worldwide continues to evoke concerns about its short- and long-term risks. Data analysis of 150 countries for the period of 1990 to 2014 (Betran *et al.*, 2016) reported an average of 18.6%, with Latin America and the Caribbean having the highest of 40.5%, followed by North America with 32.3%, European continent had an average of 25%, Asia 19.2%, with the lowest in Africa at 7.3%. The KDHS (2014) report revealed that the CS rate for Kenya was at 9%, and 5.1% in the Nyanza region, with Kisumu County having 4.1%. While data from DHIS2 (2020), showed JOORTH having a CS rate of 21.6%, implying that the national, regional rates and Kisumu County CS rate were lower than the WHO recommendation. The Kenya maternal mortality rate was 342 per 100,000 live births in 2019, which is still inadequate as per the target goal of SDG 3 of 2030 of 140 per 100,000 lives birth (WHO, 2020).

Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) is a public (government run) health facility in Kisumu County that has been in existence for more than 50 years. It provides comprehensive obstetric care and is the referral hospital serving facilities in more than 10 counties in Nyanza, western and rift valley regions. The new maternity complex consists of 60 beds capacity with 20 labour wards. Because of its status as a regional referral health facility, it would be expected that more CS deliveries are performed here than in the facilities within its catchment, regardless of the reasons for the choice.

1.2 Statement of Problem

Currently, CS is generally perceived as a low-risk procedure by both the expectant mother and the clinicians, despite this popular belief, CS is associated with a high risk of maternal morbidity and mortality when compared to vaginal deliveries. An increase in CS leads to an increased cost of burden to the health sector that is already underfunded, while lack of the procedure means that women are missing on the essential services and will lead to increase in maternal mortality rates (WHO, 2022). CS is also associated with maternal and infant morbidity like wound infections, difficulty in breathing and a long stay in hospitals. There is evidence that prenatal morbidity and mortality has not changed despite increased caesarean section rates, with recorded increased intra- and post-operative complications (Koridze *et al.*, 2015).

Newlin *et al.* (2015), Observed that women undergoing CS had higher chances of suffering from postpartum haemorrhage due to puerperal infections and surgical wound infections ending up getting a blood transfusion as a consequence of severe haemorrhage. A meta-analysis on maternal complications and caesarean section without medical indication revealed higher maternal death in women undergoing CS than women who delivered normally (Mascarello *et al.*, 2017). According to Koridze *et al.* (2015), the situation is complex, since many factors are involved: the right of patients to choose the mode of delivery, the number of patients with prior caesarean section, and physician preference for caesarean section, among others.

Delivery via CS is associated with an increased risk of respiratory infections to the infant, a higher number of infants admitted to intensive care units and an increased infant mortality rate. Sandall *et al.* (2018), reported that short-term effects like breathing difficulties (transient tachypnoea of the new-born), and long-term effects like asthma and allergies due to the altered physiological process of birth are some of the morbidities common to infants born through CS. Several studies have also reported that planned CS has the risk of breathing the infant earlier compared to the normal physiological process of labour and vaginal delivery which enhances the baby lung adaptation through a catecholamine surge that stimulates the re-absorption of the foetal lung fluid and release of surfactant.

Usually, CS has some economic implications to the affected individuals, the facility and the health sector at large. The high reimbursement rate of CS is thought to be one of the factors fuelling its increase, however, there are very few research papers written about it. According to He *et al.* (2016), the cost of CS is approximately double the cost of the trial of labour and vaginal delivery. In Kenya, the National Hospital Insurance Fund (NHIF) has reported an increase in pay out on claims arising from CS deliveries with the amount surpassing 1 billion in the year 2015 accounting for 58% of the maternity cost. Of particular concern is the higher CS rate of 21.6% at JOOTRH (DHIS2, 2020), more than the WHO recommended CS rates. The maternal mortality rate of the Kisumu County is also reported to be high at 495 per 100,000 live births (CGK, 2015). There is also a concern of inequality of health care services, in particularly reproductive health services, considering that the entire Kisumu

County CS rate is at 4.1%(KDHS, 2014), lower than WHO ideal CS rates of 10% to 15%.

1. 3 Objectives

1.3.1 General Objective

To investigate the factors associated with CS delivery at Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH)

1.3.2 Specific Objectives

1. To establish the socio-demographic factors that are associated with CS in JOOTRH
2. To establish the medical factors that are associated with CS in JOOTRH
3. To establish non-medical factors that are associated with CS in JOOTRH

1.4 Research Questions

1. What are the socio-demographic factors associated with CS in JOOTRH?
2. What are the medical factors that are associated with CS in JOOTRH?
3. What are the non-medical factors that are associated with CS in JOOTRH?

1.5 Justification

The Kenya Demographic Health Survey of 2014, reported a lower CS rate in Kisumu County, while DHIS2 reported higher CS rate in JOORTH more than the WHO recommended CS rate. Having optimal CS rates is a positive indicator of the reproductive health of women. Prior to the current study, there were no published reports on the factors contributing to CS delivery in JOORTH and Kisumu County, hence the importance of this study, which seeks to examine socio-demographic factors of women who had delivered through CS, medical and non-medical factors that contribute to CS deliveries in JOOTRH through the study period of 2011 to 2020.

1. 6 Significance

The findings of the study will contribute to the understanding the factors that affect CS delivery, and identifying the gaps as well as the recommendations based on the study objectives will now avail an avenue to inform policy makers, hospital managers and healthcare workers who are tasked with providing the essential reproductive health services, its development and implementation in the country.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Caesarean section is one of the most commonly performed major surgeries in obstetric practice intended to save the mother and child, thereby reducing maternal and perinatal mortality (Bano *et al.*, 2015). However, the increasing global rate of caesarean section has become one of the most debated topics in maternity care today (Diema *et al.*, 2019), especially given normal delivery is a natural and physiological process with numerous benefits for mother and baby, and as such CS should normally be limited to the cases in which normal delivery is not possible (Begum *et al.*, 2009; Hruban *et al.*, 2012; Siabani *et al.*, 2019).

Historically, the concern of increasing CS levels was raised decades back, when Zhmakin (1967), noted the expanding indications for caesarean sections were well justified, bearing there had also been studies on the consequences on the baby born through CS (Bezirtzoglou & Romond, 1991; Keller & Toussaint, 1960; Straker, 1962). Some of the areas researched, then, included effects of CS delivery upon survival probability, weaning weight, and open-field activity (Zarrow, 1966), as well as the consequences of repeat CS (Callan, 1964). Furthermore, the outcome of a pregnancy following a previous caesarean section has long been investigated (Waidl, 1966).

To address this critical concern, the WHO in 1985 issued a consensus statement stating that there is no justification or additional health benefit to be gained by any region having a CS rate below 10% or higher than 15%. This is against the backdrop of the complications that may arise before, during and after caesarean section, commonly including prolonged and obstructed labour, inhalation of gastric contents, pre-eclamptic toxaemia and eclampsia, haemorrhage and coagulation disorders, supine hypotensive syndrome and amniotic fluid embolism (Koridze *et al.*, 2015; Oyegunle, 1976).

The practice of CS in childbirth is complex, as it is not only dependent on medical grounds, but many other factors also contribute, including the attitude of women towards normal delivery (Siabani *et al.*, 2019), perception of CS as a pain-free method of birth and perceived safety for both mother and baby. Other reasons include

community influence and religious advice (Diema *et al.*, 2019; Ugwu & de Kok, 2015). Furthermore, there are issues relating to patient choice and physician preferences, as well as the physician-patient ratio, that play a central role in the decision to adopt CS for delivery (Koridze *et al.*, 2015). In addition, factors revolving around the risks versus benefits of both normal and CS delivery (Begum *et al.*, 2009), psychological stress especially following abuse (Halvorsen *et al.*, 2008), have been shown to influence the choice of CS by women.

It is therefore imperative that this descriptive study looks at the factors that are associated with CS rate locally, to expose their exact extents and patterns. This will boost the appreciation of CS as a crucial medical intervention, and pave way for better interaction with the target population, the pregnant women, some of whom may often opt for CS when it is not necessary.

2.2 Demographic factors influencing CS

2.2.1 Maternal age

Maternal characteristics such as age, weight, number of pregnancies and demographic status can significantly affect the rate of CS delivery (Sparic *et al.*, 2015). A study by (Elnakib *et al.*, 2019), showed that demographic characteristics of pregnant women have changed such that delayed childbearing is associated with complications of pregnancy such as hypertension, diabetes mellitus, placenta aberration, placenta previa and preterm births regardless of the parity which are risk factors for CS. This is in line with a report by Halifax (2008), that showed older women were more likely to have conditions like hypertension and diabetes or other medical conditions, which is a risk factor for CS. However, a study in Ethiopia,(Regassa, 2011), reported low CS rate in older women was attributed to the women preferring normal delivery and being attended to by traditional birth attendants. According to Strom (2013), maternal age is not a significant factor on its own but rather influenced by other changes that take place in the healthcare environment and society. In a study done in Nigeria by Evaluda *et al.* (2013), young couples had a higher risk of vaginal delivery complication thus the physicians prefer them to undergo CS. On the other hand, Diema *et al.* (2019) reported a weak positive correlation between the age of respondents and the number of times to have CS. Also, a study in the USA (Penfield

et al., 2017), revealed that young maternal age is protective against caesarean delivery in all racial or ethnic groups.

2.2.2 Socio-economic status of pregnant women

Poor socio-economic status, lack of education and lack of antenatal care greatly influence pregnancy outcome and management. According to (Shamshad, 2008), poor socioeconomic status sets a vicious circle of poor pregnancy outcomes, complications, morbidity and mortality. Few previous studies have demonstrated the difference in CS rate among the various social-economic status groups within a country or region. A population study in Norway (Tollanes *et al.*, 2007) reported that women of low socioeconomic status were more likely to undergo CS. This is in agreement with a study done in Pakistan by Shamshad (2008), that also reported those of poor social economic status were more likely to undergo CS than those of rich families. However, considering the economic status, the picture is not very clear as it may affect all different categories. A study in Finland (Räisänen, 2014), reported a less likely increase of CS delivery in women of low socioeconomic status. A study done in Ghana by Manyeh *et al.* (2019), showed rich women were more likely to undergo CS than poor women. In Duayaw Nkwanta, Ghana, a positive correlation between the average monthly income of women and the number of times of have a CS birth has also been reported (Diema *et al.*, 2019). It is therefore imperative that efforts are enhanced in educating mothers on the associated benefit and risk of caesarean sections as a method of child delivery, to allow informed choices.

2.2.3 Education

Education has been shown to affect health care outcomes, and studies have reported that educated women were more likely to undergo CS than the less educated women since they seek healthcare services (Essex *et al.*, 2013; Oner *et al.*, 2016). However, in Italy,(Torloni *et al.*, 2013), observed that women with low education were more likely to deliver through CS. In India, there were no differences in the education level in women who desired CS delivery and those who desired vaginal delivery (Cesaroni *et al.*, 2008; Koridze *et al.*, 2015).

2.2.4 Religion and Cultural Practices

Religion and Cultural practices influence on women lives including deliveries is a contributing factor in the mode of delivery. Among Christians, CS is generally acceptable while it is different in other dominoes, (Batieha *et al.*, 2017). In African traditional religions, normal birth (Vaginal deliveries), is celebrated while CS is not allowed. For Muslim faithful, they believe that childbirth should progress as ordained by God, even in Emergency they are hesitant to undergo CS. A study by (Batieha *et al.*, 2017), showed that Christian Jordanian women were more likely to undergo CS due to the planned pregnancies than their Muslim women counterparts. On the other hand, the CS rate in China is mainly determined by women who prefer to choose a lucky day for delivery (Betran *et al.*, 2016; He *et al.*, 2016).

2.2.6 Number of children

Several studies documented that first time mothers (primigravidae) are more likely to undergo CS, most likely due to the physician influence or the mother's decision to seek services at the health facilities. In a study by (Oner *et al.*, 2015), CS was higher in primigravidae in private and university health facilities compared to the middle-level public facilities despite having the same medical facilities and equipment, This study has also shown that it is higher during working hours towards evening and more so on Fridays. A study done in Cameroon (Tebeu *et al.*, 2011), showed that CS was as high in null parity women compared to other groups. This is in line with a study done in Iran (Rajabi *et al.*, 2015), that reported CS to be higher in women of low parity. In a study done in India, (Ajeet & Nandkishore, 2013), reported that preference for CS delivery was high in multiparous women and this was associated with the previous negative birth experiences.

2.3 Medical Factors

Many factors associated with the pregnant woman or foetus, or both, during pregnancy and after delivery, have been described to necessitate CS deliveries (Al Busaidi *et al.*, 2012; Pallasmaa *et al.*, 2010; Siddiqui, 2013). Many such factors were identified many decades ago, and mainly include breech presentation, dystocia, foetal distress, non-progressive labour, breech presentation and medical conditions such as HIV infection, hypertension and diabetics (Rupek *et al.*, 1972).

2.3.1 Prolonged labour

Prolonged labour is a common birth complication that accounts for two-thirds of all primary indications of emergency CS deliveries (Lones *et al.*, 2017). This is in line with research carried in a mission hospital in Tanzania (Becher, 2013), which reported 30% of CS delivery were due to prolonged labour. Although there is no ideal time of how long labour should last, prolonged labour is considered when labour exceeds 24 hours as a result of more than 20 hours of the latent phase of labour in primigravida and 14 hours in multipara women, or due to delay or lacking cervical dilatation. The timely management of prolonged labour is what is important as lack of it may have negative outcomes. However, its common indication is a concern. In a study done in the USA, Barber *et al.* (2011), noted that prolonged labour and foetal distress, which is considered as subjective indications, accounted for 50% of primary CS while other indications, considered as non-subjective, such as placenta previa, placenta abruption and multiple pregnancies, remained constant. According to Salman *et al.* (2017), CS deliveries due to prolonged labour result in poor neonatal outcomes than normal delivery while these factors can be modified, and therefore it is possible to reduce the CS rate.

2.3.2 Foetal distress

Foetal distress is one of the common indications for CS in a bid to save the foetus. Although it is a widely used clinical term, it is considered to be nonspecific (Bucklin, 2007). In 1998 the American College of Obstetrics and Gynaecologist (ACOG) published a recommendation of replacing it with the word *non assuring foetal heart rate tracing*. However, the obstetricians continue to use the term to describe a wide range of foetal heart rate abnormalities that may be resulting in the delivery of infants that may be in good condition. In a study done in Bangladesh,(Khanum & Chowdhury, 2020) reported a third of CS intervention was due to foetal distress.

2.3.3 Electronic foetal monitoring

The use of electronic foetal monitoring (EFM) is one of the tools for monitoring the foetus inside the uterus during labour, and aids in making timely decisions that save the life of the foetus and the mother (Nelson *et al.*, 2016). However, medical professionals have pointed out the difficulty in interpreting the EFM due to its low specificity and high sensitivity, thus giving high false-positive rates (McCusker *et al.*,

1988; Michikata *et al.*, 2016). McCusker *et al.*, (1988); Paterno *et al.*, (2016), have demonstrated higher caesarean section rates is associated with EFM. According to, (Thomas *et al.*, 2001), EFM is recommended in pregnant women with known risk factors but a detailed mother and caregiver discussion should be given to maximize its benefits and reduce unnecessary interventions such as CS.

2.3.4 Medical Conditions

Medical conditions like diabetics and hypertension are known risk factors that lead to CS deliveries (Al Busaidi *et al.*, 2012). A study was done in Jordan (Batieha *et al.*, 2017), reported women with diabetes mellitus, anaemia and hypertension were more likely to deliver through CS. This is in line with a retrospective study done in Ethiopia by (Abebe *et al.*, 2016). An analysis of cardio-metabolic risk factors by (Hedderson *et al.*, 2018) reported that Increase in BMI, increase in glucose intolerance and maternal hypertension, increased the odds of delivering through CS.

2.4 Non-Medical Factors

2.4.1 Cost

Delivery via CS has been reported to be high in urban areas due to the availability of trained medical personnel and good medical infrastructure in private healthcare facilities are the major contributing factor in the higher number of CS deliveries. It offers the women continuity of care and access to obstetricians throughout the pregnancy period while in public facilities the women are seen by a range of midwives and clinicians. However, the sharp rise of the procedure and unjustifiable indications reported is a concern. In Iran (Rajabi *et al.*, 2015), observed that elective CS deliveries were high among women referred in private clinics and may be due to social reasons. Similarly, Singh *et al.* (2018), observed CS deliveries in India to be threefold higher in private health facilities than in public health facilities. The trend has also been noted in Egypt (Al Rifai, 2017) and Ethiopia (Tsega *et al.*, 2015). In rural set up the reasons reflect women preferring to deliver at home rather than health facilities with some of the reasons being negative experience in the previous delivery, and the distance of health facilities (Ajeet & Nandkishore, 2013). Hospital fees and other birth delivery expenses like transport have been reported to be one of the barriers to seeking healthcare services that may have many women deliver at home or not well-set facilities, thus only get referrals when the complications set in hence the

higher number of CS among referrals. However, a study done in Tanzania reported that despite an increase in user fee, did not affect the rate of CS (Nilsen *et al.*, 2014).

2.4.2 Legal Litigations

Patient's safety can lead to malpractice claims and the fear of legal litigations does not allow the professionals to take any risk, thus preferring to carry out CS rather taking the women through physiological labour (Dexter *et al*., 2014; Kraemer *et al*., 2004; Vimercati *et al*., 2000). The study carried in the USA (Michelle *et al*., 2009) noted that obstetricians are sued more frequently and pay more for liability insurance coverage than the other medical personnel.

2.4.3 Maternal Request

Research has attributed a sizable proportion of CS delivery in developed countries to maternal requests. In a cross-sectional survey study done in China and a meta-analysis study done in the USA (Feng *et al*., 2012; UN, 2016), the maternal request was often the documented indication. A descriptive study was done in South Africa (Matshidze *et al*., 1998) noted that maternal request as an indication was high in private hospitals and may be due to the women ability to negotiate their preferences with the obstetrician. The researcher also noted that the majority were career women. Debate on CS on maternal request still exists within the society with different proponents advocating on their strong points. A world health report by (Lauer *et al*., 2010), noted that the women choices of CS delivery (demand-driven) effect on the trend is much smaller and is mostly influenced by the ability of the health care system (supply-driven) to carry such operations.

2.5 Theoretical Framework.

This study is grounded upon health believe model (HBM) proposed in 1974 by Rosentock.it state that a person's health is influenced by at least three factors (i) general health value (ii) specific health beliefs about vulnerability to a particular health threat, and (iii) beliefs about the consequence of the health problem. The theory explains the links of multiple influence that include individual, interpersonal, institutional and the community.

(i)Socio demographic characteristics

Socioeconomic status has been linked with health status where less affluent persons experience higher morbidity and mortality. The theory explains that characteristics such as gender, age, marital status and employment, although generally modifiable, are important factors that influence the outcome of a person's health

(ii) Interpersonal, community and institutional influence.

The direction of action taken by individual in these case the pregnant mother will be impacted by the knowledge, attitude and essential obstetric care given by the health institution. The desire of the women to choose a particular mode of delivery is hindered by existing medical contraindication. For example, women with cephalic-pelvic disproportion (CPD) will not be able to deliver through normal vaginal delivery.

2.6 Conceptual Framework

In this study, the rate of CS uptake (dependent variable) at JOOTRH, a major regional referral facility, was investigated in the context of being driven by factors (independent variables) attributable to the socio-demographic factors of the pregnant woman, as well as medical and non-medical factors related to both the pregnant woman and the hospital delivery system. The study also recognized the potential modifying effect of possible changes in relevant policies as well as any new discoveries (intervening variables). The interaction between the variables and key elements addressed within each variable is presented on Figure 2.1

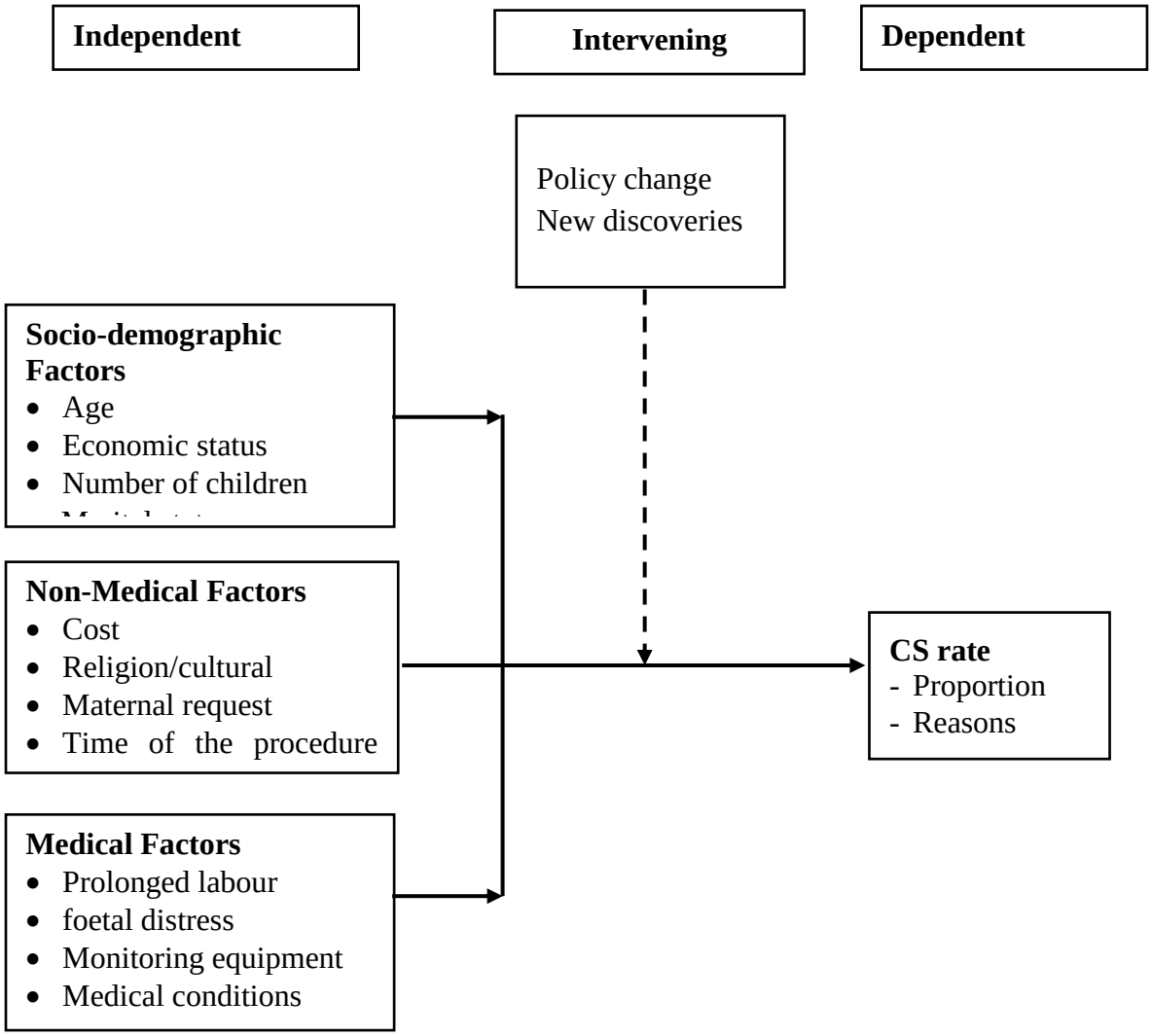


Figure 2.1: Conceptual Framework

(Source: Author)

CHAPTER THREE: METHODOLOGY

3.1 Study Site

The study was conducted in Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH). The facility is located in Kisumu central about 6 km from the town, along Jomo Kenyatta highway and next to Kondele police station. The co-ordinates are 0.0890° S, 34.7718° E. The hospital is a level 6 facility with an 800-bed capacity that is a referral centre for the entire Nyanza counties and also caters for Western and Rift valley counties. It is a teaching hospital that serves major universities and medical colleges in the region. The maternity wing consists of 60 bed capacity with 20 labour wards, the hospital conducts an average of 5000 deliveries annually.

3.2 Study Design

A hospital based cross-sectional descriptive study was conducted for 2 months (1st October- 30th November 2021) using secondary data that included 385 patients files from the facility maternity records of 2011-2020. The design was chosen so that collected data could be analysed for an association of the predictor variable and the outcome in terms of persons, place and time. Both quantitative and qualitative method were used to gather the required information.

3.3 Sample Size Determination

The sample size was determined using Yamane (1967) formula. It is a simple formula used to calculate the sample size of known population size at a given confidence level.

$$n = N/1+N(e^2)$$

where:

n = The desired sample size

N=Population (10055)

e = error (0.05 at 95%CI)

Substituting: $n = 10055/1+ (10055*0.05^2)$

$n = 384.6963$

n = 385

The sample size was allocated in each start (year) by getting the percentage (as shown on Table 3.1), for example, for the year 2011:

(962/10055) * 385= 36.83= 37

Table 3.1: Data from Kenya District Health Information System II (2020)

Year	Number of CS at JOOTRH	Sample
2011	962	37
2012	900	34
2013	994	38
2014	1050	40
2015	1243	48
2016	1236	47
2017	492	19
2018	1362	52
2019	963	37
2020	853	33
Total	**10,055**	**385**

3.4 Sampling Technique

The hospital register showed that in the study period there were 10,055 CS deliveries recoded, 385 files were selected using Stratified sampling technique and further used to allocate for each year. Files for each year was picked randomly. Purposive sampling was used to select (6) key informants for the study. Key informants comprised of informed, knowledgeable and experienced persons that included an obstetrics and gynaecologist consultant, 2 medical officers and 3 midwives/nurses working in the maternity wing. After participant consented to participate in the study, they were interviewed using a pretested semi-structured questionnaire.

3.4.1 Inclusion Criteria

A complete record of all the women who delivered through CS in the facility from January 2011 to December 2020. Healthcare workers working in the maternity wing and willing to participate in the study.

3.4.2 Exclusion criteria

Women who deliver through normal vaginal delivery. The deliveries that were recorded outside the study period. Key informants who refused or were unable to give consent.

3.5 Instruments

The study used 385 patient files retrieved from the hospital maternity records , and held (6) Key informant interviews using semi-structured questionnaires, from one obstetric and gynocoligist consultant doctor, 2 medical officers and 3 nurses among medical staff working in JOOTRH.

3.6 Piloting

Piloting was carried in Kisumu County Hospital which is a level IV facility that shares almost similar infrastructure and demographics features with JOOTRH. The study questionnaire was pretested to enhance its validity and reliability where a total 4, (representing 67%) of the sample size, health care workers in the maternity wing were randomly selected and used to pre-test the questionnaire. Following a pilot study conducted using the 4 healthcare workers drawn from Kisumu County hospital, a Cronbach alpha coefficient of 0.83 was obtained, indicating consistency in answering the questions. The results were used to fine-tune the tools before eventual data collection.

3.7 Data Collection Procedures

Secondary data that included 385 patient's files was retrieved from the hospital maternity records department and arranged according to the years of interest. In addition, all deliveries records for JOOTRH for the period 2011 to 2020 were retrieved from the KDHIS (2020). Two trained research assistants were used to administer the twelve (12) forms that included the questionnaire (appendix II) and informed consent (appendix III) to the healthcare workers in the maternity wing and the obstetric department. Collected data was stored in the researcher's computer, patients' details were coded where only the variables of interest were recorded.

3.8 Data Analysis

Summarized sample data collected from the hospital records department that included the variables of interest was entered and analysed using SPSS (v.24). Descriptive statistics was used to summarize socio-demographic and medical data. Associations were detected using correlation analysis, while differences between different groups and variables were tested using the Chi-square test. The results were presented in form of tables, charts and graphs, as applicable and appropriate.

3.9 Ethical Considerations

This study was approved by the Board of Postgraduate studies of JOOUST, (appendix VI). Ethical approval to conduct the study was obtained from Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) Research Ethics Committee (appendix VII) and permission to collect data for the study obtained from JOOTRH management (appendix VIII). All data collected from the hospital files were coded where patients name was not recorded and also those filling the questionnaire were not required to state their names in order to maintain confidentiality, the data was only used for the approved research.

CHAPTER FOUR: RESULTS

4.0 CS Rate

The total deliveries at JOOTRH in the study period of (2011-2020) was 53060 of which CS deliveries was 10,055. The CS rate was highest in year 2020 (21.63%) and lowest in the 2013 (16.87%). Average CS rate as determined for the period of the study was 19%. The trend indicates that there was a gradually increase of CS rate over the period of the study (Figure 4.1).

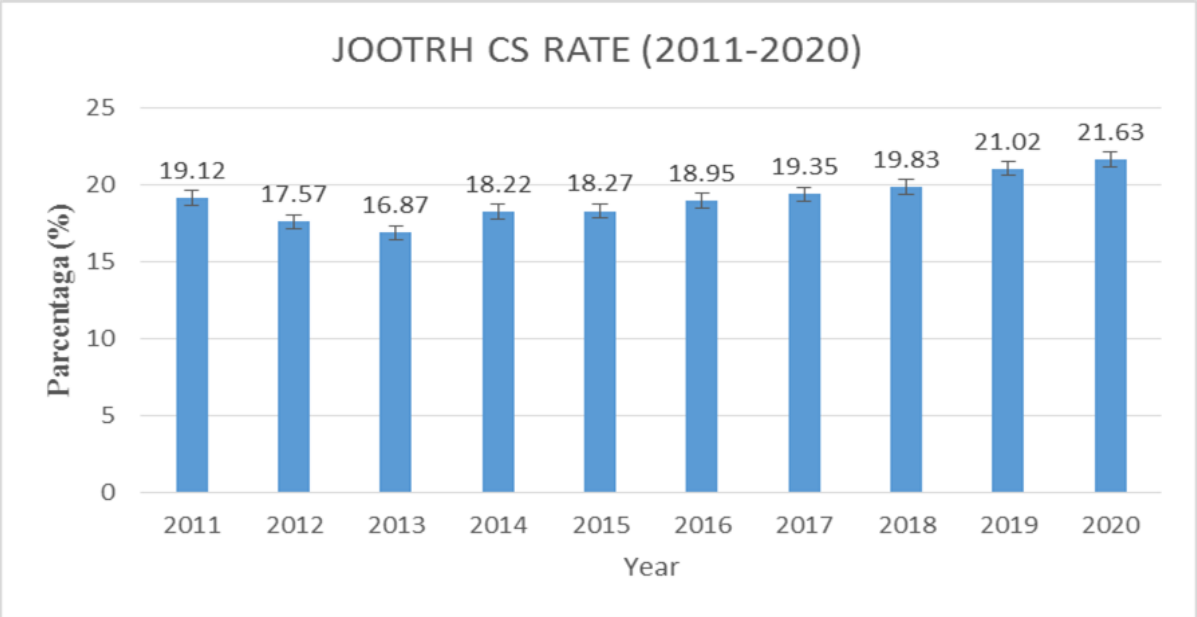


Figure 4.1: CS Rate at JOOTRH in 2011-2020

4.1 Demographic Factors

The average age for CS was established to be 26 years whereas the median age was also 26 years. Nonetheless, the age that appeared most for the cumulative period of study (2011-2020) was 22 years with a frequency of 51 as demonstrated in (Fig 4.2) . The youngest age to undergo CS during the period of study was 14 years while the oldest maternal case for CS was 42 years.

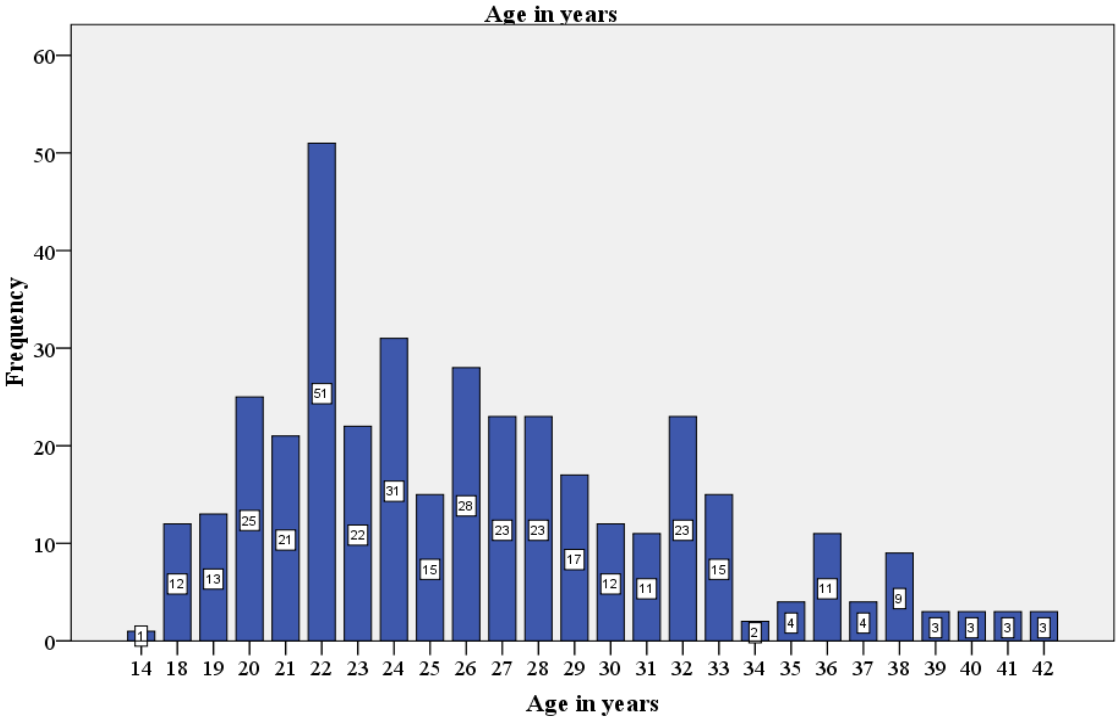


Figure 4.2: Age of the women who underwent CS at JOORTH from 2011 to 2020

The youngest age was 14 years while the oldest were 42 years. Women of age 22 years were the majority presenting 51 (13%) of the cases. The chi-square test of association between type of CS and age yielded $p = 0.126$. The test of association is summarized in the Table 4.1.

Table 4.1: Chi- Square test analysis of women's age vs. CS delivery

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	33.207	25	0.126
Likelihood Ratio	40.782	25	0.024
No. of Valid Cases	385		

4.1.2 Religion

In these study, the majority (362) representing 94% of the women who delivered through CS where Christian while 23 (6%) were Muslim. However, the chi-square test of association revealed there was no statistical association of type of religion and

likelihood of delivering through CS (p = 0.097). The Chi-square test of association is summarized in the Table 4.2.

Table 4.2: Chi-square test analysis of association of Religion with CS delivery at JOORTH

Chi-Square Tests					
	Value	**df**	**Asymp. Sig. (2-sided)**	**Exact Sig. (2-sided)**	**Exact Sig. (1-sided)**
Pearson Chi-Square	2.755[a]	1	0.097		
Continuity Correction[b]	1.738	1	0.187		
Likelihood Ratio	2.267	1	0.132		
Fisher's Exact Test				0.160	0.100
N of Valid Cases	385				

4.1.3 Marital Status

The majority of the CS patients were married and living with their spouses were 289 (75.1%) whereas those married and not living with their spouses were 20 (5.2%), divorced or separated CS clients were 5 (1.3%), while 70 (18.2%) were single, and only 1 (0.3%) was widowed. The marital status of the CS patients is summarized on Table 4.3.

Table 4.3: Showing marital status of the women who had CS delivery at JOORTH

Marital status	**Frequency**	**%**	**Valid %**	**Cumulative %**
Married and living with spouse	289	75.1	75.1	75.1
Divorced or separated	5	1.3	1.3	76.4
Married but not living with Spouse	20	5.2	5.2	81.6
Single	70	18.2	18.2	99.7
Widowed	1	0.3	0.3	100.0
Total	**385**	**100.0**	**100.0**	

The chi-square test showed there was no association between marital status and CS delivery (p = 0.297), as summarized in the Table 4.4.

Table 4.4: Association of marital status and CS delivery at JOORTH

	Chi-Square Tests		
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	4.908[a]	4	0.297
Likelihood Ratio	4.115	4	0.391
N of Valid Cases	385		

4.1.4 Education

Analysis of CS patients' educational levels revealed that 105 (27.3%) were either college or university graduates, those having only reached primary level were 123 (31.9%), while those with no education were 9 (2.3%). The majority of the CS patients had secondary education (148; 38.4%). The educational level is summarized in the Table 4.5.

Table 4.5: Education level of women who delivered through CS at JOORTH

Education level	**Frequency**	**%**	**Valid %**	**Cumulative %**
College/University	105	27.3	27.3	27.3
None	9	2.3	2.3	29.6
Primary	123	31.9	31.9	61.6
Secondary	148	38.4	38.4	100.0
Total	**385**	**100.0**	**100.0**	

The chi-square test of association revealed there was an association between CS patients' level of education and CS delivery (p= 0.018).

4.1.5 Residence

Results here revealed that a majority (287; 74.5%) of the CS patients came from Kisumu County as the primary place of residence. Other counties with substantial numbers were Siaya (29; 7.5%), Vihiga (28; 7.3%) and Kakamega (16; 4.2%). Table 4.6 shows the CS patients classified by county of residence.

Table 4.6: County of residence of CS patients JOORTH

Residency	Frequency	Percent	Valid %	Cumulative %
Homabay	6	1.6	1.6	1.6
Bungoma	3	.8	.8	2.3
Busia	2	.5	.5	2.9
Kakamega	16	4.2	4.2	7.0
Kisumu	287	74.5	74.5	81.6
Makueni	1	.3	.3	81.8
Marsabit	1	.3	.3	82.1
Migori	5	1.3	1.3	83.4
Nairobi	2	.5	.5	83.9
Nakuru	1	.3	.3	84.2
Nandi	3	.8	.8	84.9
Nyamira	1	.3	.3	85.2
Siaya	29	7.5	7.5	92.7
Vihiga	28	7.3	7.3	100.0
Total	**385**	**100.0**	**100.0**	

The chi-square test of association between the area of residency and indication for CS revealed there was no statistically significant association ($p = 0.24$) as summarized in the Table 4.7.

Table 4.7: Chi-square test of association between patients' residence and CS delivery

	Chi-Square Tests		
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	16.179[a]	13	0.240
Likelihood Ratio	12.315	13	0.502
N of Valid Cases	385		

4.1.6 No of children versus indication for CS

The number of CS patients with only 1 child was highest with 121 (31.4%) of all mothers, followed CS patients with 0 children (119; 30.9%). The mean, median and

modal number of children was 1 with a standard deviation of 1.085 and a variance of 1.177. The frequency of mothers undergoing CS due to the number of children decreased subsequently from the 2nd child, 94 (24.4%), 3rd child, 40 (10.4%) and the 4th 11 (2.9%). These are illustrated by Figure 4.3.

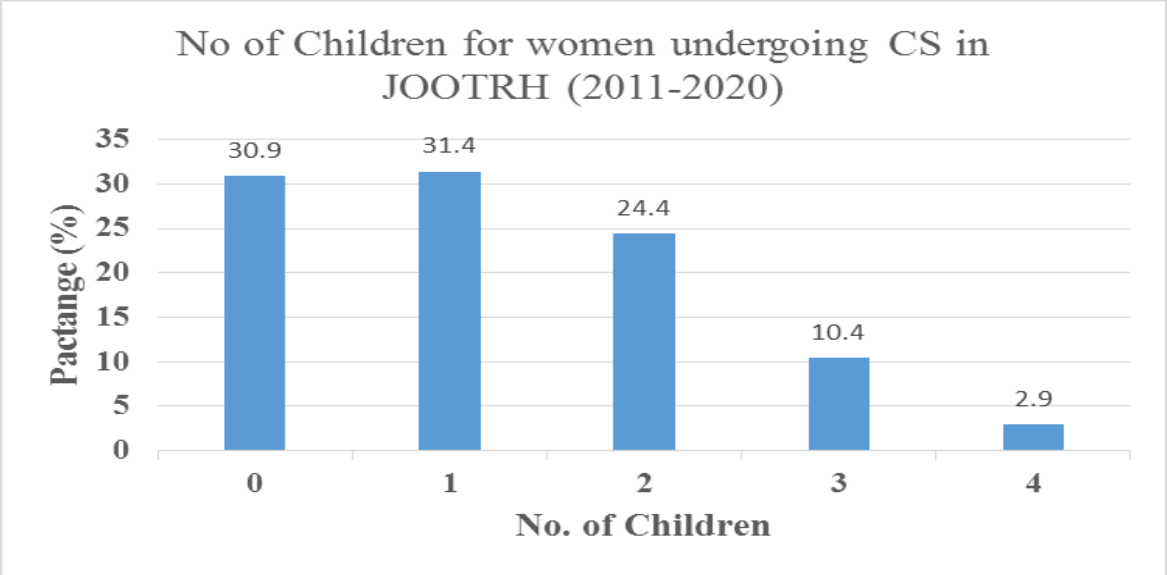


Figure 4.3: Number of children for women who underwent CS delivery at JOORTH

The Chi-square test of association established no statistically significant (p = 0.25), relationship between the number of children and indication for CS as summarized in the Table 4.8.

Table 4.8: Association between number of children and CS delivery at JOORTH

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	5.389[a]	4	0.250
Likelihood Ratio	5.862	4	0.210
N of Valid Cases	385		

4.1.7 Socioeconomic Status of CS patients

The employment status of the CS patients varied from having no employment at all (162; 42.1%) to self-employment (122; 31.7%). The CS patients that had formal

employment were 78 (20.3%), while non-formal or casual employment accounted for 23 (6%) of the CS patients (Table 4.9).

Table 4.9: Employment status of CS patients at JOORTH

Employment status	Frequency	%	Valid %	Cumulative %
Self-employed/Business	122	31.7	31.7	31.7
Formal Employment	78	20.3	20.3	51.9
Non-formal/casual Employment	23	6.0	6.0	57.9
None	162	42.1	42.1	100.0
Total	**385**	**100.0**	**100.0**	

The chi-square test of association revealed that an association (p = 0.015) between employment status and indication for CS delivery (Table 4.10).

Table 4.10: Association between employment status and CS delivery at JOORTH

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	10.481[a]	3	0.015
Likelihood Ratio	10.906	3	0.012
N of Valid Cases	385		

4.1.8 Payment Method

Majority of the CS patients had their medical bill settled by insurance (70.65%), and medical bill waivers accounted for 21.56%. Payment for CS delivery using cash was only by 7.79% of the CS patients JOOTRH (Figure 4.4).

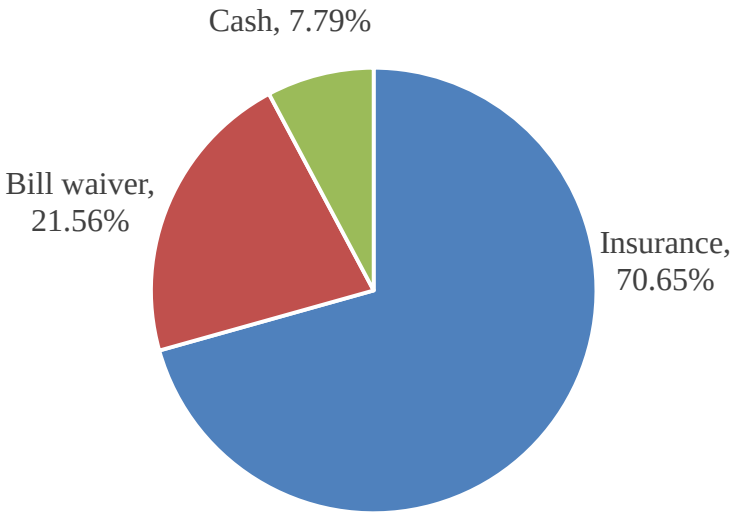


Figure 4.4: Hospital bill payment method for CS

Chi square test of association between the payment option and indication for CS revealed a p value not significant association (0.048), as shown on Table 4.11.

Table 4.11: Association between bills payment option and indication for CS delivery

	Chi-Square Tests		
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	6.087[a]	2	0.048
Likelihood Ratio	7.537	2	0.023
N of Valid Cases	385		

4.1.9 Time of Procedure

The results indicated most CS was performed in the evening with 175 (45.5%) patients having undergone the procedure within that time. The rest had the procedure conducted in the morning (111; 28.8%), or at night (99; 25.7%), as summarized on the Table 4.12.

Table 4.12: Time CS procedure is conducted at JOORTH

Time of CS	Frequency	%	Valid %	Cumulative %
Evening	175	45.5	45.5	45.5
Morning	111	28.8	28.8	74.3
Night	99	25.7	25.7	100.0
Total	**385**	**100.0**	**100.0**	

The chi-square test of association (Table 4.13) showed that there was no significant association between the time the CS procedure and indication for CS ($p = 0.610$).

Table 4.13: Association between time and Indication for CS at JOORTH in 2011-2020.

	Chi-Square Tests		
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	.989[a]	2	0.610
Likelihood Ratio	.970	2	0.616
N of Valid Cases	385		

4.1.10 Medical Personnel

The results further revealed that most of the CS procedures were conducted by general practitioners (288; 74.8%), while only 97 (25.2%) cases were conducted by specialists (Table 4.14).

Table 4.14: Medical personnel who conduct CS procedure at JOORTH

Medical Personnel	Frequency	%	Valid %	Cumulative %
General Practitioner	288	74.8	74.8	74.8
Specialist	97	25.2	25.2	100.0
Total	**385**	**100.0**	**100.0**	

The Chi-square test of association ($p = 0.120$) revealed that there was no significant statistical relevance between the medical personnel who conducted the CS procedure and the indication for CS. The data is summarized in the Table 4.15.

Table 4.15: Association between medical personnel and CS indication at JOORTH

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.411[a]	1	0.120		
Continuity Correction [b]	1.867	1	0.172		
Likelihood Ratio	2.266	1	0.132		
Fisher's Exact Test				0.136	0.089
N of Valid Cases	385				

4.2.1 Type of CS

Up to 343 (88.83%) CS cases were conducted due to obstetric emergencies, and only 43 (11.17%) accounted for elective CS cases.

4.2.2 Medical History

Medical history which was identified as a risk factor for CS indication, as the study results showed that 18 (4.7%) of the CS patients had cardiovascular diseases, 223 (57.9%) presented with *other* conditions (not specified by physician), while patients with no significant medical history were 144 (37.4%). Table 4.16 shows a summary for the CS patients' medical history.

Table 4.16: Medical history of women who had CS delivery at JOORTH

Medical History	Frequency	%	Valid %	Cumulative %
Diabetes	5	1.3	1.3	1.3
Hypertension	13	3.4	3.4	4.7
No significant history	144	37.4	37.4	42.1
Others	223	57.9	57.9	100.0
Total	**385**	**100.0**	**100.0**	

A chi-square test of association indicated that there was no statistical significance between the patients' medical history and indication for CS (p = 0.163), as shown in the Table 4.17.

Table 4.17: Association between Medical history and indication for CS at JOORTH

	Chi-Square Tests		
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	5.130[a]	3	0.163
Likelihood Ratio	5.915	3	0.116
N of Valid Cases	385		

4.2.3 ANC Attendance

Data revealed that 253 (65.7%) patients undergoing CS had completed at least 4 ANC visits while 130 (33.8%) had only partial ANC visits. Only 2 (0.5%) of the CS clients did not attend any antenatal clinic (Table 4.18).

Table 4.18: ANC attendance by the women who had undergone CS at JOORTH

ANC attendance	Frequency	%	Valid %	Cumulative %
Yes (Fully 4 visits)	253	65.7	65.7	65.7
Yes (Partially)	130	33.8	33.8	99.5
No	2	0.5	0.5	100.0
Total	385	100.0	100.0	

Regarding the likelihood of association between ANC visitations and indication for CS, the results demonstrated that there was no statistical significance (p = 0.413) between the two variables (Table 4.19).

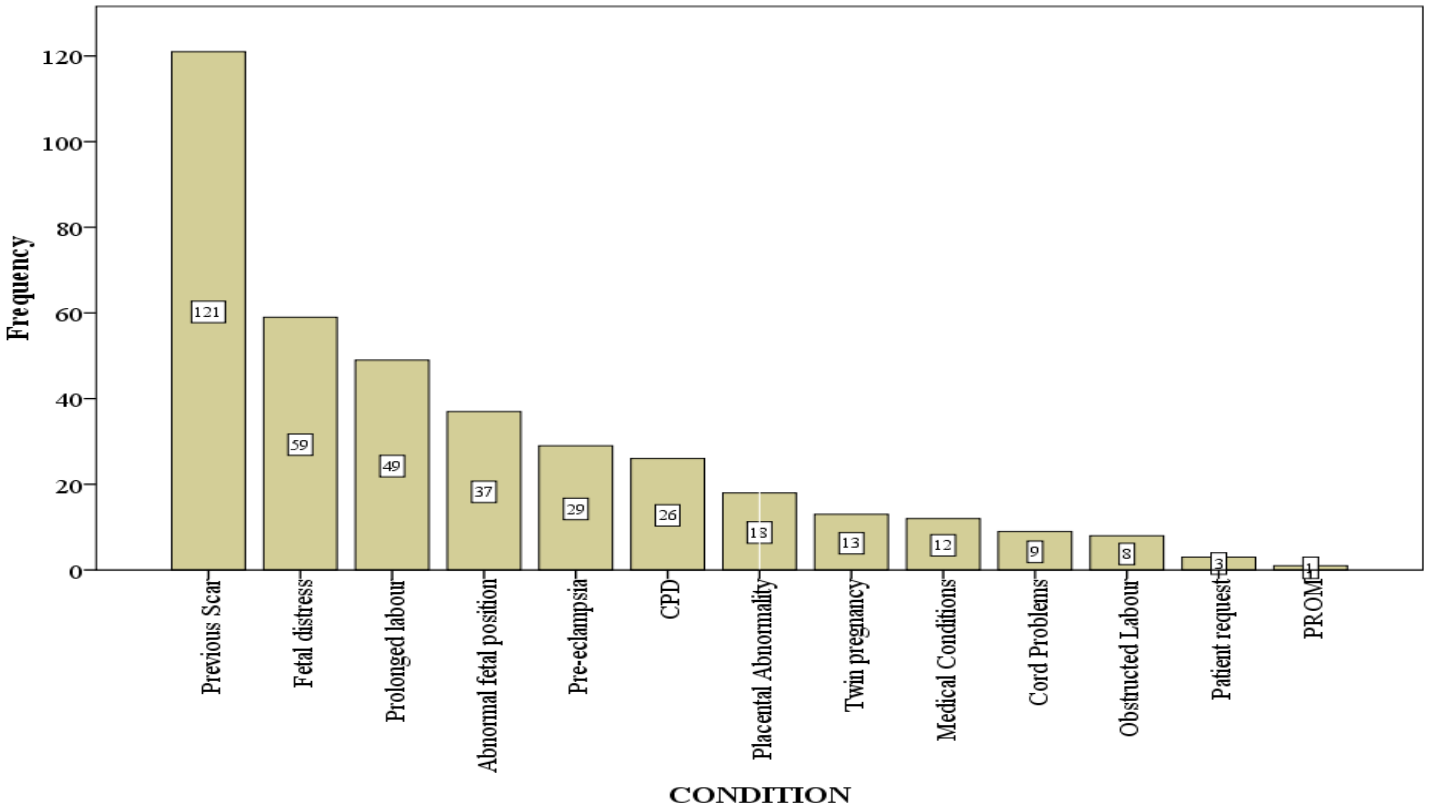
Table 4.19: Association between ANC attendance and CS indication at JOORTH

	Chi-Square Tests		
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	1.770[a]	2	0.413
Likelihood Ratio	2.050	2	0.359
N of Valid Cases	385		

4.2.4 Reasons for CS indication

The main reason for indication for CS delivery among the women was previous scars (121; 31.4%). Foetal distress also ranked high as a reason for CS with 59 (15.3%) and prolonged labour with 49 (12.7%) cases. Pre-eclampsia and cephalopelvic disproportion (CPD) were associated with 29 (7.9%) and 26 (6.8%) cases, respectively. Figure 4.5 provides a graphical illustration of the reasons for CS.

Figure 4.5: Showing the obstetric indication for CS at JOORTH in 2011-2020.



The Pearson Chi-square test of likelihood indicated that there was a strong association between the obstetric reasons and indication for CS ($p < 0.001$), as summarized on Table 4.20.

Table 4.20: Association between obstetric indication and CS at JOORTH

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	44.514[a]	11	< 0.001
Likelihood Ratio	47.384	11	< 0.001
N of Valid Cases	385		

CHAPTER FIVE: DISCUSSION

5.0 Introduction.

The study looked into an important public health issue of Cesarean Section delivery in JOOTRH as a lifesaving procedure to both mother and the infant. Social-demographic, medical and non-medical factors were examined for it is association with CS deliveries. The understanding of this factors will help the stake holders develop guidelines that could address it is increase in the facility as well as address the low rate in the County.

5.1 CS Deliveries Rate

There was a gradually increase of CS rate over the period of the study (19% in 2011 to 21.58% in 2020). The CS rate was lowest in 2013 (16.8%), these could have been contribute by the fear of conflict during the election period and the adaption of new governance structure where health sector functions were devolved to the Counties. The caesarean section rate at JOOTRH for the period of the study (2011-2020), was 19%. The CS rate is more than the WHO ideal recommended rate of 10-15% (WHO, 2022). This is further voiced by all the health care workers who were interviewed that felt the CS rate in the facility was high. However, the findings is similar to a study done in Tanzania (Nilsen *et al.*, 2014), that showed the CS rate was higher in teaching and referral hospitals. The higher CS rate may have been contributed by the increase of referrals of patients to JOOTRH This rate also bring sharp focus on the CS rate of Kisumu County which was 4.1% as indicated in the district health demographic survey report of 2014. Kisumu County is a city with several major health facilities thus it is ideal for future researchers to determine the disparity of the CS rate among the different hospitals in the County.

5.2 Socio-Demographic Factors

5.2.1 Age

The mean age of the mothers who delivered through caesarean section in this study was 26.40 years. Majority 165 (43%) were between the age of 20-24 years. The study is contrary to a study done in Wajir County-Kenya (Maalim, 2017) that reported higher CS rate in older women that was attributed to body weakness due many deliveries. The finding is similar to a study done in Nigeria (Evaluda *et al.* (2013) which showed that young women were more likely to undergo CS. This may be due

to under-developed reproductive system and complication of vaginal delivery. Also, young women rely and readily accept the medical personnel decision to undergo CS procedure as opposed to individual preference. This is further highlighted by the health workers views on the medical personnel influence on the decision.

"*Most decision are made by healthcare workers"* key informant 2 (NURSE)

"*Most women don't have insight on the decision making",* key informant 6 (RMO)

There was equally a notion that women lack enough knowledge in making the decision,

"*most women lack adequate knowledge on the CS procedure, hence are unable to completely decide for them self",* key informant 11(MOI).

This study showed insignificant association between marital status and CS deliveries. However, the majority of women who delivered through CS in the study were married thus significantly showing that the mothers had support of their spouses in having a safe delivery. This is similar to a study by (Maalim, 2017), which reported that the marital status affects the mode of delivery as the mothers have to get consent from their spouses. The health care personnel had a similar view on spouse influence on having CS delivery as factor:

"*Mostly rely on family for decision making",* key informant 8 (MO)

"*Influence from spouse"* key informant 3 (nurse)

"Most women tend to consult their spouse before decision making" key informant 1 (nurse)

5.2.2 Education

There was an association of the educational level and CS delivery. In this study, majority of the women who delivered through CS had some form of education. This result concur with studies done in Wajir-Kenya (Maalim, 2017), Ethiopia (Tsega *et al.*, 2015), and Uganda (Essex *et al.*, 2013) that showed acceptance of CS delivery among educated women. This could be a fact that educated women can easily access information and make appropriate decision on their health. Education help in demystifying the wrong and negative information.

5.2.3 Parity

The study showed that CS delivery was high in women with one child followed by those with no children. The result is in agreement with a study done in Cameron, (Tebeu *et al.*, 2011) that reported CS to be high in women of low parity and in Ethiopia (Tsega *et al.*, 2015) reported that women with high parity are likely to deliver through vaginal delivery with CS being high in women with low parity. This may be due to, the women with high parity have undergone through the experience of child birth and thus more likely to have confidence with vaginal delivery and women with low parity have an obstetric indication of having previous CS delivery.

5.2.4 Employment status

The CS delivery was high in mothers who had no employment. This is in agreement with a study done in Norway (Tollanes *et al.*, 2007) that reported high CS delivery among low-income group. This result is also contrary to study in Ghana, (Diema *et al.*, 2019) that reported positive correlation of CS and income. The difference may be due to the availablity of free delivery program in the public health facility while those with income are likely to be seeking services in private facilities.

5.2.5 Religion

The study did reveal significance association in the religion and CS delivery. This is in agreement to a study by Batieha *et al.* (2017) and Maalim (2017), that showed religion have indirect influence in the mode of delivery. However, these can be explained by the disproportion representation of the religion in the region where the majority are Christians.

5.3 Medical Factors Associated with CS Delivery

5.3.1 Indication for CS

The current research established that previous scar was a major indication of CS delivery accounting 31% of all CS deliveries. These is similar to study in Pakistan by Islam *et al.* (2011) that reported pervious scar accounted for more than a third of CS deliveries. Although the health of the mothers and their babies is paramount, studies have shown that vaginal delivery after one CS is safe if health personnel have proper monitoring resources, knowledge and access to emergency unit (WHO, 2022). It is

also likely that higher CS rate in JOOTRH may be unnecessary interventions due to high number of previous scar.

5.3.2 ANC Attendance

The current research study was to establish the association of the mother's antenatal clinic attendance and CS delivery. The results showed that more mothers, 65% completed at least 4 ANC visits while 33.8% attended partially. ANC attendance which has been mostly associated with maternal outcome has been improved due to health advocacy and the supplementary efforts from community health workers. However, the results further showed that there was no statistical significance regarding antenatal attendance and indication for CS.

5.3.3 Medical conditions.

Pregnant mother's medical conditions like diabetes, hypertension and HIV infections are known factors that contribute to indications of CS. This study did not yield any association between the mother's medical condition and CS delivery. This contrary to study in Jordan (Batieha *et al.*, 2017) and Ethiopia (Abebe *et al.*, 2016) that reported an association of medical conditions and CS delivery. However, the study has shown that the majority of the women whom had undergone the CS were young women and had no known illness that nictitate the procedure. This finding can also be explained by the fact of the medical conditions were not specified in the patients file by the attending healthcare workers with very limited options of indicating known conditions like diabetes, hypertension and HIV.

5.4 Non-Medical Factors.

5.4.1 Medical Personnel

Non-medical factors have been shown to contribute to CS deliveries. Medical personnel played a major role in the indications and carrying of the procedure in the health facilities. Although results analysed revealed that most (75%) of the CS procedures were conducted by general practitioners the study showed there was no significant association of CS and the medical personnel ($p=0.120$). Kenya being a resource constraint in health care with few specialist (skilled healthcare personnel), these assisted in the increase of access to such a crucial lifesaving surgical procedure. The study is consistent with (Kitui *et al.*, 2013) that showed perceived availability of

skilled health care personnel influenced the mother's delivery in the facility. All the key informants were of the opinion that the hospital infrastructure and availability of specialists influenced the high CS cases at JOORTH.

5.4.3 Time

In this study majority of the CS delivery were mostly conducted in the evening this could be due to the reason that JOOTRH is a referral hospital, the fact is further strengthened by over 80% of the cases being emergency. The majority of the patients whom had under gone the CS procedure came from within KISUMU County with considerable percentage coming from the neighbouring counties. This is an indication of need of strengthening the rural and low level facilities in offering this curial services to people closer.

5.4.4 Cost

Cost of delivery has been known as one of the barriers to pregnant women accessing health care more so CS delivery services. However, in this study majority of the women who had undergone the CS procedure had their bills settled by the National health insurance fund. This shows the big impact of the government policies of free maternity under the Linda mama national insurance fund program in enabling pregnant mothers to access to health care.

CHAPTER SIX: CONCLUSION AND RECOMMEDATIONS

6.1 Conclusion

The findings reported gradual increase of CS deliveries rate over the study period, with an average of CS rate of 19% in the study period. The level surpassing the WHO recommendation of 10% to 15%.

6.1.1 Socio-Demographic factors.

The result revealed level of that mothers' educational level *(p=.01*) and employment status *(p=.01)* are significantly associated with CS delivery JOOTRH.

6.1.2 Medical factors

The result revealed medical indications *(p=.00)* is significantly associated with CS delivery at JOOTRH.

6.1.3. Non-medical factors

The result did not reveal any significant association of non-medical factors with CS delivery in JOOTRH.

6.2 Recommendations

1. The Ministry of Health (Kisumu County) in collaboration with relevant stakeholders should come up with polices and guidelines on how to check and curb the increase of CS rate in JOOTRH and also address the low CS rate in the County. This may include policies and guidelines on trial of labour after caesarean section (TOLAC), vaginal birth after caesarean section (VBAC) and use of Robson classification system for women admitted to give birth.

2. The County government in collaboration with relevant stake holders, should invest and improve on hospital infrastructures that include skilled healthcare workers in all government and community facilities in the county. This will enhance services delivery and reduce referral of patients. This should be in line with the tenets of strengthening of the application of the referral guidelines across the county.

3. The JOOTRH management together with relevant stakeholders should look into the issue of healthcare financing, especially issues of bill waivers. This can be done through proper implementation of government policy of free maternity under the National healthcare Insurance (NHIF).

6.3 Suggestion for further research

Based on the study findings, it is recommended that the disparity of the CS rate between JOOTRH and the Kisumu County should be studied to determine the factors associated with CS. This will address the understating the low CS rate in the County as well as the higher CS rate in the facility.

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APPENDICES

Appendix I: Data Extraction Sheet

Demographic characteristics	Remarks
Age • < 15 years • 15-24 years • 25-34 years • 35-49 years • ≥50 years	
Religion • Christian (state denomination if available) • Islam • Others (state) • None	
Marital Status • Single • Married and living with spouse • Married but not living with spouse • Divorced/separated • Widowed	
Education level • None • Primary • Secondary • College/University	
Residency • County • Sub-county • Location/ward	
Number of children • 0 • 1 and more • If more than 1, separate by gender	
Employment • None • Self-employed/business • Formal employment • Non-formal/casual employment	
Non-Medical Factors	
Hospital bill payments • cash	

• insurance	
Time procedure is conducted • Morning • Evening/afternoon • Night	
Medical personnel cadre (confirmed from organogram) • General practitioner • Specialist • Others (specify)	
Medical Factors	
Type of CS • Elective • Emergency	
Medical history • Hypertension • Diabetes • Others	
ANC attended • No • Partial • Yes	
Reason for CS • Previous scar/Repeat CS • Foetal distress • Abnormal foetal position • Cord problems e.g., cord prolapse • Placental abnormality • Pre-eclampsia • Cephalopelvic disproportion (CPD) • Twin pregnancy • Prolonged labour • Medical conditions e.g., diabetes • Patient request	

Appendix II: Questionnaire for Healthcare workers (Doctors and Nurses)

Part A: Participant information

Age ..... years **Gender** ☐ Male ☐ Female

Employment status

☐ Full time ☐ Part time ☐ others(specify).....

Cadre.....

Part B: Information on Caesarian Section

1. Years of working experience? .....

2. How long have you practiced in maternity of this facility? .....

3. What is your opinion on the CS delivery rate in this facility?

☐ very high ☐ high ☐ optimal ☐ low ☐ very low

4. What factors/reasons do you think make the CS level to be as stated above?

a. CS-related factors

.....

.....

.....

.....

b. Patient/community factors

.....

.....

.....

.....

.....

c. Health facility/system factors

.....

.....

.....

.....

.....

5. What is your experience on the ability of the pregnant women to make decision on CS?

.....

.....

.....

6. What information is often given to the women before the CS procedure is conducted?

.....

.....

.....

7. On an approximate scale of 1-10, how frequently do women decline to undergo CS?

.....

9. What reasons are often given by the women for the decline?

.....

.....

.....

.....

8. How does the hospital handle such cases?

.....

.....

.....

10. Statement: **True** or **false** concerning the consent before CS

- Most women and their guardians/relatives do not understand what is written in the informed consent.....
- Most women and their guardians/relative expect the doctors to the make decision.....

11. Any concern, suggestion concerning the CS deliveries in this facility.

.....

Appendix III: Consent form

Research: Health Worker Perspectives on Caesarean Sections section.

Department	**Obstetrics**
Organization	JOORTH
Date	

Dear Sir, Madame,

The following interview will be conducted to gain insight in your perspectives on giving information to the patient and gaining her consent prior to CS. The interview will discuss personal experiences in handling patients delivering through CS.

- **The interviews are anonymous. The interviewee only states his/her age, gender, department and years of working experience.**
- **The interviews will be recorded and analyzed only by the interviewer.**
- **Comments may be used as quotes in the article. This, again, will be anonymous.**
- **The interview takes 30 minutes to 1 hour.**

By conducting interviews and analyzing them as one entity, the researcher tries to understand the factors associated with CS delivery in JOORTH. This will contribute to knowledge.

This interview is not compulsory and will not affect your work in a negative way. The researcher may write during the interviews. The notations include observations and possible quotes.

I hereby give my consent for participating in this study.

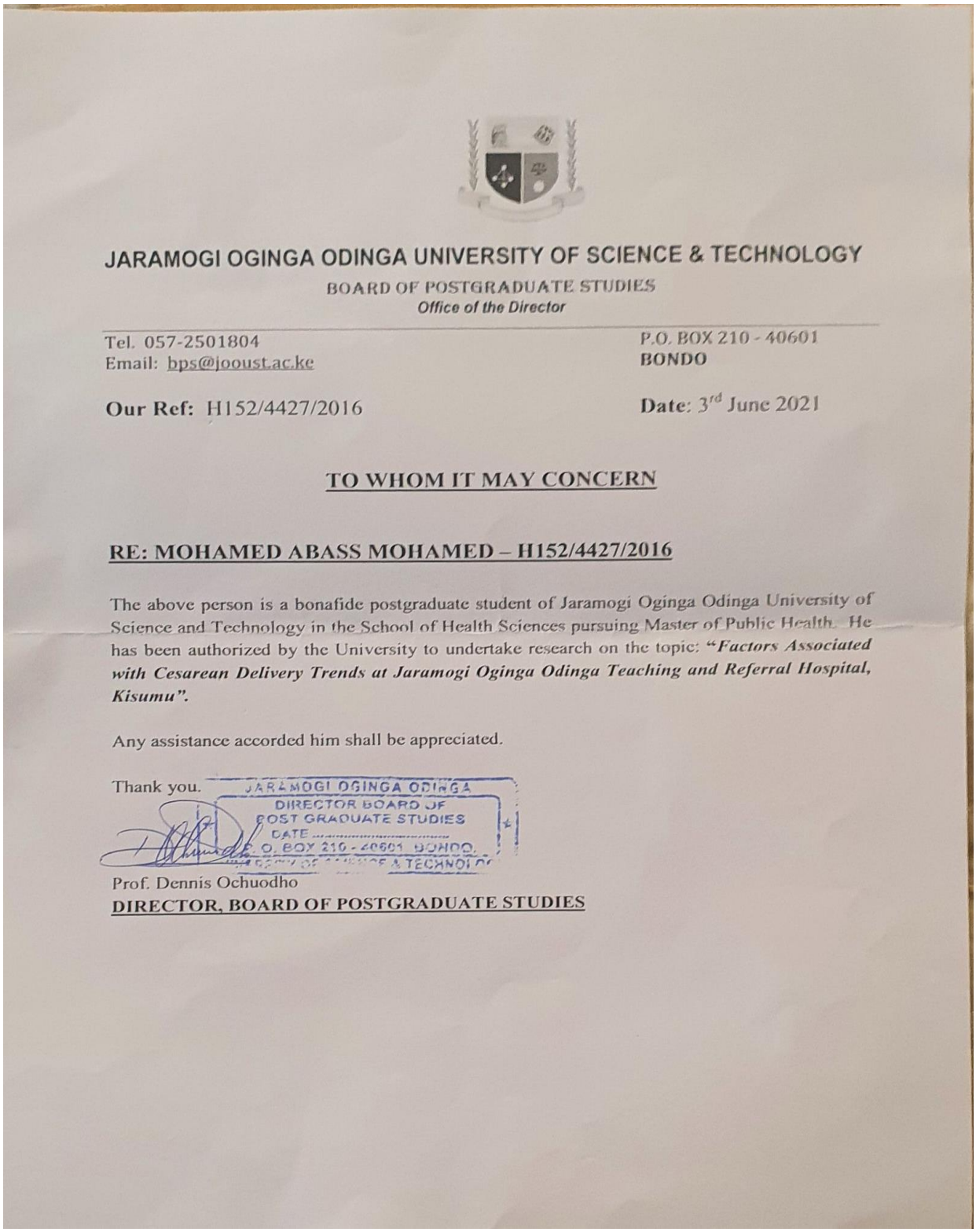
Appendix IV: Activity Schedule

Activity	**Period (2020)**		**(2021)**						
	May	**Dec**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**
Proposal development									
Proposal approval									
Data collection									
Data analysis									
Thesis writing									
Publishing									
Thesis submission									

Appendix V: Budget

Item	**Quantity**	**Cost/unit (KS)**	**Total**
Personnel			
Researcher	1	10,000.00	10,000.00
Research assistant (RA)	2	5,000.00	10,000.00
Training of RAs	2 days	10,000.00	20,000.00
Stationery	Assorted	15,000.00	15,000.00
Transport		10,000.00	10,000.00
Internet and e-resources	Assorted	20,000.00	20,000.00
Miscellaneous		15,000.00	15,000.00
Total			**100,000.00**

Appendix VI: University Approval Letter.



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

BOARD OF POSTGRADUATE STUDIES

Office of the Director

Tel. 057-2501804
Email: bps@jooust.ac.ke

P.O. BOX 210 - 40601
BONDO

Our Ref: H152/4427/2016

Date: 3rd June 2021

TO WHOM IT MAY CONCERN

RE: MOHAMED ABASS MOHAMED – H152/4427/2016

The above person is a bonafide postgraduate student of Jaramogi Oginga Odinga University of Science and Technology in the School of Health Sciences pursuing Master of Public Health. He has been authorized by the University to undertake research on the topic: ***"Factors Associated with Cesarean Delivery Trends at Jaramogi Oginga Odinga Teaching and Referral Hospital, Kisumu".***

Any assistance accorded him shall be appreciated.

Thank you.

JARAMOGI OGINGA ODINGA
DIRECTOR BOARD OF
POST GRADUATE STUDIES
DATE .....
P. O. BOX 210 - 40601 BONDO

Prof. Dennis Ochuodho
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

Appendix VII: Ethical Approval Letter

COUNTY GOVERNMENT OF KISUMU
DEPARTMENT OF HEALTH

Telephone: 057-2020801/2020803/2020321
Fax: 057-2024337
E-mail: ercjoorth@gmail.com

JARAMOGI OGINGA ODINGA TEACHING & REFERRAL HOSPITAL
P.O. BOX 849
KISUMU

When replying please quote

Ref: IERC/JOOTRH/477/21

Date: 26th August, 2021

To: Mohammed Abass Mohamed

Dear Mohamed,

RE: REQUEST FOR ETHICAL APPROVAL TO UNDERTAKE A STUDY TITLED:- FACTORS ASSOCIATED WITH CESAREAN DELIVERY TRENDS AT JARAMOGI OGINGA ODINGA TEACHING AND REFERRAL HOSPITAL, KISUMU.

This is to inform you that ***JOOTRH IERC*** has reviewed and approved your above research proposal. Your application approval number is ***IERC/JOOTRH/477/21.*** The approval period is ***26th August, 2021 – 26th August, 2022.*** This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***JOOTRH - IERC***.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***JOOTRH - IERC*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***JOOTRH - IERC*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to JOOTRH - ***IERC***.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

In case the study site is JOOTRH, kindly report to Chief Executive Officer before commencement of data collection.

Yours sincerely,

26 AUG 2021

NANCY MAKUNDA-SECRETARY
JOOTRH-IERC
KISUMU

Appendix VIII: Research Permit.

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **957941**

Date of Issue: **06/September/2021**

RESEARCH LICENSE

This is to Certify that Mr.. Mohamed ABASS Mohamed of Jaramogi Oginga Odinga University of Science and Technology, has been licensed to conduct research in Kisumu on the topic: Factors Associated with cesarean Delivery Trends at Jaramogi Oginga Odinga Teaching and Referral Hospital Kisumu. for the period ending : 06/September/2022.

License No: **NACOSTI/P/21/12718**

957941

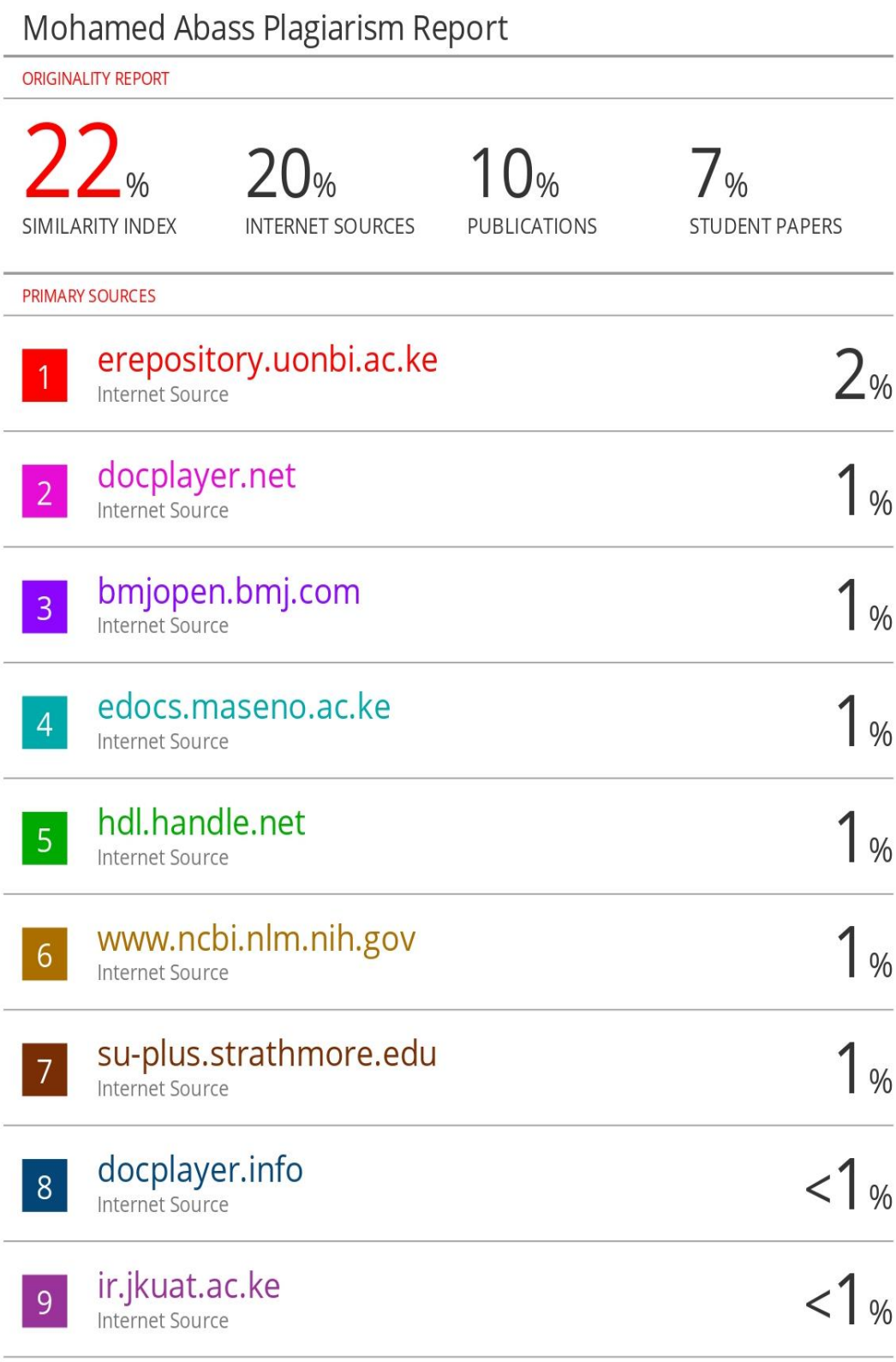
Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix IX: Plagiarism Report.



Mohamed Abass Plagiarism Report

ORIGINALITY REPORT

22%	20%	10%	7%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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8	docplayer.info Internet Source	<1%
9	ir.jkuat.ac.ke Internet Source	<1%