OCCURRENCE AND MANAGEMENT OF PUERPERAL SEPSIS AMONGST WOMEN OF REPRODUCTIVE AGE (15-49) ATTENDING TWO HOSPITALS IN NANDI COUNTY, KENYA.

MARITIM VIOLET CHEPCHIRCHIR (BSc.)

(Q139/20279/2012)

A THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD OF DEGREE OF MASTER OF PUBLIC HEALTH (REPRODUCTIVE HEALTH) IN THE SCHOOL OF PUBLIC HEALTH, KENYATTA UNIVERSITY.
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

_________________________  Date ______________________

Signature
Maritim Violet Chepchirchir
Department of Environmental and Population Health

Supervisors’ approval

This thesis has been submitted with our approval as university supervisors:

1. _______________________  Date ______________________

   Signature
   Prof. Margaret Keraka
   Department of Environmental and Population Health
   Kenyatta University

2. _______________________  Date ______________________

   Signature
   Dr. Jackim Nyamari
   Department of Environmental and Population Health
   Kenyatta University
DEDICATION
To my dear parents for their interminable support, love and encouragement throughout the study period.
ACKNOWLEDGEMENT

I would like to thank to God for granting me good health and the strength to pursue my Studies My sincere gratitude goes to my supervisors Dr. Margaret Keraka, and Dr. Jackim Nyamari for their continuous support and advice throughout this study.

Special thanks to the facility managers including; Dr. Shadrack kemei, Mrs. Florence Lelei, Mrs. Kemboi, Mrs Ngeno and Mrs Rachael, without whom it would have been difficult to obtain data. I also want to thank my research assistants for their support.
LIST OF ABBREVIATIONS AND ACRONYMS

PS: Puerperal sepsis

SPSS: Statistical Package for the Social Sciences

WHO: World Health Organizations

RTD: Reproductive tract diseases

RTI: Reproductive tract infections

KDHS: Kenya Demographic Health Survey.

TBA: Traditional birth attendant.

KII: Key Informant Interview.
### OPERATIONAL DEFINITION OF TERMS

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal morbidity:</td>
<td>These are medical complications in a woman caused by pregnancy, labor, or child delivery.</td>
</tr>
<tr>
<td>Maternal mortality:</td>
<td>This is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.</td>
</tr>
<tr>
<td>Postpartum infections:</td>
<td>This is the period beginning immediately after the birth of a child and extending for about six weeks.</td>
</tr>
<tr>
<td>Prevalence:</td>
<td>This is the ratio (for a given time period) of the number of occurrences of a disease or event to the number of units at risk in the population.</td>
</tr>
<tr>
<td>Puerperal sepsis:</td>
<td>This is serious form of septicemia contracted by women during or soon after child birth, miscarriage or unsafe abortion. This condition is normally characterized by two or more of the following symptoms: pelvic pain, fever, abnormal vaginal discharge, abnormal smell/foul odour of discharge, and delay in the size of the uterus.</td>
</tr>
<tr>
<td>Un-booked patients:</td>
<td>These are patients who did not seek antenatal services during their pregnancy period</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

DECLARATION ........................................................................................................... i
DEDICATION ............................................................................................................... ii
ACKNOWLEDGEMENT .............................................................................................. iii
LIST OF ABBREVIATIONS AND ACRONYMS ......................................................... iv
OPERATIONAL DEFINITION OF TERMS .................................................................... v
TABLE OF CONTENTS ............................................................................................... vi
LIST OF FIGURES ...................................................................................................... ix
LIST OF TABLES ......................................................................................................... x
ABSTRACT .................................................................................................................. xi

## CHAPTER ONE: INTRODUCTION.............................................................................

1.1 Background Information .................................................................................... 1
1.2 Problem Statement .............................................................................................. 2
1.3 Research Questions ............................................................................................. 4
1.4 Research Objective ............................................................................................ 4
  1.4.1 Broad objective ............................................................................................ 4
  1.4.2 Specific Objectives ....................................................................................... 4
1.5 Justification ......................................................................................................... 5
1.6 Significance of the study .................................................................................... 5
1.7 Conceptual framework ....................................................................................... 5

## CHAPTER TWO: LITERATURE REVIEW.................................................................

2.1 Introduction ......................................................................................................... 8
2.2 Puerperal Sepsis .................................................................................................. 8
2.4 Population at Risk ............................................................................................... 15
2.5 Management of Puerperal Sepsis ..................................................................... 16
2.7 Gaps in existing literature .................................................................................. 17

## CHAPTER THREE: RESEARCH METHODOLOGY ................................................

3.1 Study Area .......................................................................................................... 19
3.2: Research Design ............................................................................................... 19
3.3: Variables: Dependent and Independent .............................................................. 19
3.4: Study Population ............................................................................................... 20
3.4.1 Inclusion Criteria ............................................................................................ 20
3.4.2 Exclusion Criteria ......................................................................................... 20
3.5 Sample Size Determination ............................................................................. 20
3.6 Sampling design/techniques ............................................................................. 21
3.7 Data Collection Tools ........................................................................................ 21
3.8 Data collection methods ..................................................................................... 21
3.8.2 Pre-test ........................................................................................................... 22
3.9 Key informant interviews (KIs) ........................................................................ 22
3.10 Data quality and control ................................................................................... 22
3.10.1 Validity ......................................................................................................... 22
3.10.2 Reliability ..................................................................................................... 23
3.11 Data processing .................................................................................................. 23
3.12 Data Analysis ..................................................................................................... 23
3.13 Study Ethics ........................................................................................................ 24

CHAPTER FOUR: RESULTS ......................................................................................... 25

4.0 Introduction ......................................................................................................... 25

4.1 Socio demographic characteristics ..................................................................... 25

4.1.2 Age of mothers and their children ................................................................. 26

4.2 OCCURRENCE OF PUIERPERAL SEPSIS ......................................................... 27

4.2.1 Occurrence of Puerperal Sepsis by age among mothers .................................. 27
4.2.2 Occurrence of Puerperal Sepsis by Education level ........................................ 27
4.2.3 Occurrence of Puerperal Sepsis by Occupation ............................................. 27
4.2.4 Occurrence of Puerperal Sepsis by marital status .......................................... 28
4.2.5 Occurrence of PS by parity level .................................................................... 28

4.3 Risk factors in patients presenting with puerperal sepsis in the two hospitals in Nandi County ........................................................................................................... 29
4.3.1 Place of delivery ............................................................................................. 29
4.3.2 Mode of delivery ............................................................................................ 29
4.3.3 Duration of labour .......................................................................................... 29
4.3.4 Vaginal examination ...................................................................................... 30
4.3.5 Abortion ......................................................................................................... 30
4.3.6 Duration of rapture of membrane ................................................................. 30
4.3.7 Parity level ...................................................................................................... 31
LIST OF FIGURES

Figure 1.1: Conceptual framework..................................................6

Figure 4.8: Hygiene practices observed by respondent during delivery......37.
LIST OF TABLES

Table 4.1: Socio demographic characteristics of the respondents........................................26
Table 4.2: Age of mothers and their eldest children...............................................................27
Table 4.3: Knowledge of mothers on Puerperal Sepsis........................................................29
Table 4.4: associated risk factors among patients presenting with Puerperal sepsis...........31
Table 4.4: cross tabulation of factors associated with Puerperal sepsis.........................32
Table 4.6: Variables with significant statistical association.................................................35
Table 4.7: Morbidities associated with Puerperal Sepsis....................................................35
ABSTRACT
Puerperal sepsis is a major cause of maternal morbidity and mortality and is usually within the first 42 days after child birth/pregnancy termination. It is a common pregnancy-related condition, which could eventually lead to obstetric shock or even death. Studies have shown that puerperal sepsis is the second cause of maternal morbidity and mortality in the resource poor countries. One’s susceptibility to developing an infection is related to such factors as cesarean section, extended labor, obesity, anemia and poor prenatal nutrition, socio economic status, geographical factors amongst others. The aim of this study was to evaluate the occurrence of Puerperal Sepsis among women in Nandi County and establish the relationships that exist between the associated factors with puerperal sepsis. Moreover, the study examined the strategies that were put in place to control the infection and identify the challenges being faced in executing them. This study employed a descriptive, cross sectional study design with a sample size of 215 of Puerperal Sepsis patients of the age group 15-49 years from two selected Hospitals in Nandi County. The hospitals included Nandi Hills and Kapsabet District Hospitals. Purposive sampling was used in selection of the study respondents. Data was collected using a structured interview guides for patients on exit. Additional data on patient’s health seeking behavior and management challenges were obtained from a key informant using an open ended guide. Data collected was analyzed using SPSS version 20. Data was presented in form of percentages, frequencies through tables, graphs and charts. Qualitative data was grouped into categories, themes developed and presented in text form. The demographic data showed that women aged 20-29 years (57.2%), were the most affected while above 40 years (2.8%) were the least affected. It was found that majority (50.2%) of the respondents had attained primary school education and 62.8% were married. Most (56.2%) of the respondents were of lower parity level, 66.5% had spontaneous deliveries and 46% had experience multiple vaginal examinations 28.4% of the respondents had procured unsafe abortions. There was a high significant relation between ANC attendance and labour duration, (OR=5, 95% CI, 1.8-14.28), indicating ANC visits had a positive impact on duration of labour that a woman will experience. Proper nutrition also showed significant relationship with duration of labour,( OR=0.35, 95% CI, 0.15-0.08). Women who had balanced nutrition were more likely to experience short labour durations. Further, results indicated that there was lack of knowledge on the etiology of infection in the area, 81.9% of the respondents did not have knowledge on Puerperal Sepsis. Facilities lacked adequate prerequisites to perform PS awareness both in the facility and in the community. Reports indicated that there were issues of understaffing in the study facilities, in addition; patients had a poor health seeking behavior. These factors underscore the need for the Ministry of health to provide funds that will develop an enabling environment for awareness creation and hygiene education in this area. Policy makers and planners should also consider integrating Hygiene education and Puerperal sepsis awareness into ANC services as a strategy to prevent and control the infection.
CHAPTER ONE: INTRODUCTION

1.1 Background Information

According to WHO (2008), puerperal sepsis is a genital tract infection occurring at any time between the rupture of extra placental membranes or labour, and the 42nd day postpartum in which 2 or more of the following symptoms are present: pelvic pain, fever that is, oral temperature 38.5°C or higher on any occasion, abnormal vaginal discharge, for example, presence of pus, abnormal smell/foul odour of discharge, and delay in the size of the uterus. Puerperal sepsis has been a common pregnancy-related condition, which could eventually lead to obstetric shock or even death. It has been indicated that puerperal sepsis is the second most cause of maternal mortality in the developing world. Cases of Maternal mortality have not declined in spite of efforts by both the public and private sector to prevent such deaths (Momoh et al., 2010).

Puerperal sepsis attributed to home deliveries accounts for 15 per cent of total maternal deaths in Kenya. Postpartum infections comprise a wide range of entities that can occur after vaginal and cesarean delivery or during breastfeeding. In addition to trauma sustained during the birth process or cesarean procedure, physiologic changes during pregnancy contribute to the development of postpartum infections. Nouri and colleagues (2012) identified the major causative microorganisms to be poly microbial with group A b-hemolytic streptococcus, often being the cause of severe cases of puerperal fever.

The single most important risk factor for postpartum infection seems to be caesarean section, and prophylactic antibiotics during the procedure substantially reduce the infection risk. Improvements in service provision as promoted through the Surviving Sepsis Campaign can reduce the overall risk of mortality and morbidity from maternal
sepsis in high income as well as in low-income countries. Studies have shown that predisposing factors to puerperal sepsis includes; anaemia in pregnancy, prolonged labour, frequent vaginal examination, premature rupture of membranes and use of unsterilized/unwashed instruments during delivery (Momoh et al., 2010). Morbidities associated with puerperal sepsis includes; Vaginal discharge, Septicemia, Peritonitis or abscess formation leading to surgery, Endotoxic shock, Pelvic abscess, and finally Mortality among others (Sham Shad et al., 2010)

1.2 Problem Statement

Puerperal sepsis is serious form of septicemia contracted by women during or soon after child birth, miscarriage or unsafe abortion (Chandra et al., 2011). It has been found to be the second most common cause of maternal morbidity and mortality in the developing world (Utoo et al., 2012). Studies from high-income countries report incidence of maternal morbidity due to sepsis having increased from 0.65 per 1000 deliveries in 2002 to 1.13 per 100,000 maternities in 2008 (Bauer et al., 2013). It has been reported that each woman that dies sixteen others Suffer various forms of morbidity, among them puerperal sepsis (Razia et al., 2009).

Over 70% of maternal deaths in the developing world are caused by sepsis among other causes including; hemorrhage, hypertension disorders, unsafe abortion, and obstructed labor. Sepsis was the most frequent underlying cause of maternal morbidity and mortality in the 19th century, responsible for 50% of all cases. It is the leading cause of death in the intensive care unit in the United States (Dillen et al., 2010).

In Kenya, puerperal sepsis accounts for approximately 15% of maternal deaths. Kenya is one of the countries in sub-Saharan Africa that still experience high maternal mortality.
For instance, in 2008/09 maternal mortality ratio was estimated to be 488/100,000 live births (KDHS, 2010). Direct obstetric complications includes; puerperal sepsis, postpartum hemorrhage, pre-eclampsia and eclampsia, obstructed labor and indirect causes including HIV, malaria and anemia in pregnancy are responsible for the majority of these cases. According to the Medical records from the two Hospitals under the study, each of the hospitals attends to approximately 15 cases of puerperal infection every month (KII).

Eighty percent of maternal deaths resulting from pregnancy complications are brought about by preventable causes as they depend strongly on quality of care provided. Sepsis is among the preventable causes of maternal death. Approximately one million women die each year worldwide, as a consequence of pregnancy related complications causes (Razia et al., 2009). The most significant long-term complication is infertility resulting from tubal occlusion, estimated to affect some 450,000 women each year. (Ziraba et al., 2009, Dillen et al., 2010).

There is no accurate data on puerperal sepsis in Kenya as in many developing countries many cases of puerperal infections can go undiagnosed and under reported (Panelope et al., 2013). It is however known that 40–50% of all spontaneous vaginal deliveries and 50% of instrument-assisted deliveries can be infected when carried out by TBAs, nurses and health care workers (Iftakhar., 2009).

In Nandi hills county Hospital deliveries are on the rise but still postpartum infections are still occurring which made it necessary to carry out this study. Several studies have been
on causes of PS but few have focused on the association that exists between the risk factors.

1.3 Research Questions

1) What is the occurrence of puerperal sepsis in selected hospitals in Nandi County?
2) What is the association between the risk factors in patients presenting with puerperal sepsis in the selected hospitals in Nandi County?
3) What are the existing strategies used in the management of Puerperal Sepsis and challenges faced in its management in the selected hospitals in Nandi County?

1.4 Research Objective

1.4.1 Broad objective

To determine the occurrence of Puerperal Sepsis, and its management amongst women of reproductive age (15-49) attending two hospitals, Nandi County.

1.4.2 Specific Objectives

1. To determine the occurrence of puerperal sepsis in the selected hospitals in Nandi County.
2. To assess the relationship that exists between the associated factors of puerperal sepsis.
3. To document the management of puerperal sepsis and challenges faced in two hospitals in Nandi County.
1.5 Justification

The recognition of the important roles played by factors associated with Puerperal sepsis has led to a realization that there is need to understand the association between them in relation to the infection. The purpose of this study was therefore to provide detailed representative information on puerperal sepsis in the health facilities found in Nandi county, and assess the association between the risk factors, establish the knowledge on puerperal sepsis and determine the preventive measures in order to form a basis for decision making, policy formulation and planning towards the management of morbidities resulting from puerperal sepsis in Nandi county.

1.6 Significance of the study

Results from the study will highlight gaps in infection control strategies informing subsequent interventions to reduce the levels of infections and associated maternal morbidity. This will also boost the attainment of MDG goal five on reducing maternal mortality ratio.

1.7 Conceptual framework

This study was guided by the conceptual model in figure 1.1 below. Several factors were identified to have an influence occurrence of puerperal sepsis namely; socio-demographic factors of the patients, obstetric factors, facility characteristics, and patients behaviour.
In this model, the Independent variables of the study included:

- Socio demographic factors- refer to age, sex, educational level, occupation and marital status. It is presumed that these socio-demographic can influence maternal health positively or negatively in the community. Women who are economically stable can afford to seek reproductive health care services provided by well-trained personnel. Education level determines the knowledge of hygiene among women, and helps them to make informed decisions regarding their reproductive health.
• The health facility factors- explain various aspects that determine the control of the infection at the health facility level. These include availability of adequate working environment, availability referral systems, availability of funds, staffing, hygiene lessons and comprehensive service delivery.

• Obstetric factors- Occurrence of the disease can be influenced by place of delivery, mode of delivery, number of vaginal examinations done on a patient, duration of labour, unsafe abortion etc.

• Individual factors- From the individual level, Puerperal sepsis control can be influenced by knowledge on the infection, ANC attendance, health seeking behavior and availability of food through the pregnancy period.

Dependent variable of the study was occurrence of Puerperal sepsis
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Studies carried out by WHO (2008) shows that every year it is estimated that worldwide, more than 500,000 women die of pregnancy related complications and childbirth. Approximately seven million women who survive childbirth suffer serious health problems and a further 50 million women suffer adverse health consequences after childbirth. An Overwhelming majority of these deaths and complications occur in developing countries (Winani et al., 2005).

2.2 Puerperal Sepsis

Puerperal sepsis is defined as any bacterial infection of the genital tract which occurs after the birth of a baby. It is usually more than 24 hours after delivery before the symptoms and signs appear (WHO, 2008). It’s also scientifically defined as a polymicrobial infection presenting as a combination of endometritis, endomyometritis and endoparametritis. It is an important public health problem contributing to Maternal, morbidity and mortality. Anaerobic organisms are encountered in most infections associated with puerperal sepsis. This condition was first known as a child fever by the Hippocrates (Momoh et al., 2010). The association with a clear and well documented history spans over two hundred years since its first recognition as a separate disease entity in early 18th century. Challenges in identification led to inaccurate recording and reporting of the information and this problem has existed to date (Sham Shad et al., 2010).

Puerperal sepsis continues causes deaths continuously in developing countries mainly because of inadequate access to skilled care during and after child birth. Women may
lack to access professional health care during labour and delivery care provided in the home or hospital setting with attendant whom does not meet quality standard skills can increase the risk of infection (Hussein et al., 2012).

2.3 Prevalence and Risk Factors Associated With Puerperal Sepsis.

The first recorded epidemic of puerperal fever occurred at the Hotel-Dieude Paris in 1646 (Momoh et al., 2010). Hospitals throughout Europe and America consistently reported death rates of 20% to 25%. During 18th and 19th centuries, puerperal fever was the single most common cause of maternal mortality, accounting for about half of all deaths related to child birth. In 1843, a scientist by the name, Oliver Holmes in Boston, USA, became the first to establish that puerperal fever was contagious and was transmitted by the unwashed hands of the physician from bed to bed. Another scholar in the year 1847, Semmelweis in Vienna, Austria also concluded that examiners might transmit infection from live patients as well as from the dead and ordered his students to scrub with the chlorine solution before every physical examination (WHO, 2003). This led to a striking decrease of mortality due to puerperal sepsis from 11% in 1846 to 3% in 1847.

2.3.1 Trends in Africa

Sepsis is an important morbid condition because of its consequences on both fetal and maternal outcomes. In the mother, some of the immediate consequences include septicaemia, endotoxic shock or the development of peritonitis or abscess formation leading to surgery, Neonatal septicaemia, and pneumonia, to mention but a few. Sepsis significantly affects morbidity and mortality. Estimating the burden of puerperal sepsis among populations in Africa is problematic because of differing definitions of puerperal sepsis and lack of postnatal follow-up (Hussein et al., 2012). Puerperal sepsis was found
to be the most frequent morbidity in a study on obstructed labour in the State of Gombe in Nigeria (Utoo et al., 2012).

Puerperal sepsis is the second leading cause of maternal mortality in developing countries (WHO 2008). Although maternal sepsis nowadays accounts for a small proportion of maternal deaths in high-income countries, it still causes approximately 10% of maternal deaths in Africa and Asia. WHO (2008) estimated the maternal mortality ratio as 900 per 100 000 live births in sub-Saharan Africa, 100-times the maternal mortality ratio of resource-rich countries (nine per 100 000 live births).

A confidential study done in South African inquiring into maternal deaths, reported puerperal sepsis as the cause of 8.3% (274) of deaths (2002–04) (Ahmed et al., 2013). South Africa has a significant burden of puerperal sepsis, which is its fourth leading cause of maternal mortality. It was found out that Caesarean section (CS) is the most important risk factor for postpartum infection (Hussein et al., 2012).

According to a study done in Maidunguri University Teaching Hospital in Nigeria, it was found that the major risk factors for developing puerperal sepsis were un-booked status, home delivery, perineal trauma, caesarean section (C/S) and maternal age <24 years. The most common microorganisms isolated were *Staphylococcus aureus* and *Escherichia coli*. In a study of maternal mortality in a tertiary care hospital in Abbottabad, Nigeria to determine causes and preventable factors, the contribution of sepsis to maternal deaths was 19.2% and it was the third leading cause of death (Sham Shad et al., 2010). Sepsis is reported to be a major complication of induced abortion in Nigeria (WHO, 2008).

Despite the fact that sepsis has been indicated as one of the leading causes of maternal mortality in low and middle income countries, it is surprising how little attention has
been paid to puerperal sepsis and infection control during childbirth. It’s estimated that approximately 358,000 women die every year in Kenya from the complications of childbirth and up to 15% of these are due to puerperal sepsis (KDHS, 2010).

A study done in Tanzania to determine factors influencing puerperal sepsis where a sample size of 3,262 women were selected, only 27% (877) reported that the birth attendant inserted his or her hands into the vagina, and 25% (830) reported that the attendant washed his or her hands before doing so. Of those 830 women, 98% reported that the attendant had used soap and water while 1.5% were attended by birth assistants who washed their hands developed puerperal sepsis, compared to two (8.0%) of the 25 women who reported that the birth attendant did not wash their hands before inserting them into the vagina (Winani et al., 2005).

Several factors were significantly associated with the incidence of infection in a bivariate analysis. It was also found out that bathed or shaved before delivery had significantly fewer cases of puerperal sepsis than women who did not bathe or shave before delivery. Winani and colleagues (2005) noted that Women who experienced labor for more than three hours had significantly more cases of puerperal sepsis than women who experienced labor lasting under three hours. It was found that there was no significant difference in the incidence of puerperal sepsis between the three places of delivery: medical facilities (1.8%), home (2.3%), and other places (4.5%). Medical facilities include hospitals, health centers, and dispensaries, and the category of “other places” was most often en route to the medical facility (Winani et al., 2005). Kenya is one of the countries in sub-Saharan Africa that still experience high maternal mortality (KDHS, 2010).
A study done in Nairobi to assess maternal mortality in the informal settlement, found out that puerperal sepsis was more rampant in slum areas of Nairobi (Makumi, 2004). According to Gordon et al (2013), such areas lack adequate attention in terms of research and/or service delivery.

A study done in Kilifi Kenya, to assess the pregnancy, delivery and socio-economic factors related to Neonatal sepsis showed that there was no significant difference between the groups on maternal report of problems during pregnancy and or rate of home delivery. There was also no significant difference found between groups for the socio-economic variables of maternal age, education, employment or occupation (Gordon et al., 2005).

2.3.2 *Puerperal sepsis in other countries*

Maternal and child health are high priorities for international development. Sepsis was the most frequent underlying cause of maternal mortality in the 19th century, responsible for 50% of all cases (WHO, 2002). In industrialized countries, puerperal sepsis is rare, causing 2.1% of maternal deaths. In Africa and Asia, it is the second commonest cause of maternal mortality after hemorrhage, causing 9.7% and 11.6% of deaths respectively. During the 18th century, it took on epidermis proportions, particularly when home delivery practice changed to delivery lying-in hospital, as there still was a total ignorance of asepsis.

A study done in Mexico showed that 84% of deliveries occur in health facilities and rising Caesarean section rates were over 27% in the public sector and 70% in the private sector in 2005. Therefore septic shock has been documented to account for as much as 5 to 10% of mortality. Study in U.S.A reported that about 3 women die from puerperal
sepsis for every 100,000 deliveries and that, the single most important risk factor being caesarean section not aseptic conditions (Tuladhar et al., 2009).

A review covering a period of 20 years in Norway, postpartum sepsis accounted for 4 of the 47 deaths and was the third leading cause of death. A research report presented in Pakistan indicated that out of 20 deaths due to sepsis, 60% were due to induced abortion, most of them were first trimester abortion due to unplanned pregnancy, about 20% were due to prolonged labour, repeated vaginal examination in septic condition. 10% of the cases came in septicemia in gasping condition. Another two cases were brought dead in emergency on 14th day of delivery with history of high grade fever; unhealed, unstitched episiotomy.

Another study done in India also showed that Puerperal sepsis was 1.7% of all obstetrical admissions and 34.4% of postnatal complications. It was seen common among young patients of 15–25 years age, 66.3%, of lower parity, 63.0%, low socioeconomic status, 65.20, uneducated patients, 78.2%, home deliveries, 73.9%, prolong labour, 58.6, prolong rupture of membranes from 48–72 hours, 73.8% and deliveries conducted by untrained birth attendants, 60.5%. Puerperal sepsis morbidity characterized by; foul smelling discharge was 25%, retained product of conception, 44.5%, peritonitis, 88.60%, septicaemia, 44.3%, pelvic abscess, 10.8%, endotoxic shock, 4.3%, disseminated intravascular coagulation, 2.1%. Sepsis related mortality was 4.2% (Sham Shad et al., 2010).

A study in New Zealand reported rate of 10.9% but this could be attributed to the relatively fewer numbers of study subjects as was the case with the study in Sierra Leone. Interestingly, a higher incidence rate is reported in one study in the United States where
the study population may be considered to be of a similar background to those in developing countries (Hussein et al., 2011). This study looked at women from low socioeconomic backgrounds and reported an incidence rate of 6.18%.

In Pakistan, research showed that sepsis was among the three leading causes of death in both hospitals and the community. In Norway, on the number and causes of maternal deaths, postpartum sepsis accounted for 4 of the 47 deaths translating to 10% and was the third leading cause of death. In Poland over a 10-year period, 462 maternal deaths were recorded and sepsis accounted for 27.3% of the direct maternal deaths and was the second leading cause of death. The United States Joint Commission on Maternal Welfare uses a standard definition for puerperal fever used for reporting puerperal morbidity as an 'oral temperature of 38°C or more on any two of the first ten days postpartum (Spaans, 2004).

Studies done in Liaquat University Hospital, Hyderabad, Sindh it was found that Over the study period 230 patients presented with puerperal sepsis representing 6.28% of 3658 admissions. All patients were anemic, in 228 translating to 99% patients no aseptic measures were taken, 209 equivalent to 90.86% patients were un-booked, 56.08% patients had frequent vaginal examination, 126 equivalent to 54.78% patients had home delivery, 48.26% patients had prolong rupture of membrane, 46.52% patients had prolong labor and 9.13% patients had unsafe miscarriage (Chandra et al., 2011). A study on ‘Maternal Intensive Care and Near-miss Mortality' in Canada, showed sepsis to be the third main reason for transfer to intensive care unit and accounted for 15% of cases. This was also observed in Brazil where sepsis was among the leading causes of transfer to intensive care unit (Singh et al., 2011). India, a study showed that 50% of maternal deaths
due to sepsis were related to unsafe induced abortion. Sepsis has been shown to have a very high case fatality rate (Iftakhar et al., 2009).

2.4 Population at Risk

Women especially of reproductive age group 15-49, are physically, mentally and socially more vulnerable to infections such as puerperal sepsis. These women are more vulnerable to RTIs and RTDs which increases the risk of one developing Puerperal sepsis (Singh et al., 2011). It has been found that there are higher chances of sepsis in poor females who are suffering from chronic ill health and malnutrition delivering in unhygienic conditions. These women are unable to afford the cost of health facility. To most women, poverty combines with cultural constraints that construct a social barrier around them which health services cannot penetrate (Sham Shad et al., 2010).

Most of births take place at home, where delivery is carried out without aseptic measures. Women cannot adopt a good health seeking behaviors even when they know that they have life threatening condition (chisembele., 2004). Studies done in Pakistan reported high rate of 67.2% of sepsis in low socioeconomic group. low economic social set up is associated with illiteracy, poor hygiene, ill health, poor antenatal care, prolonged labour, delayed referrals and pre-labour rupture of membranes all setting encourages the development of sepsis (Sham Shad et al., 2010).

During pregnancy, some of these women are found to have poor health seeking behavior, poor nutrition, and anaemia. After labour and delivery, the women of reproductive age group may be faced with long labour, poor hygiene/infection control practices, multiple vaginal examinations, instrumental delivery, delivery through caesarian section, retained
products of conceptions, hemorrhage and lacerations on genital tract (Momoh et al., 2010).

Women who get pregnant at an early age are inexperienced mothers and may land on the hands of traditional birth attendants who never practice aseptic measures like hand washing and antiseptic materials to provide clean delivery service, clean cord cutting, perineal hygiene and antibiotic cover after delivery. Statistics have shown that nearly a quarter of Kenyan women start childbearing by age 20 and this proportion is double for women living in urban informal settlements (Ziraba et al., 2009). A research carried out in the 2003 by Kenya Demographic Health Survey (KDHS), showed that the proportion of births attended to by skilled personnel in Kenya was reported to be only 42%. Such unskilled deliveries are done outside health facilities due to lack of education regarding health care, antenatal visits and delivery in well-equipped and well-staffed medical facilities (KDHS, 2003).

These young mothers are unfamiliar with the process of labour, its length and complications (khaskeli et al., 2013). Most primigravida mothers are found to take a long course of labour and trials in various hands before reaching health facility (Ahmed et al., 2013). A study to support this showed that age and parity tend to be younger, 70% less than 30 years age and 77% having parity of 2 or less. There is strong association of prolong labour with puerperal sepsis which occurs in younger mothers of lower parity (Sham Shad et al., 2010).

2.5 Management of Puerperal Sepsis

Behavioral theories from models developed in psychology have been used to examine infection control practices such as hand washing in health care providers, concluding that
it is the interdependence of various factors including environment, organization and structure that matters, rather than individual behavior (Hussein et al., 2011). Viable strategies are those that make changes which affect interactions between individuals, and how they function within their environment and their institutions (Savita et al., 2009).

In sub-Saharan Africa research has generally focused on either child or maternal health, and there are likely to be opportunities for simple preventive measures affecting both (Simon et al., 2007). According to Miller (2012), there are significant gaps in knowledge of the infective organisms that cause puerperal sepsis in resource-poor settings and the antibiotic management needed to treat it. It’s been shown that some developing countries have recently experienced increased use of health facilities for labour and delivery care and there is a possibility that this trend could lead to rising rates of puerperal sepsis (Mavalankar et al., 2011). Findings by Khaskheli and colleagues (2013), shows that some countries now have high number of utilization of health facilities but cases of postpartum infections are still being recorded. A health systems approach is necessary to reduce maternal mortality and the occurrence of infections resulting from childbirth. Organizational and behavioral change underpins the success of infection control interventions (Mavalankar et al., 2011).

2.7 Gaps in existing literature

One strategy to manage the occurrence of PS is by understanding how the risk factors influence its occurrence and establishing the possible associations that might exist between them. Establishing the association between the risk factors will help in formulating better interventions that can be used to prevent its occurrence and management of PS cases, as opposed to relying merely on identifying the risk factors.
Existing researches have been focusing on the prevalence and risk factors associated with puerperal sepsis. There is need to examine the occurrence of PS based on the socio demographic characteristics and obstetric characteristics. Furthermore, due to the continuous persistence of PS despite the rise in utilization of Health facilities during delivery, there is need to establish the management strategies used in the hospital and the possible challenges faced by the health care facilities and also the associations that exist between the risk factors to establish whether controlling one risk factor could affect the other. There are limited studies evaluating management of PS in the health care facilities. This study investigated; the occurrence of PS, the association that exist between the associated factors influencing occurrence of PS, the management strategies of PS in the health care facilities and the challenges that exist in its management.
CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Study Area

The study was conducted in Nandi district hospital and Kapsabet district in hospital, Nandi County. The hospitals at the time of study served as the major hospitals in the county where most referrals were made from other hospitals and medical centers in the area. The county bordered several counties including; Uasin Gishu to the North and East, Kericho to the South East, Kisumu to the South, Vihiga to the South West, Kakamega to the West and Baringo County to the East. It is located between Latitude 0° and 0° 34 ’, Longitude -34°34’/35°25E and altitude – 1300 -2500. The county has a total of six constituencies namely; Tinderet, Mosop, Emgwen, Chesumei, Aldai and Nandi Hills.

3.2: Research Design

The study utilized a cross sectional descriptive study design. The design provides a 'snapshot' of the outcome and the characteristics associated with it, at a specific point in time thus enabling the study to; examine the distribution of Puerperal sepsis among the study population with different risk factors at time of study. It also allowed establishment of the associations between the variables in the study. The design employed both qualitative and quantitative research methods whereby, questionnaires were used to collect quantitative data while KII schedule was used to record qualitative data.

3.3: Variables: Dependent and Independent

The dependent variable of the study was occurrence puerperal sepsis while the independent variables were: Socio-economic characteristics such as: age, economic status, occupation, education, knowledge on puerperal sepsis, marital status and parity status; Obstetric factors including: mode of delivery, unsafe abortion, prolonged labour,
place of delivery, antenatal care, Vaginal examinations. Patient’s characteristics including: knowledge on PS; facility factors including availability of adequate equipment, finance, staff distance, referral systems and hygiene lessons.

3.4: Study Population

The study targeted all women of reproductive age (15-49 years) who visited the hospital for health care services during the time of study. The study targeted all women who had been diagnosed with puerperal sepsis. The health care providers in charge of these patients were also included in the study. The total population of women, aged 15-19 years in Nandi County was 33,373.

3.4.1 Inclusion Criteria

Women who participated in the study were those who had been diagnosed with puerperal sepsis and had given consent to be included in the study.

3.4.2 Exclusion Criteria

The study excluded eligible women who were not willing to participate, those in critical conditions and those not mentally sound.

3.5 Sample Size Determination

Sample size was calculated using Fischer’s, et al, 1998 formula (n = (Z^2pq)/d^2). The study was done at 95% level of confidence using the puerperal sepsis rate (15%) in Nandi County (KII/ Hospital records). P=15% q=85%, d= error at 5%

1.96^2*0.15*0.85/ (0.05^2) = Sample size =195.

Then 10% was added to address attrition

195 + (10%) = 215
3.6 Sampling design/techniques

Purposive sampling technique was used to select the study population. Only patients had been diagnosed with puerperal sepsis were selected and willing to participate in the study were interviewed at the point of exit. This design was suitable since the study was examining the associations between the study’s variables exclusively on Patients diagnosed with puerperal sepsis. The condition itself was not evenly distributed among all patients in the hospital thus the design was appropriate so as to get a large sample for the study.

3.7 Data Collection Tools

Data collection instruments that were used in the study included questionnaire (Appendix 3, A), and key informant schedule (Appendix 4). Semi-structured interview guides were used to collect data from patients on exit. Study objectives were critically scrutinized and relevant questions were developed. The tools were then taken to the field for testing. The tools were improved after the pre-test to the satisfaction of the researcher. An open ended questionnaires was administered to a key informants in the facilities under study for more information on the facility infrastructure and the health seeking behavior of the women in Nandi County

3.8 Data collection methods

The interviewer questionnaires were filled during an exit interview with women who had been diagnosed with puerperal sepsis. This was used to establish the occurrence of PS sepsis among women of reproductive age 15-49 in Nandi County. It consisted of socio demographic characteristic section, obstetric profile section, and knowledge status section of PS among the respondents. The interview was done to each respondent
individually and in a private space to ensure privacy and confidentiality. Questions were translated to the respondent in the language they understood for more accurate answers.

3.8.2 Pre-test

Pretest was done in Uasin Gishu District Hospital to test if the research instrument met the objectives of the study. The hospital served patients with similar characteristics to those who visited the two hospitals in the study. A total of 20 patients were interviewed.

3.9 Key informant interviews (KII)

Key informant schedules were conducted with the hospital two managers/ medical superintendent and two head nurses from each hospital to establish information on management of PS and the existing challenges. These are the persons with the overall information on the health status of the hospital and that of both the hospital and Nandi County.

3.10 Data quality and control

3.10.1 Validity

To ensure that the results of the study were valid, pre-test was done after which appropriate corrective measures were addressed on the research tool. Irrelevant/ambiguous questions were dropped from the list and reframing was done to capture relevant information. The researcher further consulted with the data analysts and study supervisors who advised on appropriate development of questions that met all the objective of the study. This was to ensure accurate data that represented all the variables in the study.
3.10.2 Reliability

To ensure that there was consistency of the data, research assistants were passed through a comprehensive training where they were given a brief enlightenment on Puerperal sepsis after which they went through the data collection tools. They were also involved in the pretesting so as to familiarize themselves with the study tools, the dependent variable under study and the health facilities. The generated data was analyzed using SPSS version 21 to ensure study questions were answered. Double checking was done to ensure all responses were entered correctly.

3.11 Data processing

Collected data were passed through cleaning and coding process before analysis. The process involved field editing of the questionnaires. After data collection, data coding was done where all answers were assigned with codes before entering it into the computer using SPSS vs.21. Data cleaning was then done to eliminate errors and inconsistencies that might have occurred during data entry.

3.12 Data Analysis

Data was analyzed using Statistical Package for Social (SPSS) version 21. Descriptive statistics such as percentages, frequencies and mean were used to describe proportions for the occurrence of Puerperal sepsis. For the analytical methods, Odds ratio was used to assess associations between the variables (factors associated with PS) in the study. For the qualitative portion of the study, the data collected from the key informant was analyzed to thematic content and the most common narratives were quoted. Descriptive data was presented in tables, graphs and charts.
3.13 Study Ethics

Ethical approval was obtained from Kenyatta University ethics committee and Ministry of Higher Education, Science and Technology. Thereafter permission was obtained from the management of the facilities under study. The study also obtained informed consent from the participants. Confidentiality was ensured by interviewing the respondents in a private place and none of their personal information (for example; name and contact details) was recorded.
CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter presents the results of analysis of responses collected by use of questionnaires administered to patients presenting with puerperal sepsis and managers and/or supervisors in charge. A total of 215 patients and five health care staff participated in the study. The findings in this section are sequentially arranged in the order of study’s specific objectives, that is, to establish the occurrence of Puerperal sepsis, to assess risk factors associated with Puerperal Sepsis and its management amongst women of reproductive age (15-49 years) in selected hospitals in Nandi County.

4.1 Socio demographic characteristics

Results in this study shows that the age of respondents ranged from 15 to 46, with a mean of 25.2 years. Majority (90.2%) of the participants had attained various levels of education; 50.2% primary school education, 28.4% secondary school education and 11.6% tertiary education respectively. A further 63.7% of the respondents did not have any kind of employment, 15.3% were employed while 20.9% of the respondents had self-employment. Approximately, 56.2% of the respondents were of lower parity status while 29.8% were of the upper parity level. 28.4% of the respondents had procured unsafe abortions. Table 4.1 presents the Socio- demographic characteristics of the study participants.
Table 4.1 The socio demographic characteristic of the study (n=215)

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>FREQUENCY</th>
<th>PERCENTAGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE RANGE (Years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-25</td>
<td>127</td>
<td>59.1</td>
</tr>
<tr>
<td>26-35</td>
<td>69</td>
<td>32.1</td>
</tr>
<tr>
<td>36-46</td>
<td>19</td>
<td>8.8</td>
</tr>
<tr>
<td>PARITY STATUS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primipara</td>
<td>45</td>
<td>20.9</td>
</tr>
<tr>
<td>Multipara</td>
<td>115</td>
<td>53.5</td>
</tr>
<tr>
<td>Grand multipara</td>
<td>25</td>
<td>11.6</td>
</tr>
<tr>
<td>None</td>
<td>30</td>
<td>14.0</td>
</tr>
<tr>
<td>EDUCATIONAL LEVEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>21</td>
<td>9.8</td>
</tr>
<tr>
<td>Primary</td>
<td>108</td>
<td>50.2</td>
</tr>
<tr>
<td>Secondary</td>
<td>61</td>
<td>28.4</td>
</tr>
<tr>
<td>Tertiary/College</td>
<td>25</td>
<td>11.6</td>
</tr>
<tr>
<td>OCCUPATION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self employed</td>
<td>45</td>
<td>20.9</td>
</tr>
<tr>
<td>Employed</td>
<td>33</td>
<td>15.4</td>
</tr>
<tr>
<td>Not employed</td>
<td>137</td>
<td>63.7</td>
</tr>
</tbody>
</table>

4.1.2 Age of mothers and their children

The study involved mothers presenting with puerperal sepsis between the ages of 15 and 46 years. While the minimum age of the eldest child of the mothers was less than 1 year, the maximum was age was 28 years. The ages of the eldest children were investigated to reveal the age of mother at first delivery and to examine child spacing. The average age of eldest child was 6.9 years. These findings are presented in table 4.2 below.
Table 4.2 Descriptive Statistics of the ages of the mother and their eldest children

<table>
<thead>
<tr>
<th></th>
<th>Sample size (N)</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the mother</td>
<td>215</td>
<td>32</td>
<td>15</td>
<td>46</td>
<td>25.2</td>
<td>6.5</td>
</tr>
<tr>
<td>Age of the respondent’s eldest child</td>
<td>186</td>
<td>28</td>
<td>0</td>
<td>28</td>
<td>6.9</td>
<td>6.5</td>
</tr>
</tbody>
</table>

* Valid Sample was 186; this was reduced by 29 due to abortions where the eldest child was not alive

4.2 OCCURRENCE OF PUERPERAL SEPSIS

4.2.1 Occurrence of Puerperal Sepsis by age among mothers

Of the 215 women investigated, 18.2% were between age 15 and 19 years, 57.2% were between age 20 and 29 years, 21.9% of the respondents were between age 30 and 39 years and only 2.8% of the respondents were above 40 years. This study showed that a majority (57.2%) women who are diagnosed with puerperal sepsis fall between the age of 20 and 29 years.

4.2.2 Occurrence of Puerperal Sepsis by Education level

Results showed that 21 respondents (9.8%) were illiterate, 180 respondents (50.2%) had attained primary school level of education, and 61 respondents (28.4%) had attended secondary school while 25 of them (11.6%) had attained tertiary level education. Table 2 below shows this finding on level of education and puerperal sepsis as observed in the study.

4.2.3 Occurrence of Puerperal Sepsis by Occupation

The report showed that 39.5% (85) of the respondents were housewives, 20.9% (45) were self-employed, 15.3% (33) were employed, while the others 24.2% (52) were
unemployed. This shows that a majority (63.7%) of the victims of puerperal sepsis were of low socio-economic status.

4.2.4 **Occurrence of Puerperal Sepsis by marital status.**

From the sample of infected mothers who were selected, 79 (36.7%) were single while 135 (62.8%) were married. There was a very small proportion (1%) whose marital status was unknown. Puerperal sepsis was more common among the married respondents.

4.2.5 **Occurrence of PS by parity level**

Results showed that mothers with two children had increased the risk of getting puerperal sepsis by 14.4% compared with those with only one child. However, subsequent third, fourth or more deliveries decreased the risk of the disease.

4.2.6 **Age of the mother at first delivery**

The study revealed that the mean age at first delivery was 19.2 years. The least age of first delivery among the mothers who were interviewed was 9 years (± 3.6 years) while the highest was 32 years (± 3.6 years).

4.2.7 **Knowledge of mothers on puerperal sepsis**

The study also investigated whether the mothers in the sample had prior knowledge about puerperal sepsis. Functional knowledge is an important prerequisite puerperal sepsis prevention and control. Among the mothers who participated in the study, 18.1% reported having prior knowledge about the disease while the rest (81.9%) reported having no prior knowledge about the disease as shown in table 4.3 below.
Table 4.3 Knowledge of mothers on PS

<table>
<thead>
<tr>
<th>Knowledge of puerperal sepsis</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>39</td>
<td>18.1</td>
</tr>
<tr>
<td>No</td>
<td>176</td>
<td>81.9</td>
</tr>
<tr>
<td>Total</td>
<td>215</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.3 Associated factors of Puerperal Sepsis in patients attending the two hospitals in Nandi County

This section presents assessment of risk factors associated with Puerperal sepsis that were investigated.

4.3.1 Place of delivery

Among the women who had delivered and had the disease, 82 (38.1%) of the respondents were found to have had deliveries in healthcare facility, while 33.5% (72) of respondents had delivered at home. The rest, 28.4% (61) had unsafe abortions.

4.3.2 Mode of delivery

Among the women with puerperal sepsis assessed, there was a high proportion of respondents (66.5%) who had delivered through spontaneous vaginal delivery. This was compared to only 4.7% who had Caesarian-section delivery and about 0.5% who had instrumental assisted delivery. The rest, 28.4%, had procured unsafe abortion.

4.3.3 Duration of labour.

Regarding assessment of duration of labour as an obstetric risk factor, it was found that most of the women with puerperal sepsis (34.8%) had their labour lasting between 6 and 12 hours; 28.4% had their labor lasting between 12 and 24 hours; and 8.4% of the women
had their labour lasting between 24 and 36 hours. The rest of the respondents (28.4%) had performed unsafe abortion.

4.3.4 **Vaginal examination**

The study examined vaginal examinations as a risk factor to puerperal sepsis. It was evident that most of the puerperal sepsis cases (46%) had experienced several vaginal examinations before delivery. Those who had been examined twice were 12.6% while those with a single examination formed 7.4% of the sampled sample. Those who had not been examined completely were (4.7%) while those who did not know if they were examined contributed 0.9% of the sample.

4.3.5 **Abortion**

Upon assessment of abortions as a risk factor, it was observed that about 28% of the respondents had procured unsafe abortions at home while 71.6% were delivery cases. The study revealed that there was a high proportion (56.7%) among the respondents who had poor or no ANC attendance. About 15% of respondents had their antenatal visits before delivery.

4.3.6 **Duration of rapture of membrane**

It was also found majority of women (42.8%) who had delivered had waited for their membrane rapture that lasted for 24 hours or more, (17.2%) had a waited for 36 hours or more, while 11.6% accounted for those who had their rapture of membrane lasting for 48 hours or more. Others, 61 (28.4%) did not experience membrane rapture since they had unsafe abortion.
4.3.7 Parity level
From the study it was observed that, women of the lower parity were at high risk of the infection with a high number of 121 (56.2%). Respondents of upper parity level accounted for 64 (29.7%) while about 30 (14.0%) had done unsafe abortions.

Table 4.4 Associated factors of Puerperal Sepsis among the respondents (N=215)

<table>
<thead>
<tr>
<th>Specific risk factor for PS</th>
<th>Response</th>
<th>No of Observations</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate food (n=154)</td>
<td>Yes</td>
<td>130</td>
<td>60.5</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>24</td>
<td>11.2</td>
</tr>
<tr>
<td>Unsafe abortion (n=215)</td>
<td>Yes</td>
<td>61</td>
<td>28.4</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>154</td>
<td>71.6</td>
</tr>
<tr>
<td>Other diagnosis (n=215)</td>
<td>Yes</td>
<td>38</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>116</td>
<td>54.0</td>
</tr>
<tr>
<td>Parity level (n=215)</td>
<td>Lower(1&amp;2)</td>
<td>121</td>
<td>56.2</td>
</tr>
<tr>
<td></td>
<td>Upper(≥3)</td>
<td>64</td>
<td>29.7</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>30</td>
<td>14.0</td>
</tr>
<tr>
<td>ANC attendance (n=154)</td>
<td>Yes</td>
<td>122</td>
<td>56.7</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>32</td>
<td>14.9</td>
</tr>
<tr>
<td>Vaginal examinations (n=154)</td>
<td>One</td>
<td>16</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>Two</td>
<td>27</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td>Several</td>
<td>99</td>
<td>46.0</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>10</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Duration of labour (n=154)</td>
<td>6-12 hrs</td>
<td>75</td>
<td>34.8</td>
</tr>
<tr>
<td></td>
<td>12-24 hrs</td>
<td>61</td>
<td>28.4</td>
</tr>
<tr>
<td></td>
<td>24-36 hrs</td>
<td>18</td>
<td>8.4</td>
</tr>
<tr>
<td>Duration of rupture of membrane (n=154)</td>
<td>&gt;=24 hrs</td>
<td>92</td>
<td>42.8</td>
</tr>
<tr>
<td></td>
<td>&gt;=36 hrs</td>
<td>37</td>
<td>17.2</td>
</tr>
<tr>
<td></td>
<td>&gt;=48 hrs</td>
<td>25</td>
<td>11.6</td>
</tr>
<tr>
<td>Place of delivery (n=154)</td>
<td>Home</td>
<td>72</td>
<td>33.5</td>
</tr>
<tr>
<td></td>
<td>Health care facility</td>
<td>82</td>
<td>38.1</td>
</tr>
<tr>
<td>Mode of delivery (n=154)</td>
<td>Spontaneous delivery</td>
<td>143</td>
<td>66.5</td>
</tr>
<tr>
<td></td>
<td>Cs delivery</td>
<td>10</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>Instrumental assisted delivery</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>
Information from a key informant affirmed that unsafe abortions were as a result of poor economic status that encouraged even married couples to procure them. Stigmatization was seen as a consequence of unwanted pregnancies which encourages the practice of unsafe abortions. The following excerpt is verbatim report of the key informant’s reasons why unsafe abortions are ubiquitous in Nandi County. “…even married couples prefer to carry out unsafe abortions due contraceptive failure or promiscuity”

4.4 Assessment of interactions among factors associated with puerperal sepsis

A cross tabulation of risk factors was done after which Chi-square values were used to show the level of significance. The findings showed that Duration of labour and antenatal care attendance had significant statistical associations. It was also found that there was a statistical significance between duration of labour and availability of food during the pregnancy period of the respondent. Conversely, there were no significant associations between other variable combinations in the study as shown in the table below.

Table 4.5: cross tabulations of factors associated with Puerperal Sepsis

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>ANTENATAL CARE ATTENDANCE N=154</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CATEGORY</td>
</tr>
<tr>
<td>Level of education</td>
<td>To school</td>
</tr>
<tr>
<td></td>
<td>Never</td>
</tr>
<tr>
<td>Occupation</td>
<td>Employed</td>
</tr>
<tr>
<td></td>
<td>Not employed</td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
</tr>
<tr>
<td></td>
<td>Not married</td>
</tr>
<tr>
<td>Mode of delivery</td>
<td>Spontaneous vaginal</td>
</tr>
<tr>
<td></td>
<td>Others</td>
</tr>
<tr>
<td>Knowledge on PS</td>
<td>Yes</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>Health facility</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>Duration of Labour</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Availability of food</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>56 (36%)</td>
</tr>
<tr>
<td>No</td>
<td>19 (12%)</td>
</tr>
<tr>
<td><strong>Mode of delivery</strong></td>
<td></td>
</tr>
<tr>
<td>Spontaneous vaginal</td>
<td>70 (12%)</td>
</tr>
<tr>
<td>Others</td>
<td>5 (4%)</td>
</tr>
<tr>
<td><strong>Distance to hospital</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;10 km</td>
<td>19 (12%)</td>
</tr>
<tr>
<td>&gt;10 km</td>
<td>56 (36%)</td>
</tr>
<tr>
<td><strong>ANC</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>53 (34%)</td>
</tr>
<tr>
<td>No</td>
<td>22 (14%)</td>
</tr>
<tr>
<td><strong>Vaginal Examinations</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>16 (10%)</td>
</tr>
<tr>
<td>None</td>
<td>12 (8%)</td>
</tr>
<tr>
<td><strong>Knowledge on PS</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (5%)</td>
</tr>
<tr>
<td>No</td>
<td>20 (13%)</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
</tr>
<tr>
<td>To school</td>
<td>25 (16%)</td>
</tr>
<tr>
<td>Never</td>
<td>3 (2%)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>20 (13%)</td>
</tr>
<tr>
<td>No</td>
<td>8 (5%)</td>
</tr>
<tr>
<td><strong>Place of Delivery</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>To school</td>
<td>129 (84%)</td>
</tr>
<tr>
<td>Never</td>
<td>6 (4%)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>72 (47%)</td>
</tr>
<tr>
<td>None</td>
<td>63 (41%)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>100 (65%)</td>
</tr>
<tr>
<td>Single</td>
<td>35 (23%)</td>
</tr>
<tr>
<td><strong>ANC</strong></td>
<td></td>
</tr>
<tr>
<td>Attended</td>
<td>109 (71%)</td>
</tr>
</tbody>
</table>
Subsequently, odds ratios were used to estimate the strength of association between the investigated combinations that showed statistical significance.

The odds of antenatal care attendance among mothers with short duration of labour was 0.35 times more likely than among those with extended duration of labour (OR=0.35, 95% CI, 0.15-0.80). This means that mothers with extended duration of labour were less likely to have attended ANC than mothers with short duration of labour.

The study also found that adequate food was associated with short duration of labour. Mothers who reported having adequate food were 5 times more likely to experience short duration of labour compared with mothers who did not have adequate food (OR= 5, 95%CI, 1.8 -14.28) as shown in the table 4.6 below.
Table 4.6 Associations which showed statistical significance between the variables

<table>
<thead>
<tr>
<th>Variables cross tabulated</th>
<th>Odds Ratio (point estimate)</th>
<th>95% Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC attendance &amp; Duration of labour</td>
<td>0.35</td>
<td>0.15-0.80</td>
</tr>
<tr>
<td>Duration of labour &amp; balanced nutrition</td>
<td>5</td>
<td>1.8-14.28</td>
</tr>
</tbody>
</table>

4.5: Morbidity from sepsis

Table 4.7 shows the distribution of morbidities experience by the respondents. Results showed that most of the women participating in the study (82.3%) were found to have suffered from fever associated with puerperal sepsis. This was followed by abnormal vaginal discharge (79.1%), foul/smelly vaginal discharge (66.5%) and delayed reduction in the size of the uterus (54.9%). The most common morbidities associated with puerperal sepsis were found to affect about 93% of the study population.

Table 4.7: Shows morbidities resulting from puerperal sepsis

<table>
<thead>
<tr>
<th>MORBIDITY</th>
<th>RESPONSE</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal Vaginal discharge</td>
<td>Yes</td>
<td>170</td>
<td>79.1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>45</td>
<td>20.9</td>
</tr>
<tr>
<td>Pelvic pain</td>
<td>Yes</td>
<td>200</td>
<td>93.0</td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td>15</td>
<td>7.0</td>
</tr>
<tr>
<td>Fever</td>
<td>Yes</td>
<td>177</td>
<td>82.3</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>38</td>
<td>17.7</td>
</tr>
<tr>
<td>Foul/Smelly vaginal discharge</td>
<td>Yes</td>
<td>143</td>
<td>66.5</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>72</td>
<td>33.5</td>
</tr>
<tr>
<td>Delay in size of uterus</td>
<td>Yes</td>
<td>118</td>
<td>54.9</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>97</td>
<td>45.1</td>
</tr>
</tbody>
</table>
4.6 Management of Puerperal Sepsis in the selected hospitals in Nandi County

This section presented the possible management strategies that have been put in place to prevent PS from the hospital level and the patient’s level. It also investigated challenges that are being faced by the facility when trying to control the infection.

4.7 Hospital management

To establish the strategies employed by the hospitals in management of PS, healthcare staffs working at the post natal ward were asked to form group discussions where questions were asked by the interviewer and answers were taken randomly from the participants. These focus group discussions revealed that the predisposing factors of PS were; anemia, non-adherence to aseptic technique during delivery, prolonged rupture of membrane, vaginal examinations and retained products of conception and also unsafe abortion.

The facilities lacked enough qualified staff. This is supported by a report from KIIIs who said that sometimes the health care staffs in the delivery ward were overwhelmed with the work load.

“...There’s shortage of staff in this facility to provide services and also carrying out sensitization and advocacy of PS in the community” KII

4.7.1 Management of puerperal sepsis among patients

Figure 4.8.2 below presents the management strategies observed by mothers during their deliveries. It was established that, 113 of the respondents suggested that their assistants used gloves, 22 of the respondent noted that they observed their assistants washing their hands before the procedure, 11 of the respondent did not observe any hygienic method
while 4 of the respondents did not have an idea on such matters. From the study findings, it was evident that use of gloves was a common practice. The figure below exhibits these findings.

![Hygiene technique observed during delivery](image)

**Figure 4.8.2: Hygiene practices observed by respondent from the person assisting during delivery**

During the KII session, it was reported that most women who developed the infection after hospital deliveries may have failed to maintain their hygiene at their homes.

“*Mothers who have had spontaneous vaginal deliveries in this facility are released exactly after six hours of delivery. We ensure high standards of aseptic techniques in all processes. It’s then the responsibility of the mother to keep herself clean during the healing process. Some of these women develop the infection at their homes only to come back to the hospital for treatment*”

The study revealed that most women who developed the infection had poor health seeking behaviors. It was reported that the women could not embark on care seeking
paths even when they knew that they had life threatening conditions. Some visit the health facility when the infection has dominated their bodies.

“...Most of the women with Puerperal Sepsis Related symptoms seek for health care services when in critical condition” KII.

Report from the study showed that the region also lack proper transport infrastructure therefore obstructing creation on awareness on puerperal sepsis in the community by community health care workers.

“We’ve had challenges of accessing the some areas to give education on puerperal sepsis, consequences of unsafe abortion, family planning and to carry out advocacy on male involvement in family planning as part of the strategy to reduce postpartum complications. The area has inaccessible roads due to its geographical features”KII

It was established that in these facilities, mothers were allowed to go home after six hours of spontaneous deliveries. “........Mothers together with their new born are discharged immediately after six hours of delivery” (KII)
4.8 DISCUSSION

4.8.1 Occurrence of Puerperal Sepsis

From the study, it was evident that most mothers, who developed puerperal sepsis, were aged 20-29 (57.2%) and of lower parity (primipara) (56.2%). Perhaps, this may have resulted from the fact that young inexperienced mothers tend to seek services of traditional birth attendants. They mostly deliver outside health facility due to lack of knowledge regarding health care, antenatal visits and delivery in adequately equipped medical facilities. They also have poor child spacing tendency. With the coming of the second child (poorly spaced) they are overwhelmed with duties hence forgetting about their health (Penelope et al, 2013). This findings tally with a study done by Sheeba et al (2013), which concluded that, this is the group of women who suffer a lot with infective morbidities caused by poverty, illiteracy and malnutrition. They carry their pregnancy in very poor settings and having low resistance for the infection, these women are usually ignorant in seeking ante natal checkup or contraceptive advice.

Young mothers are unfamiliar with the process of labour, its length and complications. Mostly primigravida mothers take a long course of labour and trials in various hands before reaching the health facility. Other studies by Sham shad et al, 2010 also showed that age, and parity tends to be younger, 70% less than 30 years age and 77% having parity of 2 or less.

Most women (64%) in this study were of low Socio-economic status. There is higher occurrence of sepsis in poor females delivering in unhygienic conditions. This might have compromised their health seeking behavior. Most (50.2%) of them had only attained primary school education rendering them jobless .They lack adequate resources to afford
the cost of health facility. To many women, poverty combines with cultural constraints that construct a social barrier around them which health services do not penetrate (Hussein et al., 2011).

Poor socio-economic status among women hinders them from acquiring food and in this case a balanced diet. Other studies have reported high rate (65.2%) of sepsis in low socioeconomic group. Poor social set up is associated with illiteracy, poor hygiene, ill health, poor antenatal care, prolonged labour, delayed referrals and pre-labour rupture of membranes all setting the scene for sepsis to settle in (Sham Shad et al., 2010).

While investigating places of delivery among the respondents, this study found out that majority (38.1%) had delivered in the health facilities. Previous research, however, suggests that most (73.8%) of the study participant had delivered at home (Khaskeli et al., 2013).

Regarding the information, that mothers together with their new born being released from the hospital after six hours, Symptoms of Puerperal Sepsis take up to 42 days to manifest. Hospital delivery by itself cannot reduce chances of one getting the infection if there are no proper antiseptic techniques put in place in the health care facility. Perhaps, the new mother acquired the contamination before leaving the healthcare facility and thereafter developing the disease.

The study found out that sepsis was higher (38.1%) among hospital deliveries compared to 33.5% of home deliveries. These results were in Contrast with study done by Sham shad et al (2010) where home deliveries was high at 37.9% compared to 26.1% of hospital deliveries. The reason for persistent high maternal morbidity due to sepsis, is
brought about by multiple factors, like deliveries assisted by unskilled personnels in unhygienic conditions, late referral to hospital, poor socioeconomic status, prolong labour, induced miscarriage(abortion) and other chronic illnesses like anemia (Chandra et al., 2011).

Women of the lower parity status seem to be more affected. Most (62.8%) of the respondents in the current study were married. Theoretically, they seem to lack adequate time to uphold proper hygiene practices due to responsibilities that awaits them. Possible risk factors among these women include; lack knowledge on Puerperal sepsis, lack of adequate experience in motherhood and poor child spacing (Tuladhar et al., 2009).

Lack of knowledge, among women on PS play a major problem in Nandi County. Abortions/induced miscarriages, that accounted for 28.1% of the study cases, were conducted in unsafe setting and in unhygienic conditions by untrained personnel. This trend was distributed evenly throughout the age group. The ultimate consequence of this behaviour other than death resulting from hemorrhage was PS. Without knowledge of PS, these women fell victims of the infection which may endanger their lives. In developed countries concept of unsupervised deliveries without aseptic measures is part of past and incidence of induced miscarriage are very low because of legalization of miscarriage (Chisembele., 2004). Whereas in developed countries single most contributing factor for puerperal sepsis is caesarean section (Chandra et al., 2011), in this study, only 4.7% had puerperal sepsis after undergoing a caesarian delivery.

4.8.2 Assessment of factors associated with Puerperal Sepsis

This was done to confirm if one variable influenced other(s). Results from establishment of availability of food demonstrated that nutrition could determine the duration of labour
that a mother will experience. There was a strong association of availability of food and duration of labour. Those with adequate food experienced short labour duration unlike those with inadequate food. The study agrees with that of Singata et al (2013) which concluded that poor nutritional balance may be associated with longer and more painful labors.

In addition, prolonged labor attracts several vaginal examinations. This directly leads to sepsis. Prolonged state of an open cervix, often with raptured membranes during prolonged labors, allows infections to ascend from the vagina. According to Momoh et al. (2010) PS can be prevented through consumption of adequate nutritive food or supplements, especially those rich in proteins and vitamins during pregnancy. Availability of proper food helps the boosts the body immune system to fight infections when they occur (Seale et al., 2009). This will help reduce cases of puerperal sepsis resulting from prolonged

The study showed that patients who had a poor obstetric history during pregnancy were at a higher risk of experiencing long periods of labour. Those with poor obstetric profile were mothers who did not attend antenatal clinic in the health care facility; they either patronize quacks or did not visit health facilities at all (KII). This finding concurs with that of Utoo and colleagues (2012), a study that reported that the incidence of puerperal sepsis was more rampant among un-booked mothers (8.7%) than the booked ones (1.9%).

There was no association between the knowledge of PS and parity status among the mothers. Mothers lacking knowledge on the importance of hygiene and its consequences are all at a high risk regardless of their parity level. This finding is supported by a study done by Rinku (2013) which reported that there was no significant association found
between the knowledge of primi postnatal mothers on puerperal sepsis with selected demographic variables such as age, educational status, occupation, family income, type of family, place of residence and source of information.

This study also revealed that the mode of delivery could not be a product of antenatal care attendance. Puerperal sepsis is principally the consequence poor hygiene. Therefore, if antenatal clinic visits are made during pregnancy but not during the process of delivery or post partum period, the mother may encounter microbial contamination and she is likely to be infected.

4.8.3 Management of Puerperal Sepsis

Currently, increasing concerns of hospital and health care associated with infection control has been recorded in many medical disciplines even in developed countries. This experience has led to increasing trends of utilization of health facilities for prevention and control of infection; hence there is strong need of good implementation of established infection control programs at all health facilities in Kenya. Proper education, improvements of guidelines, various technologies and introduction of new clinical guidelines is required for infection control measures (Khaskeli et al., 2013).

As indicated from the result, it’s quite evident that most of the deliveries were done using gloves. Use of gloves was expected to reduce cases of infection but this was not the case in this study. The gloves used might not have been sterile enough to put out contamination by microorganism. Perhaps there might have been cases of glove recycling for economic reasons. The study found out that mothers who come to deliver were requested to purchase gloves to be used in the procedure. Those with prolonged labour are likely to be subjected to glove recycling due to frequent check-up. This might have
been the same case to Khaskheli et al, (2013) findings which indicated that there was been no link established between use of hand hygiene products and reduction in nosocomial infections based on the current systemic reviews.

4.8.4 Management of Puerperal Sepsis by the facility.

Understaffing in the healthcare facilities was found to be a major problem. All the Key informants, who participated in the study, strongly agreed that the facilities did not have adequate staff. With the problem of under-staffing, management of patients becomes tedious leading to development of infections. There will be a poor attendance to mothers during labour. This exposes mothers to long periods of labour which puts them at high risk of puerperal sepsis (Ziraba et al., 2009). The staff found in the post-partum and gynecology ward had adequate knowledge of aseptic technique and most of them had knowledge on Puerperal Sepsis.

One of the KII participants acknowledged that there was no use of partograph in the labour ward. This was agreed by all other participants in the group. They unanimously submitted that use of partograph help reduce chances of infection amongst these mothers by making their management easier. This finding agrees with the study by WHO (2009) which suggested that use of partograph will aid in reducing adverse obstetric outcomes in under-resourced settings, prolonged labour and delay in decision-making.

Education of mothers on personal hygiene and puerperal sepsis awareness in the community could be effective in eradication of the menace. Even with the few available community health workers, access of these women was a problem because of the terrain of the area which has steep hills and valleys. Poor infrastructure made it difficult for the
community health workers to access deep into the community to create awareness on the condition.

Facilities lacked adequate funds to carry out initiatives that could help reduce chances of PS in the area. Such initiatives include education of the community on PS, male involvement on family planning issues, and awareness creation on consequences of unsafe abortions.

4.8.5 Management of PS by patients

It was reported that women in Nandi County lacked adequate information on PS and delayed in seeking for health care services. Poor health seeking behavior among women is brought about by high levels of poverty and ignorance. Some of these women lacked funds to seek early treatment on the onset of symptoms. Lack of funds prompts a person to try cheap forms of treatment including herbs while others do not reveal their health status to their partners for fear of stigmatization. Reports indicate that these women reported to have tried other possible treatment on their own and failed. This puts them at risk of developing other complications which endanger their health.

“…others seek medical attention when symptoms are severe after trying self-medication including herbs.” KII.

Level education is significant in imparting knowledge on the patient. Most of the respondents (50.2%) had primary school education. 81.9% of all the respondents confessed to not being aware of PS. This challenges the management and prevention of the infection both from the facility and personal level.
4.8.6 Morbidities

The high rate of morbidity and mortality could be as a result of late referral, and operative interventions in established infected undernourished women (Bamfo., 2013). Characteristic problems related to infection control in developing countries include poor antibiotic pre-scribing practices, poorly functioning laboratory services, lack of surveillance data and sub-optimal design or construction of buildings and water and sanitation systems. Overcrowding of facilities and insufficient number of health workers are commonly noted. It has been proven that increased bed numbers, nurse to patient ratio and bed space have negative effects on infection transmission. Managers role are not well specified, which contribute to the poorly quality of services. Use of Prophylactic antibiotics during operation reduces endometritis by 66-75% and also reduces rate of wound infection. In our part of world considering all these factors proper education, training regarding anti septic techniques and proper antibiotic cover will improve a lot.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Occurrence of PS
• There was a high number (68.7%) of housewives and of lower parity level. The study concluded that if these groups had adequate education on the importance of personal hygiene and on puerperal sepsis, occurrence of the infection would be minimal.

• Most (81.9%) of respondents did not have knowledge on the disease they were being treated for. The result indicates that in Nandi County, there is a strong need for health education and continuous work in all aspects for improvement of maternal health. The results of this study revealed that there is lack of a strategic approach for preventing and managing even in the health facilities in Nandi County. Most of the patients after being treated of the infection still did not know the etiology and possible prevention practices of the infection.

• Report from the study showed that most of the respondents had delivered in health care facilities. The study therefore concluded that hospital delivery of its own without other services like hygiene awareness to mothers after delivery might not be very effective against puerperal sepsis. In addition, such infection is nosocomial; one can contract it in the health facility as a result of poor antiseptic practices.

Assessments of risk factors
• Food availability was found to have a positive effect on duration of labour. Those with adequate food throughout their pregnancy period were found to experience short labour durations during delivery. This helped reduces individual’s vulnerability to infections. The low socio economic state of some women has left them incapable of acquiring food.

• Women that did not go for antenatal care services during pre-partum period are found to experience long labour durations during delivery. These women lack proper knowledge on how to plan for their birth and where to deliver. Most deliver at home through the assistance of TBAs who might not have adequate skills on hygiene. They end up being victims of Puerperal sepsis.

**Management of Puerperal sepsis**

• Awareness creation on Puerperal Sepsis and educating the postnatal mothers regarding the prevention of puerperal infections will increase the areas of learning domain to be a healthy mother and helps to give birth to a healthy child. The entire community needs to be trained on hygiene practices and its consequences. Community health workers are the ambassadors of such. Adequate funding of health facilities provision proper transportation means ensures that this objective is achieved. Such programs act as a preventive measure against puerperal sepsis, thus reducing maternal morbidity and mortalities in the area.

• There were a substantial number of unsafe abortions reported in the study. Such cases arose as a result of failure of family planning methods among married women and in fear of stigmatization by the community; they ended up performing
unsafe abortions at their homes. Others were done by school going girls who
procured abortion to safe themselves from shame and fear of punished by their
parents.

- The study found that low involvement of men in reproductive health issues like
  family planning was another setback in the improvement of maternal health.
  Women lacked support in decision making on family planning issues, health
  seeking behavior from their spouses. Men involvement can boost control of
  maternal morbidities resulting from pregnancy related complications. In case of
  unwanted pregnancy well informed couples will seek safe abortion services if
  necessary. Proper decisions on family planning methods will also be made and
  better health seeking behavior will be practiced.

- Understaffing is another factor that compromises control of infections in the
  health facilities. Reports from the study showed that there were issues of
  understaffing in the health facilities. This brings about issues of patient poor
  attendance. A patient is likely to develop infection as a result of delayed
  medication, negligence and even experiencing long duration of labour without
  assistance.

- The study reported that the poor state of infrastructure in the area and the terrain
  of the area have made it impossible to access the community for hygiene
  education and PS awareness creation by health care staff. Such initiatives can help
  reduce cases of infection since the community will be able to adopt good health
  seeking behavior including ANC attendance and early seeking of treatment in
  case of diseases. The study reported that some women tried treatments on their
own before going to the hospitals. This eventually puts their lives at risk since the disease would have dominated beyond treatment.

- The study found the hospitals lacked funds to facilitate awareness creation and hygiene education. This has made it impossible to control cases of infection in this county.

- The study reported that women were being asked to buy gloves to be used during delivery. Use of gloves is one of the methods to reduce infection cases but with the low economic state of some women, control of infection could be weakened perhaps because cases of recycling can occur.

### 5.2 Recommendations

In view of the findings of this study the following recommendations can be made:

- There is need for awareness creation on Puerperal Sepsis followed by Education of the community on hygiene especially post-partum mothers so as to prevent cases of infections in Nandi County. Community health workers and Health care staff should be holding frequent educational camps.
The County Ministry of health and the County Financial Authorities should consider funding the hospitals so as to create an enabling environment for the Facility to carry out awareness creation on Puerperal sepsis to their patients. This will help spread the knowledge to the community.

The county Government should consider improving the infrastructure in the area; this includes building accessible roads and improving those that already exist. This will help the health care staff to access the community in creating PS awareness and advising them on good health seeking behaviors.

There is a need to enlighten the community on the need for ANC attendance, skilled attendant at delivery and hospital delivery under aseptic conditions and also maintaining high hygiene after delivery. Women need to be encouraged more to utilize ANC services and during which hygiene and nutrition lessons are rolled out. Awareness creation on PS needs to be integrated among such services.

Health care facilities should consider providing gloves for use during delivery

the results of the present study are limited to only the hospital environment, the nature and extent of the impact of the disease in different settings like within the community could be different. A community based study on the same is recommended for further studies.
REFERENCES


Sham Shad, Saadia Shamsher, and Bushara Rauf. 2010. Puerperal sepsis —still a major threat for parturient. *J Ayub Med Coll Abbottabad*, 22(3)


APENDICES

Appendix 1: Informed consent form for the participant

My name is Ms Violet Chepchirchir, i am a Masters student from Kenyatta University. I am conducting a study on “Occurrence and Management of Puerperal Sepsis amongst women of reproductive age (15-49) in selected hospitals, Nandi county”. The information will be used by the Ministry of Medical Services and Public Health and Sanitation to improve access and quality for management of puerperal sepsis in this hospital as well as in other regions of Kenya.

PROCEDURES TO BE FOLLOWED

Participation in this study will require that I ask you some questions in order asses the occurrence and management of puerperal sepsis.

You have the right to refuse participation in this study. You will get the same care and medical treatment whether you agree to participate in the study or not and your decision will not change the care you will receive from the clinic today or that you will get from any other time.

Please remember that participation in the study is voluntary. You may ask questions related to the study at any time.

You may refuse to respond to any question and you may stop an interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from this clinic or any other organization now or in the future.

DISCOMFORT AND RISKS

Some of the questions you will be asked may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these question if you so choose. You may also stop the interview at any time. The interview may add approximately half an hour to the time you wait before you receive your routine services.

BENEFITS

Your participation in this study will help us learn how to provide effective prevention and management services that can improve the health of women and reduce the risk of puerperal sepsis. You will also benefit from being screened for the condition and if you are found to have a problem you will be advised on treatment.

REWARD

There may be no direct benefit if you agree to participate in the study, however, the research findings will help to shape up future interventions that will potentially help improve health of women.
CONFIDENTIALITY

All the interviews will be conducted privately within the clinic. Your name will not be recorded on the questionnaire. Filled questionnaires will be kept in a secure cabinet for safe keeping at Kenyatta University. Privacy will be maintained in the whole process.

CONTACTS INFORMATION

If you have any question about your rights as a research volunteer, you may contact

Dr. Jackim M. Nyamari – 0722 589 335

Dr. Margaret Keraka- 0721 817 521

Ethical Review Committee Secretariat – kuerc@ku.ac.ke.

PARTICIPANT’S STATEMENT

The above information above regarding my participation in the study has been made clear to me. I have been given a chance to ask questions which, have been answered to my satisfaction. Am voluntarily participating in this study. I understand that my records will be kept private and that I can leave the study at any time. I understand that i will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care i will receive from the clinical today or that i will get from any other clinic at any other time.

Name of participant..................................................................................................................

Signature or Thumbprint...........................................................................................................

Date

Investigator’s statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved.

Name of interviewer ..........................................................
Appendix 2: Assent form for underage participants

Guardian’s Statement
The above information regarding the participation of ........................................ in the study is clear to me. I have given been given a chance to ask questions and my questions have been answered to my satisfaction. I understand that the records will be kept private and that my ............. can leave the study at any time. I understand that she will get the same care and medical treatment whether she decides to leave the study or not and their decision will not change the care they will receive from the clinic today or that she will get from any other clinic at any other time.

Name of the guardian...................................................................................................
............................................................................................................................... ........................................
Signature/thumb print Date

UNDERAGE ASSENT
The above information regarding my participation in the study is clear to me. I have been given a chance to ask question and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care I will receive from the clinic today or that I will get from any other clinic at any other time.

Name of underage ...........................................................................................................
............................................................................................................................... ........................................
Signature/Thumb print Date

INVESTIGATOR’S STATEMENT
I the undersigned, have explained to the volunteer in a language she understands, the procedures to be followed in the study and the risks and the benefits involved.

Name of Interviewer ...................................................................................................
............................................................................................................................... ........................................
Interviewer signature Date
Appendix 3: Questionnaire

This questionnaire is meant to collect information about you and your experience as a patient. This provides important feedback which will be used to enhance the provision of a better health care and prevent the problem of puerperal sepsis. Your responses will be treated with utmost confidentiality. Kindly respond to all items with honesty. Thank you for your cooperation.

SECTION A

(I): SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS

[ use a tick where applicable i.e (✓) ]

1. What is your age?

2. What level of education did you complete?

3. What is your occupation

4. What is your marital status?
   [3] others, (specify)…………………………

5. How many deliveries have you had?

6. How old is your eldest child?

RISK FACTORS/OBSTETRIC PROFILE

1. Where do you normally have your deliveries done?
   (specify)……………………………………

2. What was the mode of your last delivery?
3. What was the duration of labour in your last delivery?

4. How long did the rapture of the membrane take?

5. Were you assisted during delivery?
   [1] Yes  [2] No (if No, Proceed to question 8)

6. a). If Yes, Who assisted you?

   b). What kind of hygienic practice did you observe from the person assisting you. (tick any that you observed)
   [1]. Washed hands before assisting.  [3] None

7. Are you aware of puerperal sepsis?

8. Have you developed any of the following symptoms in the last 72 hours (tick all that you have ever suffered from)
   [1]. Abnormal vaginal discharge
   [2]. Pelvic pain
   [3]. Fever
   [4]. Abnormal smell/foul odor of discharge
   [5]. Delay in the size of uterus
   [6]. Never suffered from any

9. If any of the above, did you seek treatment or help?
   [1]. Yes  [2]. No

10. If yes, from who?
    [1]. A government Health center
    [2]. Self-treatment
    [3]. Community member
    [4]. Relative/sister/brother
    [5]. Private Clinic/Drug Shop/Pharmacy
    [6]. Herbalist
11. Do you know of a woman within your area who has been treated of PS infection within 72 hours of delivery?

12. Did you have adequate food throughout your last pregnancy period?

13. If you suspected you had PS related symptom, would you seek treatment at this District Hospital and why?

14. How far is your home from this hospital (in Kilometers)?

15. Did you go for antenatal care before delivery?

16. If No, why?

   Others, specify

17. Have you been diagnosed of any disease before delivery?

18. If yes, specify?

19. Are you satisfied with service delivery in this hospital?

20. If No, explain
21. How many vaginal examination did you have before delivery

Appendix 4. Questionnaire - Abortion cases

This questionnaire is meant to collect information about you and your experience as a patient. This provides important feedback which will be used to enhance the provision of a better health care and prevent the problem of puerperal sepsis. Your responses will be treated with utmost confidentiality. Kindly respond to all items with honesty. Thank you for your cooperation.

SECTION A

(I): SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS

[ use a tick where applicable i.e (✓) ]

7. What is your age?
   ........................................................................

8. What level of education did you complete?

9. What is your occupation

10. What is your marital status?
    [3] others,(specify)..............................

11. Where did you have your abortion done?
    [3] Others, (specify)................................................

12. Were you assisted in through the process?

13. Are you aware of puerperal sepsis?

14. Have you developed any of the following symptoms in the last 72 hours (tick all that you have ever suffered from)
    [1]. Abnormal vaginal discharge
    [2]. Pelvic pain
    [3]. fever
    [4]. Abnormal smell/foul odor of discharge
5. Delay in the size of uterus
6. Never suffered from any

15. If you suspected any of the above in future, will you seek treatment or help?
   [1]. Yes  [2]. No

16. If yes, from whom?
   [1]. A government Health center
   [2]. Self treatment
   [3]. community member
   [4]. Relative/sister/brother
   [5]. Private Clinic/Drug Shop/Pharmacy
   [6]. Herbalist
   [7]. Other (Specify)

17. If you suspected you had PS related symptom, would you seek treatment at this
   District Hospital and why?
   ---------------------------------------------------------------------------------
   ---------------------------------------------------------------------------------
Appendix 5. KII guide (Health workers)

MANAGEMENT OF PUERPERAL SEPSIS

What do you think causes puerperal sepsis?

Is there existing and functional referral system in this hospital?

Do you use partograph for every woman in labour?

Do you observe aseptic technique during delivery?

How do you handle patients who develop the condition in the hospital?

Do you have hygiene lessons for patients who seek ANC services in this facility?

How is the health seeking behaviors of women with PS related symptoms?

What strategies have been put in place to prevent occurrence of such infections in this hospital?

Are there any challenges faced by the hospital in executing these strategies?

() yes    ( ) No

If yes, specify:
Appendix 6. Graduate school recommendation letter

KENYATTAA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

K.R. Box 43844, 00100
NAIROBI, KENYA
Tel: 8710901 Ext. 57550

Our Ref: Q139/20279/12

DATE: 27th February, 2014

The Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION MARITIM VIOLET CHEPCHIRCHIR– REG. NO.
Q139/20279/2012

I write to introduce Ms. Maritim Violet Chepchirchir who is a Postgraduate
Student of this University. She is registered for M.P.H degree programme in the
Department of Environmental Health.

Ms. Chepchirchir intends to conduct research for a M.P.H proposal entitled,
“Occurrence and Management of Puerperal Sepsis amongst Women of
Reproductive Age (15–49) in Selected Hospital in Nandi County.”

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL
Appendix 8. Graduate School Approval Letter

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

FROM: Dean, Graduate School
DATE: 20th February, 2014

TO: Ms. Violet Chepchirchir
C/o Environmental Health Dept.
Kenyatta University

REF: Q159/20279/12

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board at its meeting of 12th February, 2014 approved your Research Proposal for the M.Sc. Degree, Entitled “Occurrence and Management of Puerperal Sepsis Amongst Women of Reproductive Age (15-49) in Selected Hospital in Nandi County”.

You may now proceed with your Data collection.

Thank you.

JOSEPHINE KENDI
FOR DEAN, GRADUATE SCHOOL

cc. Chairman, Environmental Health Dept.

Supervisors:

1. Dr. Margaret Keraka
   C/o Environmental Health Dept.
   KENYATTA UNIVERSITY

2. Dr. Jackim Nyamari
   C/o Environmental Health Dept.
   KENYATTA UNIVERSITY

JK/cao

Committed to Creativity, Excellence & Self-Reliance