RISK FACTORS ASSOCIATED WITH BORN BEFORE ARRIVAL AND BIRTH OUTCOME AMONG POSTNATAL WOMEN IN THARAKA NITHI COUNTY, KENYA

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DECLARATION

This research Thesis is my original work and has not been presented for a degree in any other University or any other award.

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DEDICATION

I dedicate this work to my wife Joy and my children Winnie and Ken, whose love and devotion to academics inspired this research.
ACKNOWLEDGEMENT

It is with immense gratitude that I acknowledge the support of my principal supervisors, Prof. Margaret N. Keraka and Dr. Peterson N. Warutere. With their continuous guidance and persistent help, this dissertation was made possible.

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To my wife Joy and children Winnie, and Ken, thank you for your understanding, patience and support during the research process.

Finally, acknowledgement is due and is hereby made to all those people who lend a supportive hand in the process of undertaking this project.
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<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Birth Asphyxia</td>
<td>Reduced blood flow to the brain of a new born during delivery</td>
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<tr>
<td>Born Before Arrival:</td>
<td>Births occurring outside health facility.</td>
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<tr>
<td>Gestational Age</td>
<td>The duration of the pregnancy dated from the first day of last menstrual period.</td>
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<tr>
<td>Hypothermia</td>
<td>Temperature below 35° c in newborn</td>
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<tr>
<td>Multiparity</td>
<td>Having given birth to more than one child</td>
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<tr>
<td>Neonatal sepsis</td>
<td>Newborn infection acquired during delivery</td>
</tr>
<tr>
<td>Parity</td>
<td>A state of having given birth to an infant/s weighing 500gm or more alive or dead</td>
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<tr>
<td>Perinatal mortality</td>
<td>Death of fetus after 20 weeks up to the first week after birth</td>
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<tr>
<td>Post-natal period.</td>
<td>The period following delivery up to six weeks</td>
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<tr>
<td>Precipitate labor</td>
<td>Fast/quick labor</td>
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<tr>
<td>Prematurity</td>
<td>Baby born before 37 complete weeks</td>
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<tr>
<td>Preterm birth</td>
<td>Birth occurring between 20 weeks and 37 incomplete weeks.</td>
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<tr>
<td>Preterm labor</td>
<td>Labor occurring between 20 weeks and 37 incomplete weeks.</td>
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<tr>
<td>Primiparous</td>
<td>A mother carrying the first pregnancy</td>
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<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>ANC</td>
<td>Antenatal Care</td>
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<td>BBA</td>
<td>Born before arrival</td>
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<td>FANC</td>
<td>Focus Antenatal Care</td>
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<tr>
<td>GA</td>
<td>Gestation Age</td>
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<td>KDHS</td>
<td>Kenya Demographic Health Surveys</td>
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<td>KUERCE</td>
<td>Kenyatta University Ethical and Research Committee</td>
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<tr>
<td>LMP</td>
<td>Last Menstrual Period</td>
</tr>
<tr>
<td>MDGs</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>MOMS</td>
<td>Ministry of Medical Services</td>
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<tr>
<td>MOPHS</td>
<td>Ministry of Public Health and Sanitation</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science, Technology and Innovation</td>
</tr>
<tr>
<td>RA</td>
<td>Research Assistant</td>
</tr>
<tr>
<td>SBA</td>
<td>Skilled birth attendant</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical package for social Science</td>
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<tr>
<td>SSA</td>
<td>Sub Sahara Africa</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<td>UNICEF</td>
<td>United Nations Children Emergency Fund</td>
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<td>UNFPA</td>
<td>United Nations Fund for Population</td>
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<td>WHO</td>
<td>World Health Organization</td>
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ABSTRACT

Born before arrival (BBA) is a childbirth that occurs outside health facility. BBA constitute a high-risk newborn population and have increased perinatal mortality and morbidity. BBA neonatal adverse birth outcome prolong hospital stay. Tharaka Nithi was among Counties with the highest number of BBA (2%) compared with national (0.9%). The objective of the study was to assess risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County. The study used 1:2 age matched case-control study design to analyze the comparison between the case and the control. The study was conducted in Tharaka Nithi County and the study population were post-natal women in Tharaka Nithi. Purposive and simple random sampling techniques were used to select cases and Controls, and questionnaire was used to collect the data. Data was analyzed using SPSS version 23.0. Descriptive statistics (frequencies and percentages) were used to describe sample characteristics and inferential statistics (chi square, Fishers exact test and Odds Ratio) were used to infer the sample characteristics to the population level. Ethical clearance was sought from Kenyatta University Ethical and Review Committee, permit was sought from NACOSTI and consent sought from respondents. The Socio-demographic risk factors associated with BBA were; marital status (p=0.005), education level (p=0.004), monthly income (p=0.001) and parity (p=0.003), however there was no association between occupation and BBA. The physical risk factors associated with BBA were; distance to the health facility (p=0.005), availability of means of transport (p=0.004), status of the road (p=0.003) and time of delivery (p=0.001). The Obstetric risk factors associated with BBA were; duration of labor (p=0.011), mode of previous delivery(p=0.016), and recognition of onset of labor (p=0.001). The non-ANC compliance and birth preparedness factors associated with BBA were; ANC attendance (p=0.004), timing of ANC attendance (p=0.001), number of ANC visits (p=0.014), identification for health facility for delivery (p=0.001), identification for means of transport (p=0.020), knowledge of signs and symptoms of labor (p=0.003), knowledge of EDD (p=0.001), financially prepared for hospital delivery (p=0.010), and basic supplies for birth (p=0.001). There was significant difference between BBA and hospital birth outcome. The adverse birth outcome were asphyxia, neonatal sepsis, prematurity, and hypothermia. The study recommends Tharaka Nithi County Government responsible departments to use the study new knowledge to reduce/eliminate risk factors associated with BBA and consequently reduce BBA and advanced birth outcome.
CHAPTER ONE: INTRODUCTION

1.1. Background of the study

Born before arrival (BBA) is a childbirth that occurs outside health facility. This occurs when a baby is delivered on way to the hospital (Phiri et al, 2014). Born before arrival babies constitute a high-risk newborn population and have high perinatal mortality and morbidity (Bassingthwaighe et al, 2013).

The documentation of BBAs is still lacking in developing countries, developed countries record an incidence between 0.1% - 0.3%, which rises exponentially in low income countries to greater that 50% in countries such as India and Ethiopia. The rate of BBAs serves as an index of accessibility to perinatal care; a rate greater than 1.5% signals challenges in health care provision. If such a rate exists, further investigations and appropriate interventions are merited (Khupakonke et al, 2017).

Globally, BBA contribute to an estimated 4 million neonates’ deaths and a similar number of stillborn annually. The highest numbers of neonatal deaths are in south-central Asian countries and the highest rates are generally in sub-Saharan Africa (SSA) where the incidence of BBA is high (Lawn et al., 2005; WHO., 2014). Most of neonatal deaths (73%) occur during the first week of life, around 36% occur within the first 24 hours and this is the time BBA neonates with advance outcome die. Up to two thirds of newborn deaths could be prevented if skilled health workers perform effective health measures at birth and during the first week of life (WHO, 2014; London, 2011). However, 5.2 million deliveries including BBA globally, occur without one in attendance (UNICEF, 2009).

Reducing incidence of BBA and ensuring skilled attendance at birth is widely acknowledged as key to reducing stillbirths and neonatal deaths (Kerber et al, 2007).
In Kenya, Childhood mortality rates (including neonatal) continue to decline; Under five 52/1000 live births, infant 39/1000 live births and Neonatal, 22/1000 live births respectively (KHDS, 2014). The neonatal mortality rate of 22 deaths per 1,000 live births indicates that progress remains to be made before Kenya achieves Every Newborn Action Plan’s goal of a neonatal mortality rate below 10 deaths per 1,000 live births by 2035 (UNICEF, 2014).

To achieve Sustainable Development Goal (SDG) Number 3: - Ensure healthy lives and promote wellbeing for all at all ages, an elaborated effort is required to reduce under five mortalities further.

Since BBA neonatal adverse birth outcomes are amongst major causes of neonatal mortality and morbidity, reduction of BBA births will reduce neonatal mortality and morbidity. The study intends to assess risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County.

1.2. Statement of the problem.

Born before arrival babies constitute a high-risk newborn population and have high perinatal mortality and morbidity (Bassingthwaigte et al, 2013). Although the numbers of BBA births are small, studies have shown high perinatal mortality and morbidity associated with being out of hospitals in emergency situation (Alabi et al, 2015).

Born before arrival have higher rate of perinatal mortality compared to hospital deliveries (hospital deliveries are 7 times safer than BBA) (Zlatko et al, 2011).

BBA adverse neonatal birth outcome prolong hospital stay and the anticipated prolonged hospital stay has significant social, emotional and financial adverse impact to the family and the country at large.
Tharaka Nithi County was one of the Counties with the highest number of BBA (2%) compared with National (0.9%) (KDHS, 2008/09) and it is among the Counties leading with highest Perinatal and Neonatal mortality rates at 44/1000 pregnancies and 24/1000 live births respectively, compared with National, Perinatal mortality rate of 29/1000 pregnancies and Neonatal mortality rate of 22/1000 live births (KHDS, 2014).

Similar studies that have been conducted in Kenya have only been conducted in Urban areas and no such study has been conducted in Tharaka Nithi County.

1.3. Justification of the study.

Born before arrival births, carry high neonatal morbidity and mortality. Born before arrival adverse neonatal birth outcome which include; birth asphyxia, neonatal sepsis, hypothermia and prematurity will prevent Kenya from achieving Sustainable Development Goal (SDG) NO 3. Globally, half of all newborn deaths occur during the first 24 hours, so recognizing BBA as a potential risk factor for early neonatal mortality will lead to targeted interventions to improve initial management of these neonates.

Most of BBA births occur in public places and in unhygienic conditions without privacy and skilled birth attendance (SBA), risking the mother and the newborn to infections and also leaving the mother with shame and her dignity eroded (Phiri et al, 2014).

The rate of BBAs serves as an index of accessibility to perinatal care; a rate greater than 1.5% signals challenges in health care provision. If such a rate exists, further investigations and appropriate interventions are merited (Khupakonke et al, 2017). The BBA rate of 2% in Tharaka Nithi exceeds 1.5% and hence, investigations and appropriate interventions are justified.
1.4. Research questions:

i. What are the maternal socio-demographic risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County?

ii. Which are the Obstetric risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County?

iii. What are physical risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County?

iv. How are ANC compliance and birth preparedness risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County?

1.5. Broad objective of the study;

To assess risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County.

1.6. Specific objectives of the study.

i. To determine maternal socio-demographic risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County.

ii. To establish Obstetric risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County.

iii. To determine physical risk factors associated with BBA and birth outcome among postnatal women in Tharaka Nithi County.

iv. To establish how ANC compliance and birth preparedness risk factors are associated with BBA and birth outcome among postnatal women in Tharaka Nithi County.
1.7. Significance of the study.

The findings will empower Health care providers to identify pregnant women at risk of BBA and advise them accordingly as well as empowering pregnant women to know risk factors associated with BBA. It will assist reduce incidence of BBA and neonatal mortality through better policies and practices. The findings will facilitate informed decision making by Tharaka Nithi County government and will also give insight to future researchers who will be interested in this area of study.

1.8. The scope of the study:

The study was limited to the investigation of risk factors associated with BBA and birth outcomes among postnatal women in Tharaka Nithi County, Kenya.

1.9. Assumption of the study:

The study assumed that, respondents responded to the questions honestly and that the sample size was representative of the population.

1.10. Limitation of the study:

Recall bias by the study participants was one of the study limitations. The study relied on the subjects’ recall and availability of existing medical records. It may be difficult to validate the information given by the subjects. This limitation was minimized by retrieving and correlating some information from the participants’ maternal child booklet and the inpatient files and by limiting the delivery-interview time to no more than 24 hours. Selection bias was another limitation in this study. The cases were matched with the controls for age in a ratio of 1:2. The recruitment of cases was sequential while that of the controls, when more than two were available, a simple random sampling was done. These procedures were done to minimize on selection
bias. The study was conducted in Tharaka Nithi County. This study thus reflects on circumstances of BBA in rural setting and thus does not adequately reflect the true situation in Urban areas and therefore cannot be generalized.
1.1. Conceptual framework:

**Independent variables**

Maternal socio-demographic risk factors:
- i. Age
- ii. Parity
- iii. Marital status
- iv. Education
- v. Occupation
- vi. Socio-economic status

Obstetric risk factors:
- i. Duration of labor
- ii. Previous deliveries
- iii. Recognition of Labor pains
- iv. Gestation age at birth

Physical risk factors:
- i. Distance to the hospital
- ii. Transport availability
- iii. Status of roads
- iv. Time of delivery
- v. Cost of hospital delivery

ANC compliance and birth preparedness risk factors:
- i. ANC attendance
- ii. Number of ANC visits
- iii. Time started attending ANC
- iv. Birth preparedness

**Dependent Variables**

Hospital delivery  ➔  Good neonatal birth outcome

Hospital delivery  ➔  BBA

BBA  ➔  Advance neonatal birth outcome

- i. Birth Asphyxia.
- ii. Neonatal sepsis.
- iii. Hypothermia
- iv. Prematurity

**Figure. 1.1**: Relationship between independent and dependent variables.

*(Adapted from Tanwira, 2013)*.

Majority of mothers without risk factors, deliver in hospitals with good neonatal birth outcome and short hospital stay hence, less economic burden to the family and health sector. On the other hand, majority of mothers with risk factors for BBA deliver outside the hospitals, with advance neonatal birth outcome and prolonged hospital stay or mortality leading to economic burden to the family and health sector.
2.1. Introduction.

Risks of severe, avoidable maternal and neonatal complications at birth are increased if the birth occurs before arrival at the health facility and in the absence of skilled birth attendants. Birth Before Arrival (BBA) is a preventable phenomenon still common in modern-day practice despite extensive improvements made in obstetric care and in accessibility to healthcare (Khupakonke, 2017). Born before arrival babies constitute a high-risk newborn population and have high perinatal mortality and morbidity associated with being outside the hospital during emergency (Bassingthwaighte et al, 2013).

Born before arrival births have been reported from different communities and constitute a special group as regards to morbidity and mortality (Parag, et al, 2014). Within the literature available there is wide variation in the countries, health care systems and populations studied.

The documentation of BBAs is still lacking; developed countries record an incidence between 0.1% - 0.3%, which rises exponentially in low income countries to greater that 50% in countries such as India and Ethiopia (Parag, et al, 2014). The rate of BBAs serves as an index of accessibility to perinatal care, a rate greater than 1.5% signals challenges in health care provision. If such a rate exists, further investigations and appropriate interventions are merited (Khupakonke (2017). According to the 2009 Kenya Demographic Health Survey (KDHS) statistics, the BBA prevalence in Tharaka Nithi County was at 2 %, compared with National of 0.9 % and thus required an array of investigations that will enable understanding of the contributing factors.
In Kenya, although, there has been reduction in maternal and under five mortality rates, maternal mortality ratio, Neonatal, Infant and under five mortality remains unacceptably high at 362/100,000, 22/1000 live births, 39/1000 live births and 52/1000 live births respectively (KHDS, 2014).

A study conducted in South Africa identified risk factors associated with BBA to be bad roads, lack of transport, inability to recognize labour, preterm delivery, starting ANC late, few numbers of ANC attendance, distance and lack of finance (Alabi et al, 2015). Another study conducted in South Africa found maternal characteristics associated with the occurrence of a BBA to be single (not married), long distance to hospital, higher gravidity, having an unplanned pregnancy and previous history of BBAs. Other associated risk factors included being unbooked at ANC and experiencing a short duration of labour, preterm delivery and low birth weight baby (Khupakonke et al, 2017).

In Kenya, a study conducted in Coast general hospital found risk factors associated with BBA to be long distance to the hospital, Occupation, gestation age at delivery, duration of labour, and birth preparedness. However, marital status and education level were not associated with BBA. The study also found BBA advance neonatal outcome to be birth asphyxia, neonatal sepsis, prematurity and hypothermia (Tanwira, 2013).


2.2.1. Maternal age.

Maternal age is associated with BBA. Young mothers are more likely to deliver in health facility than their elder counterparts (Wnjira et at, 2011). Being an older mother has been identified as the risk factor for BBA in a study done in Malawi
According to KDHS, 2008/09 women who delivered at home or en route to the hospital were of older age. Older women with experience of previous normal deliveries, tend to wait at home until they are in established labor when they go to the hospital. A study done in South Africa found maternal age not associated with occurrence of BBA (Khupakonke et al, 2017)

2.2.2. Parity.

Multiparity has been identified has one of the risk factors for BBA in previous studies in the various populations (Mazalale, et al, 2015; Zlatko, et al, 2011; Khupakonke et al, 2017). First labor is usually prolonged and there is enough time to come to the hospital whereas subsequent labors are shorter resulting in unexpected out of hospital delivery (Pushpa, 2005). Quick child birth and having had an uncomplicated first delivery influence multiparous deliver at home or en route to the hospital (Bassingthwaigte et al, 2013). A study conducted in South Africa did not find association between parity and BBA (Parag et at, 2014).

2.2.3. Marital status.

Marital status has been associated with BBA (Zlatko et al, 2011). Women delivering at home or before arrival to the hospital are more likely to be unmarried (Mazalale et al, 2015). Marital status has influence on maternity service utilization. For example, unmarried pregnant girls are afraid to report pregnancy for fear of being reprimanded by their parent (Alabi et at, 2015). A study conducted in Coast General hospital did not find any association between marital status and BBA (Tanwira, 2013).

2.2.4. Maternal education.

Education has been identified as risk factor for BBA (Mazalale et al, 2015; Zlatko et al, 2011). It has been found quantitatively important and statistically reliable estimates of the positive effect of maternal schooling on the use of Antenatal care and
skilled birth assistance. Education influences early health care seeking behavior including maternity services. Woman’s education is a major factor affecting utilization of maternal health services. Those with more education have high likelihood of seeking maternity services (Kitui et al, 2013).

2.2.5. Occupation.

Occupation has been identified has a risk factor for BBA (Tanwira, 2013). Maternal occupation has been found to be most consistently associated with the use of health institution for delivery (KDHS, 2008/09). Employment was found not to be risk factor for BBA (Khupakonke et at, 2017).

2.2.6. Socio-economic status.

Socio-economic status has been identified has a risk factor for BA (Mazalale et al, 2015). The incidence of BBA in various studies from different communities’ range from 0.4 % to 1.8 % of all deliveries, however in poor communities the incidence may be as high as 7.9 % (Scott et al, 2005). Being wealthy strongly predicted where women delivered (Kitui et al, 2013). Although user fees were abolished for delivery services in 2006 in Zambia, the poor socio-economic position of families placed them at a disadvantage due to costs of purchasing required items and transport (Phiri et al, 2014).
2.3. Obstetrics risk factors.

2.3.1. Duration of labor pains.

Sometimes multiparous women experience fast labor/quick child birth known as precipitate labor and is associated with the risk of the BBA (Alabi et al, 2015; Kumbani et al, 2013; Tanwira, 2013). Precipitate labor is unexpected and may not be avoidable, but history of such labor during ANC should warn the clinician about possibility of BBA in subsequent pregnancy (Pushpa, 2005).

2.3.2. Previous deliveries.

The mode of previous deliveries will predict the likelihood of BBA. The previous history of precipitate delivery, BBA and preterm birth put a woman at risk of BBA (Khupakonke et al, 2017).

2.3.3. Recognition of Labor pains.

Failure to recognize the onset of labor by parturients and their attendants is perhaps the most important factor in the occurrence of BBA (Alabi et al, 2015). Sometimes women are misdiagnosed with false labor pain or early labor and returned home to come when in established labor, such women deliver on the way back home or are hesitant to report when they are in established labor and end up with BBA delivery (Alabi et al, 2015). ANC classes therefore have an important role in imparting information as to how to recognize the labor onset and when to attend the hospital.

2.3.4. Gestation age (GA) at delivery.

Preterm birth/delivery is defined as birth between 20 weeks and 37 incomplete weeks and is risk factor for BBA (Parag, 2013; Alabi et al, 2015) and number one cause of perinatal morbidity and mortality in developed countries (Tanwira, 2013), and these complications are inversely proportional to GA at birth (Vincenzo, 2007).
2.4. Physical risk factors.

2.4.1. Distance to the health facility.

The WHO recommends that there should be a health facility within 5km radius of every home or settlement. It should be easy for women who need maternal care to reach the health facility and transport cost should not prevent women from using these services (MOH, 2007). Increasing distance from hospitals is a significant risk factor for BBA (Kitui et al, 2013). The distance to the maternity hospital has been reported to be more important in maternity care than other general curative health services and has been recognized as a major barrier to delivery in health facilities and contributor to BBA (Dhaka et al, 2011; Gabrysch et al, 2009; Gabrysch et al, 2011). Distance to the nearest health facility has been shown to be an important barrier to seeking healthcare both in terms of being an obstacle to reaching a health facility, and as a disincentive to seeking care leading to home delivery or BBA (Phiri et al, 2014). Studies conducted in Malawi and South Africa did not find distance to be associated with BBA (Kumbani et al, 2013; Parag et al, 2014).

2.4.2. Transport.

Physical access to health facilities due to lack of access to a timely, and appropriate transport, and economic consideration are important barriers for women to deliver at health facilities in Kenya (Kitui et al, 2013).

Lack of transport has been reported to be a causative factor for BBA and delay in getting access to transport at night particularly on holidays could contribute to delay in arrival to the hospital (Alabi et al, 2015; Kitui et al, 2013).

2.4.3. Status of the roads.

Lack of or bad condition of the roads causes delay in mother reaching health facility leading to BBA (Tanwira, 2013). Roads in bad condition make transport to the
hospital expensive and this prevents the mother from going to hospital in time. A study done in South Africa identified bad state of untarred roads as a major issue in making access to health facility difficult especially when it rained (Alabi et al, 2015).

2.4.4. Time of delivery.
Labor starting at night is associated with BBA delivery (Ekele et al, 2007; Kumbani, et al, 2013). At night, lack of safety and absence of public transport contributes to delay in arrival to the hospital leading to BBA (Alabi et al, 2015),

2.4.5. Cost of hospital delivery.
The cost of deliver services can be out of reach to mothers with financial constraints, this combined with other costs like travel costs, time costs and unofficial cost make mothers reluctant to seek maternity services early leading to occurrence of BBA ((Kitui et al, 2013; Alabi et al, 2015). The cost of preparing for facility childbirth also contributed to delay in seeking facility childbirth leading to home delivery or BBA (Phiri et al, 2015).

2.5. ANC compliance and birth preparedness risk factors.

2.5.1. ANC attendance.
Antenatal care (ANC) from a skilled provider is important to monitor pregnancy and reduce the risk of morbidity for mother and baby during pregnancy and delivery. The quality of antenatal care can be monitored through the content of services received and the kind of information mothers are given during their visit (KDHS, 2014).

Being non or poor ANC attendance and hence carrying an unsupervised pregnancy is high risk for BBA (Parag et al, 2014; Zlatko et al, 2011). Pregnant Mothers are taught about birth and emergency preparedness during ANC visits and therefore, those who do not attend ANC are never taught.
2.5.2. Number and Timing of Antenatal Care visits.

Regular antenatal care is helpful in identifying and preventing adverse pregnancy outcomes when it is sought early in the pregnancy and is continued until delivery. The World Health Organization recommends that women have at least four antenatal care visits during each pregnancy and the first ANC visit to occur within the first three months of pregnancy KDHS, 2014). It is possible during these visits to detect health problems associated with a pregnancy and to plan interventions. In the event of any complications, more frequent visits are advised, and admission to a health facility may be necessary (MOH, 2012). Various studies have associated Poor antenatal attendance with BBA (Kumbani et al, 2013, Parag et al, 2014).

2.5.3. Birth Preparedness;

Individualized birth plan is one of the basic components of Focused ANC and it must be addressed in all the antenatal visits from the first to the very last one. It covers all the aspects of birth preparedness which include; knowledge of EDD, knowledge of signs and symptoms of labor, identification of facility for delivery and mode of transport, being financially prepared for hospital delivery and having basic supplies for birth (MOH, 2007).

Lack of birth preparedness has been shown to be significantly associated with the risk of having BBA and adverse birth outcome (Tanwira, 2013). Unawareness of signs and symptom of labor and failure to recognize the onset of labor by pregnant women and their attendants are perhaps the most important risk factors in the occurrence of BBA (Scott et al, 2005, Alabi et al, 2015).
2.6. BBA good Neonatal birth outcome.

This is a normal neonate born without birth complications. The hospital stay is short and overall, there is no financial burden to the family and the health sector (Tanwira, 2013).

2.7. BBA adverse Neonatal birth outcomes.

2.7.1. Birth asphyxia.

Birth asphyxia has been identified as one of leading causes of neonatal mortality and morbidity especially when it occurs where resuscitation is not possible (Hoang et al, 2012; Mmbaga et al, 2012). Born before arrival deliveries occur in places without skilled birth attendants and resuscitation equipment.

2.7.2. Neonatal sepsis.

Neonatal sepsis is among the leading causes for neonatal mortality and morbidity (Mmbaga et al, 2012). It is estimated that 26 % of newborn infants who die do so because of infections that occur around birth (WHO, 2006). Born before arrival newborns have higher risk of infection because of being born in an unhygienic environment.

2.7.3. Prematurity.

Preterm baby is a baby born before 37 complete weeks and is among the cause of neonatal mortality and morbidity (Mmbaga et al, 2012). Globally, it has been reported that preterm babies have a 13 times greater risk of death than full-term babies (Hoang et al, 2012). The preterm babies have a good survival rate if they receive appropriate care from skilled birth attendants. Prematurity is the leading cause of neonatal mortality.
2.7.4. Hypothermia.

Hypothermia in children is defined as core temperature less than 35 °C and neonates are particularly at risk. Born before arrival babies are born in open environment and are not covered as the birth is not planned and hence hypothermia is a major BBA neonatal complication and carries a very high neonatal mortality and morbidity (Scott et al, 2005).

2.8. Summary of literature review.

Almost all (99%) neonatal deaths arise in low-income and middle-income countries, yet most epidemiological and other researches focus on the 1% of neonatal deaths in rich countries.

Most of BBA researches have been conducted in developed countries despite developing countries having the highest number of BBAs. BBAs constitute a high-risk newborn population and have high perinatal morbidity and mortality.

In Kenya, most of studies and health surveys done, only look at home and hospital deliveries, but do not consider deliveries taking place between the house and health facility. Thus, the reasons for mothers having BBA births have not been adequately investigated. BBA studies conducted in Kenya have been done in urban areas and therefore, there is a need to conduct one in rural areas.

Tharaka Nithi is among counties with highest Perinatal and Neonatal mortality rates which are all related to BBA. It had also the highest number of BBA in Kenya and no study has been conducted there to establish the risk factors associated with BBA.
CHAPTER THREE: RESEARCH METHODOLOGY.

3.1. Location of the study.

The study was carried out in Tharaka Nithi County, and the sample population was drawn from health facilities offering maternity services in Tharaka Nithi County. Tharaka Nithi County is located approximately between Latitude $00^\circ 07'$ and $00^\circ 26'$ South and between longitude $37^\circ 19'$ and $37^\circ 46'$ East. The total area of the County is 2,662.1 Km$^2$; including the shared Mt Kenya forest estimated to have 360Km$^2$ in Tharaka Nithi County.

3.2. Study design.

The design of the study was age matched case-control study. A case-control study compared the case and the control and was adopted because BBA is a rare health outcome and the design enabled the cases to be intentionally searched to get the required sample size. The BBA response was recorded at entry to the study and an attempt was made to look backward in time to possible explanatory features (exposure to risk).

3.3. Study population.

The study population were postnatal women in Tharaka Nithi County. They consisted of mothers who delivered on the way to the hospital (cases) and mothers who delivered in the hospital (Controls).
3.4. Hospitals in Tharaka Nithi County.

<table>
<thead>
<tr>
<th>SNO</th>
<th>HOSPITAL</th>
<th>SUB COUNTY</th>
<th>DELIVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chuka Level 4 Hospital</td>
<td>Chuka IgambaNg’mbe Sub County</td>
<td>226</td>
</tr>
<tr>
<td>2</td>
<td>Kajuki Level 3</td>
<td>Chuka IgambaNg’ombe Sub County</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>Kibugua Level 3</td>
<td>Chuka IgambaNg’mbe Sub County</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>PCEA Chogoria Level 4</td>
<td>Maara Sub County</td>
<td>138</td>
</tr>
<tr>
<td>5</td>
<td>Magutuni Level 4</td>
<td>Maara Sub County</td>
<td>41</td>
</tr>
<tr>
<td>6</td>
<td>Muthambi Level 3</td>
<td>Maara Sub County</td>
<td>17</td>
</tr>
<tr>
<td>7</td>
<td>Marimanti Level 4</td>
<td>Tharaka Sub County</td>
<td>90</td>
</tr>
<tr>
<td>8</td>
<td>Kibung’a Level 4</td>
<td>Tharaka Sub County</td>
<td>21</td>
</tr>
<tr>
<td>9</td>
<td>Ciakariga Level 3</td>
<td>Tharaka Sub County</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>St Orsola Level 4</td>
<td>Tharaka Sub County</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td>585</td>
</tr>
</tbody>
</table>

Table 3.1. Distribution of Hospitals and deliveries per hospital in September 2013 in Tharaka Nithi County

3.5. Inclusion criteria.

The inclusion criteria for cases were all BBA mothers who came to the hospital and for controls were all women who delivered in the hospital after arrival of BBA mothers and were willing to participate in the study.

3.6. Exclusion criteria.

The study excluded the eligible women who were too sick to respond to questions, and those who were not willing to participate in the study.

3.7. Sample Size.

It is estimated that 85% of all deliveries are normal (MOH, 2007).

Sample size needed to compare two binomial proportions using a two-sided test with significance level \( \alpha \) and power 1- \( \beta \) (Paired-sample case).

\[
n = \frac{\left[ z_{1-\frac{\alpha}{2}} + 2z_{1-\beta} \frac{p_{BqB}}{p_{B-qB}} \right]^2}{4 \ p_{B-0.5}^2 p_A} \text{ Matched pairs (B. Rosner, 2010)}
\]

Where:
n = the desired sample size

\( p_A \) = Projected proportion of deliveries with adverse birth outcome among all pairs (BBA and hospital deliveries)

\( p_B \) = Projected proportion of deliveries with adverse birth outcome among BBA mothers

\( q_B = 1 - p_B \)

\( \alpha \) = Type I error (Significance level) = 0.05

\( \beta \) = Type II error = 0.1

Power of study = 1 - \( \beta \) = 90%

\( p_A = 1 - 0.85 \)

\( p_B = 95/100 (0.95) \)

\( q_B = 1 - 0.95 = 0.05 \)

\[
n = \frac{\left[ z_{1-0.05} + 2z_{1-0.010} \right]}{4 \cdot 0.95 - 0.5^2 \cdot 0.15} = \frac{\left[ z_{0.975} + 2z_{0.90} \right]}{4 \cdot 0.45^2 \cdot 0.15}
\]

\[
n = \frac{[1.96 + 2 \times 1.28 \times 0.217944947]^2}{4 \times 0.2025 \times 0.15} = \frac{6.340017132}{0.1215} = 52.2 = 53
\]

\( 2n = 2 \times 53 = 106 \) (Individuals)

Therefore, a sample of 53 BBA mothers (Cases) were 1:2 matched with 106 mothers who delivered in the hospital (Control) within 24 hours after arrival of BBA mother.

3.8. Sampling technique.

Non-probability (Purposive) and simple random sampling techniques were used in this study to select hospitals, cases (BBA) and controls. There are ten (10) health facilities in Tharaka Nithi County that offer maternity services, and all participated in the study because that is where deliveries are conducted and where both mothers and
babies with complications are treated or admitted. Purposive sampling was used to select cases because BBA was a rare occurrence and allowed the researcher to use all eligible cases that had the required information with respect to the objectives of the study. Matching was done in which a BBA mother was matched with two hospital delivered mothers (Controls) of the same age (±5 years). A ratio of 1:2 (cases and controls) was used to increase the statistical confidence since the number of cases were limited by the rarity of cases. Where there were more than two hospital deliveries a simple random sampling was used to select the controls.


Both primary and secondary data collection methods were used. Primary data was collected by use of questionnaires. The questionnaires were administered to the respondents by the research assistants. The questionnaire included both structured and unstructured questions to capture both qualitative and quantitative data. Secondary data was obtained from maternity and medical record’s departments where data was kept.

3.10. Data collection procedure.

Researcher administered questionnaires were administered by the trained research assistants to all eligible BBA mothers and eligible women who delivered in the hospitals after arrival of BBA. Key informants like Health care providers who were in a state of providing detailed information were also interviewed. The research assistants used the questionnaires to interview the respondents by reading the questions to the respondents and writing the responses down. The research assistant also translated questions to Kimeru for those mothers who did not understand English.
3.11. Validity of instruments.

Validity is a measure of how well a test measures what it is supposed to measure. To enhance the validity of the instruments, the researcher conducted pretesting of instruments in a health facility where study was not conducted. This enabled the researcher to find out whether the questions were measuring what they were supposed to measure, wording was clear, questions were interpreted in the same way by respondents, what response was provoked and if there was any research bias.

3.12. Reliability of the instruments.

Reliability is the measure of the degree to which a research instrument yields consistent results or data after repeated trials. Research assistants were trained on how to use the questionnaire to minimize errors. A pretesting was conducted before the main research to establish the accuracy and the relevance of the various items, hence ascertained its reliability.

3.13. Data analysis and presentation.

Quantitative data was analysed using computer software (IBM SPSS, version 23.0). Descriptive statistics (i.e. frequencies and percentages) were used to describe sample characteristics and Inferential statistics (i.e. chi-square, Fishers exact test and Odds Ratio) were used to infer the sample characteristics to the population level. Fishers exact test was used when table cells had expected values/frequencies less than five. The P value and Confidence Interval (CI) were used to determine whether the association was statistically significant (i.e. $p \leq 0.05$ or 95% CI included 1 or not).
CHAPTER FOUR: RESULTS.

4.1. Introduction.

This section presents results based on the objectives of the study. The results are on Maternal Socio-Demographic risk factors, Obstetric risk factors, Physical risk factors and Antenatal Care compliance and birth preparedness.

Over a period of three months between October and December 2015, a total of 159 postnatal mothers from all health facilities (10) that offer maternity services were enrolled into the study. They comprised of 53 mothers who had delivered on their way to hospital (cases). They were matched for age (± 5 years) with 106 mothers who had delivered in hospitals (controls) as shown in the table 4.1 below.

Table 4.1. Health facilities in Tharaka Nithi county used in the study.

<table>
<thead>
<tr>
<th>SNO</th>
<th>HEALTH FACILITY</th>
<th>NO OF CASES (BBA)</th>
<th>NO OF CONTROLS (Hospital delivered)</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chuka level 4 Hospital</td>
<td>10</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>PCEA Chogoria level 4</td>
<td>7</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>Marimanti level 4</td>
<td>8</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>Magutuni level 4</td>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>Kibung’a level 4</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>Kajuki level 3</td>
<td>5</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>7</td>
<td>Chiakariga level 3</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>8</td>
<td>ST. Orsola level 4</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>Muthambi level 3</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>Kibugua level 3</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>53</td>
<td>106</td>
<td>159</td>
</tr>
</tbody>
</table>

4.2. Socio-demographic characteristics.

This study was carried out among 159 post-natal mothers; Cases (n=53) and Controls (n =106), matched one to two by age in Tharaka Nithi County. The overall mean age was 27.57 years (range 19 – 35) and median 28 years. The mean ages for cases and control were 27.58 and 27.51 respectively.
The study showed that about half 49% (n=78) of the respondents were aged between 25 and 29 years, 34% (n=54) were 30-34 years, 15.1% (n=24) were 20-24 years and 1.9% (n=3) aged 15-19 years. Most of the respondents 84.9% (n=135) were married while 15.1% (n=24) were single. Slightly over a third of respondents 38% (n=60) had attained secondary level of education, 35.2% (n=56) primary education and 27% (n=43) tertiary education. A third of respondents 32% (n=51) were self-employed, 30.8% (n=49) were employed, 28.9% (n=46) were housewives and 8.2% (n=13) were unemployed. Slightly over a half of respondents 58% (n=92) had an average family income of less than Ksh.20,000 and 42.1% (n=67) had ksh.20,000 or more. Majority of respondents 82.4% (n=131) had less than 4 deliveries and 17.6% (n=28) had 4 or more deliveries as shown in table 4.2 below.
Table 4.2: Socio-demographic characteristics of the respondents.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age groups</td>
<td>15-19 years</td>
<td>3</td>
<td>1.9%</td>
</tr>
<tr>
<td></td>
<td>20-24 years</td>
<td>24</td>
<td>15.1%</td>
</tr>
<tr>
<td></td>
<td>25-29 years</td>
<td>78</td>
<td>49.1%</td>
</tr>
<tr>
<td></td>
<td>30-34 years</td>
<td>54</td>
<td>34.0%</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>24</td>
<td>15.1%</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>135</td>
<td>84.9%</td>
</tr>
<tr>
<td>Education level</td>
<td>Primary</td>
<td>56</td>
<td>35.2%</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>60</td>
<td>37.7%</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>43</td>
<td>27.0%</td>
</tr>
<tr>
<td>Occupation</td>
<td>House wife</td>
<td>46</td>
<td>28.9%</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>13</td>
<td>8.2%</td>
</tr>
<tr>
<td></td>
<td>Self employed</td>
<td>51</td>
<td>32.1%</td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>49</td>
<td>30.8%</td>
</tr>
<tr>
<td>Family monthly income</td>
<td>&lt; ksh 20,000</td>
<td>92</td>
<td>57.9%</td>
</tr>
<tr>
<td></td>
<td>≥ ksh 20,000</td>
<td>67</td>
<td>42.1%</td>
</tr>
<tr>
<td>Parity</td>
<td>≥ 4</td>
<td>28</td>
<td>17.6%</td>
</tr>
<tr>
<td></td>
<td>&lt; 4</td>
<td>131</td>
<td>82.4%</td>
</tr>
</tbody>
</table>

4.3. Socio-demographic risk factors associated with BBA.

The study examined association between the following socio-demographic factors and BBA; marital status, education level, occupation, average family monthly income and parity.

The study showed that slightly over a quarter 26.4% (n=14) of BBA mothers were single compared with 9.4% (n=10) of hospital delivered mothers who were single and 73.6 (n=39) of BBA mothers were married compared with 90.6% (n=96), of hospital delivered mothers who were married.

Slightly over a half 52.8% (n=28) of BBA mothers had attained primary education compared with slightly over a quarter 26.4% (n=28) of hospital delivered mothers who had attained primary education, about a third 30.2% (n=16) of BBA mothers had
attained secondary education compared with 41.5% (n=44) of hospital delivered mothers who had attained secondary education and 17% (n=9) of BBA mothers had attained tertiary education compared with 32.1% (n=34) of hospital delivered mothers who had attained tertiary education.

Slightly over a third 34% (n=18) of BBA mothers were housewives compared with 26.4% (n=28) of hospital delivered mothers who were housewives, 13.2% (n=7) of BBA mothers were unemployed compared with 5.7% (n=6) of hospital delivered mothers who were unemployed, 28.3% (n=15) of BBA mothers were self-employed compared with 34% (n=36) of hospital delivered mothers who were self-employed and 24.5% (n=13) of BBA mothers were employed compared with 34% (n=36) of hospital delivered mothers who were employed.

A majority 77.4% (n=41) of BBA mothers had an average family monthly income of less than ksh20,000 compared with about a half 48.1% (n=51) of hospital delivered mothers who had the same monthly income and 22.6% (n=12) of BBA mothers had an average family monthly income of ksh20,000 or more compared with 51.9% (n=55) of hospital delivered mothers who had the same monthly income.

A third 30.2% (n=16) of BBA mothers had 4 or more deliveries compared with 11.3% (n=12) of hospital delivered mothers who had 4 or more deliveries and 69.8% (n=37) of BBA mothers had less than 4 deliveries compared with 88.7% (n=94) of hospital delivered mothers who had less than 4 deliveries.

The study showed significant statistical association between the following socio-demographic risk factors and BBA; marital status (OR=3.446; 95%CI=1.411-8.415; P=0.005), education level ($\chi^2=11.177$; df=2; P=0.004), average family monthly
income (OR=3.685; 95%CI=1.745-7.782; P=<0.001) and parity (OR=3.387; 95% CI=1.463-7.843; P=0.003). However, the study did not show any significant statistical association between occupation and BBA ($\chi^2$=4.531; df=3; P=0.210). The results were presented in table 4.3 below.

**Table 4. 3: Relationship between Socio-demographic factors and BBA.**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Respondent response</th>
<th>Dependent variable</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-demographic risk factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status;</td>
<td>Single</td>
<td>14(26.4%)</td>
<td>10(9.4%)</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>39(73.6%)</td>
<td>96(90.6%)</td>
</tr>
<tr>
<td>Highest education level attained</td>
<td>Primary</td>
<td>28(52.8%)</td>
<td>28(26.4%)</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>16(30.2%)</td>
<td>44(41.5%)</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>9(17.0%)</td>
<td>34(32.1%)</td>
</tr>
<tr>
<td>Occupation</td>
<td>House wife</td>
<td>18(34.0%)</td>
<td>28(26.4%)</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>7(13.2%)</td>
<td>6(5.7%)</td>
</tr>
<tr>
<td></td>
<td>Self employed</td>
<td>15(28.3%)</td>
<td>36(34.0%)</td>
</tr>
<tr>
<td></td>
<td>Employed</td>
<td>13(24.5%)</td>
<td>36(34.0%)</td>
</tr>
<tr>
<td>Average family monthly income (KSH)</td>
<td>&lt; ksh20,000</td>
<td>41(77.4%)</td>
<td>51(48.1%)</td>
</tr>
<tr>
<td></td>
<td>$\geq$ ksh20,000</td>
<td>12(22.6%)</td>
<td>55(51.9%)</td>
</tr>
<tr>
<td>Parity</td>
<td>$\geq$4</td>
<td>16(30.2%)</td>
<td>12(11.3%)</td>
</tr>
<tr>
<td></td>
<td>&lt;4</td>
<td>37(69.8%)</td>
<td>94(88.7%)</td>
</tr>
</tbody>
</table>
4.4. Physical risk factors associated with BBA.

The study examined the relationship between the following physical factors and BBA: the distance, means of transport, status of the road, time of delivery and cost of hospital delivery.

Means of transport included private and public vehicles. A poor road was that either was impassable, had pot holes/furrows/trenches/ditches, muddy and slippery, too narrow for a vehicle to use or had no bridge/drift/culvert.

The study showed that slightly over a half 58.5% (n=31) of BBA mothers resided 20km or more compared with slightly over a third 34.9% (n=37) of hospital delivered mothers who resided in the same distance and 41.5% (n=22) of BBA mothers resided in less than 20km compared with 65.1% (n=69) of hospital delivered mothers who resided in the same distance.

Slightly below a quarter 20.8% (n=11) of BBA mothers resided in areas without means of transport compared with 5.7% (n=6) of hospital delivered mothers who resided in areas without means of transport and 79.2% (n=42) of BBA mothers resided in areas with means of transport compared with 94.3% (n=100) of hospital delivered mothers who resided in areas with means of transport.

A majority 88.7% (n=47) of BBA mothers used roads in poor status compared with over a half 67.0% (n=71) of hospital delivered mothers who used roads of the same status and 11.3 (=6) of BBA mothers used roads in good status compared with 33% (n=35) of hospital delivered mothers who used roads of the same status.

Over a half 69.8% (n=37) of BBA mothers delivered at night compared with below a half 40.6% (n=43) of hospital delivered mothers who delivered at night and 30.2% (n=16) of BBA mothers delivered during the day compared with 59.4% (n=63) of hospital delivered mothers who delivered during the day.
9.4% (n=5) of BBA mothers could not afford cost of hospital delivery compared with 2.8% (n=3) of hospital delivered mothers and 90.6% (n=48) of BBA mothers could afford cost of hospital delivery compared with 97.2% (n=103) of hospital delivered mothers who could afford cost of hospital delivery.

The study showed significant statistical association between the following physical factors and BBA; distance to the health facility (OR=2.628; 95%CI=1.336-5.170; P=0.005), means of transport (OR=4.365; 95%CI=1.515-12.574; P=0.004), status of the roads (OR=3.862; 95%CI=1.507-9.897; P=0.003) and time of delivery (OR=3.388; 95%CI=1.677-6.843; P=0.001). However, the study did not show any significant statistical association between cost of hospital delivery and BBA (OR=3.576; 95%CI=0.821-15.582; P=0.118). The results are presented in table 4.4 below.
Table 4.4: Relationship between Physical factors and BBA.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical factors</strong></td>
<td><strong>Case (BBA) (N=53)</strong></td>
<td><strong>Control (Hospital delivered) (N=106)</strong></td>
</tr>
<tr>
<td><strong>Distance to health facility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20km or more</td>
<td>31(58.5%)</td>
<td>37(34.9%)</td>
</tr>
<tr>
<td>Less than 20km</td>
<td>22(41.5%)</td>
<td>69(65.1%)</td>
</tr>
<tr>
<td><strong>Availability of means of Transport</strong></td>
<td>No</td>
<td>11(20.8%)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>42(79.2%)</td>
</tr>
<tr>
<td><strong>Status of the road</strong></td>
<td>Poor</td>
<td>47(88.7%)</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>6(11.3%)</td>
</tr>
<tr>
<td><strong>Time of delivery</strong></td>
<td>Night</td>
<td>37(69.8%)</td>
</tr>
<tr>
<td></td>
<td>Day</td>
<td>16(30.2%)</td>
</tr>
<tr>
<td><strong>Cost of hospital delivery affordability</strong></td>
<td>No</td>
<td>5(9.4%)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>48(90.6%)</td>
</tr>
</tbody>
</table>

4.5. Obstetric risk factors associated with BBA.

The study examined relationship between the following Obstetric factors and BBA; duration of labor, mode of previous delivery, recognition of labor pains and gestation age at delivery.

Abnormal previous mode of delivery is delivery which was either BBA, preterm or precipitate.

The study showed that 7.5% (n=4) of BBA mothers had labor lasting less than 5 hours (precipitate labor) compared with none of hospital delivered mothers with precipitate labor and 92.5% (n=49) of BBA mothers had labor lasting for 5 hours or more (precipitate labor) compared with 100% (n=106) of hospital delivered mothers who had labour lasting for 5 hours or more.
13.2% (n=7) of BBA mothers had abnormal mode of previous delivery compared with 2.8% (n=3) of hospital delivered mothers and 86.8% (n=46) of BBA mothers had normal mode of previous delivery compared with 97.2% (n=103) of hospital delivered mothers.

15.1% (n=8) of BBA mothers did not recognize labor pains compared with none of hospital delivered mothers and 84.9% (n=45) of BBA mothers recognized labor pains compared with 100% (n=106) of hospital delivered mothers who recognized labour pains.

11.3% (n=6) of BBA mothers delivered before term compared with 3.8% (n=4) of hospital delivered mothers who delivered before term and 88.7% (n=47) of BBA mothers delivered at term compared with 96.2% (n=102) of hospital delivered mothers who delivered at term.

The study showed significant statistical association between the following obstetric factors and BBA; duration of Labor pain (OR=3.163; 95%CI=2.509-3.987; P=0.011), mode of previous delivery (OR=5.225; 95%CI=1.293-21.112; P=0.016), and Labor pains recognition (OR=3.356; 95%CI=2.627-4.286; P =< 0.001). However, the study did not show any significant statistical association between gestation age at birth and BBA (OR=3.255; 95%CI=0.877-12.083; P = 0.085). The results are presented in table 4.5 below.
Table 4.5: Relationship between Obstetric factors and BBA.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Response</th>
<th>Dependent variable</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric factors</td>
<td></td>
<td>Case (BBA) (N=53)</td>
<td>Control (Hospital delivered) (N=106)</td>
</tr>
<tr>
<td>Duration of Labor pain</td>
<td>&lt;5 Hours</td>
<td>4(7.5%)</td>
<td>0(0.0%)</td>
</tr>
<tr>
<td></td>
<td>≥5 Hours</td>
<td>49(92.5%)</td>
<td>106(100%)</td>
</tr>
<tr>
<td>Mode of previous delivery</td>
<td>Abnormal</td>
<td>7(13.2%)</td>
<td>3(2.8%)</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
<td>46(86.8%)</td>
<td>103(97.2%)</td>
</tr>
<tr>
<td>Labor pains recognition</td>
<td>NO</td>
<td>8(15.1%)</td>
<td>0(0.0%)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>45(84.9%)</td>
<td>106(100%)</td>
</tr>
<tr>
<td>Gestation age</td>
<td>&lt;37 weeks</td>
<td>6(11.3%)</td>
<td>4(3.8%)</td>
</tr>
<tr>
<td></td>
<td>≥37 weeks</td>
<td>47(88.7%)</td>
<td>102(96.2%)</td>
</tr>
</tbody>
</table>

4.6. Antenatal Care Compliance and birth preparedness association with BBA.

The study examined association between ANC compliance and birth preparedness and BBA. The following ANC compliance and birth preparedness were examined; ANC attendance, Number of ANC visits, timing of ANC attendance, Knowledge of signs and symptoms of labor, Knowledge of EDD, Identification of health facility for delivery, Identification of transport, financially prepared for hospital delivery and Basic supplies for birth.

The study showed that 9.4% (n=5) of BBA mothers did not attend ANC compared with none of hospital delivered mothers and 90.6% (n=48) of BBA mothers attended ANC compared with 100% (106) of hospital delivered mothers who attended ANC. About a quarter 24.5% (n=13) of BBA mothers started attending ANC after 6 months compared with 1.9% (n=2) of hospital delivered mothers and 75.5% (n=40) of BBA
mothers started attending ANC before or at 6 months compared with 98.1% (n=104) of hospital delivered mothers who started attending before or at 6 months.

Slightly over a third 32.1% (n=17) of BBA mothers made less than 4 ANC visits compared with 11.3% (n=12) of hospital delivered mothers and 67.9% (n=36) of BBA mothers made 4 or more ANC visits compared with 88.7% (n=94) of hospital delivered mothers who made 4 or more ANC visits.

About a quarter 24.5% (n=13) of BBA mothers did not know signs and symptoms of labor compared with 7.5% (n=8) of hospital delivered mothers and 75.5% (n=40) of BBA mothers knew signs and symptoms of labor compared with 92.5% (n=98) of hospital delivered mothers who knew signs and symptoms of labor.

About a quarter 24.5% (n=13) of BBA mothers did not know their EDD compared with 3.8% (n=4) of hospital delivered mothers and 75.5% (n=40) of BBA mothers knew their EDD compared with 96.2% (n=102) of hospital delivered mothers who knew their EDD.

Slightly below a half 47.2% (n=25) of BBA mothers did not identify health facility for delivery compared with 17.9% (n=19) of hospital delivered mothers and 52.8% (n=28) of BBA mothers identified health facility for delivery compared with 82.1% (n=87) of hospital delivered mothers who identified health facility for delivery.

Slightly below a third 28.3% (n=15) of BBA mothers did not identify means of transport compared with 13.2% (n=14) of hospital delivered mothers and 71.7% (n=38) of BBA mothers identified means of transport compared with 86.8% (n=92) of hospital delivered mothers who identified means of transport.

17.0% (n=9) of BBA mothers were not financially prepared for hospital delivery compared with 3.8% (n=4) of hospital delivered mothers and 83% (n=44) of BBA
mothers were financially prepared for hospital delivery compared with 96.2% (n=102) of hospital delivered mothers who were financially prepared for hospital delivery.

15.1% (n=8) of BBA mothers did not have basic supplies for birth compared with none of hospital delivered mothers and 84.9% (n=45) of BBA mothers had basic supplies for birth compared with 100% (n=106) of hospital delivered mothers.

The study showed significant statistical association between all the ANC compliance and birth preparedness factors and BBA; ANC attendance (OR=3.208; 95%CI=2.537-4.057; P = 0.004), timing of ANC attendance (OR=13.684; 95%CI=2.867-65.315; P = <0.001), number of ANC visits (OR=2.910; 95%CI=1.212-6.982; P=0.014), knowledge of signs and symptoms of labor (OR=3.981; 95%CI=1.533-10.340; P=0.003), knowledge of EDD (OR=8.288; 95%CI=2.550-26.938; P= <0.001), identification of health facility for delivery (OR=4.088; 95%CI=1.964-8.509; P= <0.001), identification of means of transport (OR=2.594; 95%CI=1.142-5.893; P=0.020), financially prepared for hospital delivery (OR=5.216; 95%CI=1.525-17.839; P = 0.010) and basic supplies for birth (OR=3.356; 95%CI=2.627-4.286; P= <0.001). The results are presented in table 4.6 below.
Table 4.6: Relationship between Antenatal Care Compliance and birth preparedness factors and BBA.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Respondent Response</th>
<th>Dependent variable</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC Compliance and birth preparedness factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANC Attendance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>5(9.4%)</td>
<td>0(0.0%)</td>
<td>OR=3.208</td>
</tr>
<tr>
<td>Yes</td>
<td>48(90.6%)</td>
<td>106(100%)</td>
<td>95%CI=2.537-4.057</td>
</tr>
<tr>
<td>Timing of ANC attendance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 6 months</td>
<td>13(24.5%)</td>
<td>2(1.9%)</td>
<td>OR=16.900</td>
</tr>
<tr>
<td>≤ 6 months</td>
<td>40(75.5%)</td>
<td>104(98.1%)</td>
<td>95%CI=3.650-78.259</td>
</tr>
<tr>
<td>Number of ANC visits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 4 times</td>
<td>17(32.1%)</td>
<td>12(11.3%)</td>
<td>OR=3.699</td>
</tr>
<tr>
<td>≥ 4 times</td>
<td>36(67.9%)</td>
<td>94(88.7%)</td>
<td>95%CI=1.688-8.507</td>
</tr>
<tr>
<td>Knowledge of signs and symptoms of labor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>13(24.5%)</td>
<td>8(7.5%)</td>
<td>OR=3.981</td>
</tr>
<tr>
<td>Yes</td>
<td>40(75.5%)</td>
<td>98(92.5%)</td>
<td>95%CI=1.533-10.340</td>
</tr>
<tr>
<td>Knowledge of EDD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>13(24.5%)</td>
<td>4(3.8%)</td>
<td>OR=3.208</td>
</tr>
<tr>
<td>Yes</td>
<td>40(75.5%)</td>
<td>102(96.2%)</td>
<td>95%CI=2.537-4.057</td>
</tr>
<tr>
<td>Identification of health facility for delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>25(47.2%)</td>
<td>19(17.9%)</td>
<td>OR=13.684</td>
</tr>
<tr>
<td>Yes</td>
<td>28(52.8%)</td>
<td>87(82.1%)</td>
<td>95%CI=2.867-65.315</td>
</tr>
<tr>
<td>Identification of means transport</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>15(28.3%)</td>
<td>14(13.2%)</td>
<td>OR=2.910</td>
</tr>
<tr>
<td>Yes</td>
<td>38(71.7%)</td>
<td>92(86.8%)</td>
<td>95%CI=1.212-6.982</td>
</tr>
<tr>
<td>Financially prepared for hospital delivery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>9(17.0%)</td>
<td>4(3.8%)</td>
<td>OR=3.981</td>
</tr>
<tr>
<td>Yes</td>
<td>44(83.0%)</td>
<td>102(96.2%)</td>
<td>95%CI=1.533-10.340</td>
</tr>
<tr>
<td>Basic supplies for birth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>8(15.1%)</td>
<td>0(0%)</td>
<td>OR=3.208</td>
</tr>
<tr>
<td>Yes</td>
<td>45(84.9%)</td>
<td>106(100%)</td>
<td>95%CI=2.537-4.057</td>
</tr>
</tbody>
</table>

Note: OR = Odds Ratio; 95%CI = 95% Confidence Interval; P = Significance Level
4.7. BBA and hospital Birth outcome.

The study examined the difference between BBA and hospital birth outcome.

The study showed that slightly over a half 52.8% (n=28) of BBA babies had advanced neonatal outcome compared with 15.1% (n=16) of hospital delivered babies and about half 47.2% (n=25) of BBA babies had good neonatal outcome compared with 84.9% (n=90) of hospital delivered babies who had good neonatal outcome.

5.7% (n=3) of BBA babies died during perinatal period (still birth and neonatal death) compared with none of the hospital delivered babies and 94.3% (n=50) of BBA babies survived compared with 100% (n=106) of hospital delivered babies who survived.

About a half 49.1% (n=26) of BBA babies were admitted compared with 15.1% (n=16) of hospital delivered babies and 50.9% (n=27) of BBA babies were not admitted compared with 84.9% (n=90) of hospital delivered babies who were not admitted.

The study showed significant statistical difference between hospital delivery and BBA on birth outcome (OR=6.300; 95%CI=2.954-13.436; P=<0.001), perinatal outcome (OR=3.120; 95%CI=2.483-3.921; P=0.036), babies admitted (OR=5.417; 95%CI=2.541-11.546; P=<0.001) the results are presented in table 4.7 below.
Table 4.7: Comparison between BBA and hospital Birth outcome.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Respondent response</th>
<th>Dependent variable</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BBA (n=53)</td>
<td>Hospital Delivered (n=106)</td>
</tr>
<tr>
<td>Birth outcome</td>
<td>Advanced neonatal outcome</td>
<td>28(52.8%)</td>
<td>16(15.1%)</td>
</tr>
<tr>
<td></td>
<td>Good neonatal outcome</td>
<td>25(47.2%)</td>
<td>90(84.9%)</td>
</tr>
<tr>
<td>Perinatal outcome</td>
<td>Perinatal death</td>
<td>3(5.7%)</td>
<td>0(0.0%)</td>
</tr>
<tr>
<td></td>
<td>Alive</td>
<td>50(94.3%)</td>
<td>106(100%)</td>
</tr>
<tr>
<td>Babies admitted to NBU/Ward</td>
<td>Yes</td>
<td>26(49.1%)</td>
<td>16(15.1%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>27(50.9%)</td>
<td>90(84.9%)</td>
</tr>
</tbody>
</table>

4.8. Indication for admission for BBA babies.

The study found indication for admission for BBA babies in order of frequency to be birth asphyxia 24.5% (n=13), neonatal sepsis 11.3% (n=6), prematurity 9.4% (n=5) and hypothermia 3.8% (n=2), the results are presented in figure 4.1 below.
4.9. Indication for admission for controls babies.

The study found indication for admission for controls babies in order of frequency to be birth asphyxia 5.7\% (n=6), neonatal sepsis 5.7\% (n=6), prematurity 3.8\% (n=4) and hypothermia 0\%, the results are presented in figure 4.2 below.

![Figure 4.2: Proportion of indication for admission for hospital delivered babies](image_url)
CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS.

5.1. DISCUSSION.

This chapter presents discussion of results in relation to literature review. The discussion is guided by the research questions and objectives of the study and the results obtained from the study.

5.1.1. Socio-demographic risk factors associated with BBA in Tharaka Nithi County.

The study established significant statistical association between marital status and BBA. Slightly over a quarter 26.4% (n=14) of BBA mothers were single compared with 9.4% (n=10) of hospital delivered mothers among post-natal women in Tharaka Nithi County. This is probably because single mothers delay going to the hospital when labor start, looking for someone to leave behind taking care of other children, they have no one to accompany them to the hospital especially if labor pains start at night and have to wait up to the following morning due to insecurity. Youth and teenagers who are still under care of their parents tend to hide pregnancy and when labor pains start, they do not reveal until when it is at advanced stage. The findings of this study were consistent with other studies done in Malawi, South Africa and Slovenia respectively by Mazalale et al, (2015); Alabi et al, (2015) and Zlatko et al, (2011), who found being single to be a risk factor for BBA.

The findings of this study were inconsistent with another study done in Kenya (Coast General Hospital) by Tanwira, (2013), which did not find marital status associated occurrence of BBA. This is probably because this study was conducted in rural area and the other one in Urban area where the transport is available throughout and security is good, unlike in rural areas.
The study established significant statistical association between education and BBA. Slightly over a half 52.8% (n=28) of BBA mothers were primary school leavers compared with slightly over a quarter 26.4% (n=28) of hospital delivered mothers. This is probably because education influences early health care seeking behavior including maternity services and woman’s education is a major factor affecting utilization of maternity services. Women who underwent some level of formal education have high likelihood of seeking maternity services. The findings of this study were consistent with other studies done in Kenya, Malawi, and Slovenia by Kitui et al, (2013); Mazalale et al, (2015), and Zlatko et al, (2011), whose studies found low education to be a risk factor for BBA.

The study established significant statistical association between family monthly income and BBA. A majority 77.7% (n=41) of BBA mothers had family monthly income less than ksh.20,000 compared with about a half 48.1% (n=51) of hospital delivered mothers. This is probably because families with low income will not afford to hire a vehicle when the mother develops labor pains and only relies on public transport which is not available at appropriate time. These mothers walk for long distances when public vehicles are not available. The findings of this study are consistent with findings of Phiri et al, (2014); Kitui et al, (2013) and Mazalale et al, (2015), who in their studies found socio economic status to be a risk factor for BBA.

The study established significant statistical association between parity and BBA. A third 30.2% (n=16) of BBA mothers had 4 or more deliveries compared with 11.3% (n=12) of hospital delivered mothers. This is probably because multiparous women having had uncomplicated first deliveries tend to wait too much at home and go to hospital when they are almost at second stage of labor. Multiparous women also tend to have precipitate labor. The findings of this study are consistent with findings of
Khupakonke et al, (2017); Bassingthwaithe et al, (2013) and Zlatko et al, (2011), who studied risk factors for BBA in South Africa, and Slovenia respectively and found parity to be a risk factor for BBA. First labor is usually prolonged and there is enough time to go to the hospital whereas subsequent labors are shorter resulting in unexpected out of hospital delivery (Pushpa, 2005). Quick child birth and having had an uncomplicated first delivery influence multiparous deliver at home or en route to the hospital ((Bassingthwaithe et al, 2013). The findings of this study are inconsistent with findings of another study conducted in South Africa which did not find parity to be a risk factor for BBA (Parag et al, 2014). This is probably because where this study was conducted the focused antenatal care is improved and multiparous Mothers are counseled on importance of going to the hospital early when labor starts.

The study did not find any significant statistical association between occupation and BBA. 13.2% (n=7) of BBA mothers were unemployed compared with 5.7% (n=6) of hospital delivered mothers. This is probably because those who were unemployed were married by husbands who were employed or businessmen. House wives in rural set up are engaged in income generating activities like farming. The findings of this study are consistent with study conducted in south Africa which found occupation not a risk factor for BBA (Khupakonke et al, 2017). The findings of this study are inconsistent with study conducted in Coast general hospital which found occupation (being house wife) to be a risk factor for BBA (Tanwira, 2013). This is probably because this study was done in rural areas where unemployed women or house wives were doing something to earn a living especially farming whereas the other study was done in urban area where house wives do not engage in income generating activities like farming.
5.1.2. Physical risk factors associated with BBA in Tharaka Nithi County.

The study established significant statistical association between distance to the health facility and BBA. Slightly over a half 58.5% (n=31) of BBA mothers resided 20 km or more compared with slightly over a third 34.9% (n=37) of hospital delivered mothers. This is probably because long distance delays the mother in labor from reaching the hospital in time. The findings of this study are consistent with studies conducted in Kenya, Nepal and Zambia respectively, which found long distance to be a risk factor for BBA (Tanwira, 2013; Kitui et al, 2013; Dhakal et al, 2011; Gabrysch et al, 2009; Gabrysch et al, 2011 and Phiri et al, 2014). However, the findings of this study are inconsistent with studies conducted in Malawi and South Africa which found distance not a risk factor for BBA (Kumbani et al, 2013 and Parag et al, 2014). This is probably because these studies were conducted in urban areas where the roads were in good conditions and transport available all the time.

The study established significant statistical association between means of transport and BBA. 20.8% (n=11) of BBA mothers resided in areas without means of transport compared with 5.7% (n=6) of hospital delivered mothers. This is probably because lack of means of transport makes the mother who is in labor to walk or use other means like ox-cart, Wheel barrow or bicycle and this delays the mother from reaching the hospital in time. The findings of this study are consistent with studies done in South Africa and Kenya which established lack of transport to be a risk factor for BBA (Alabi et al, 2015 and Kitui et al, 2013).

The study established significant statistical association between status of the roads and BBA. A majority 88.7% (n=47) of BBA mothers used roads in poor status compared with over a half 67.0% (n=71) of hospital delivered mothers. This is probably because roads in poor state delays the mother in labor from reaching the
hospital especially during the rainy season even if the transport was available. The findings of this study are consistent with studies done in Kenya and South Africa which found lack of or bad condition of the roads to be a risk factor for BBA (Tanwira, 2013 and Alabi et al, 2015).

The study found significant statistical association between time of delivery and BA. Over a half 69.8% (n=37) of BBA mothers delivered at night compared with less than a half 40.6% (n=43) of the hospital delivered mothers. This is probably because there is no public transport at night and also due to insecurity, mother has to wait till the following day leading to BBA. The findings of this study are consistent with studies done in Malawi and Kenya which found labor starting at night to be associated with BBA (Kumbani, et al, 2013 and Alabi et al, 2015).

The study did not find any significant statistical association between cost of hospital delivery and BBA. 9.4% (n=5) of BBA mothers could not afford cost of hospital delivery compared with 2.8% (n=3 of hospital delivered mothers. This is probably because maternity services are free in all public facilities. The findings of this study are inconsistent with other studies that found costs of hospital delivery to be associated with BBA, (Kitui et al, 2013; Alabi et al, 2015 and Phiri et al, 2014). This probably because maternity services are not free in public health facilities in countries where these studies were conducted.

5.1.3. Obstetric risk factors associated with BBA in Tharaka Nithi County.

The study established significant statistical association between precipitate labor and BBA. 7.5% (n=4) of BBA mothers had precipitate labor compared with none of hospital delivered mothers. This is probably because precipitate labor occurs very fast leaving no room for the mother to reach the hospital. The findings of this study are
consistent with other studies, which found precipitate labor to be a risk factor for BBA (Tanwira, 2013 and Kumbani, et al, 2013).

The study found significant statistical association between mode of previous delivery and BBA. 13.2% (n=7) of BBA mothers had abnormal mode of previous delivery compared with 2.8% (n=3) of hospital delivered mothers. This is probably because history of previous mode of delivery predicts mode of subsequent deliveries. The findings of this study are consistent with studies which found previous history of precipitate delivery, BBA and preterm birth puts a woman at risk of BBA (Scott et al, 2005; Khupakonke, 2017).

The study established significant statistical association between failure to recognize labor and BBA. 15.1% (n=8) of BBA mothers did not recognize labor pains compared with none of hospital delivered mothers. This is probably because failure to recognize labor hinders the mother in labor from going to the hospital. The findings of this study are consistent with studies, which found unawareness of symptoms of true labor to be a risk factor for BBA (Scott et al, 2005; Alabi et al, 2015).

The study did not find any significant statistical association between gestation age at delivery and BBA. 11.3% (n=6) of BBA mothers delivered before term compared with 3.8% (n=4) of hospital delivered mothers. This probably because some of the mother were not sure of their LMPs and hence their EDDs were not correct. The findings of this study were inconsistent with other studies that found preterm delivery to be a risk factor for BBA (Parag et al, 2014; Tanwira, 2013).

5.1.4. ANC compliance and birth preparedness factors association with BBA.

The study showed significant statistical association between non-ANC attendance and BBA. 9.4% (n=5) of BBA mothers did not attend ANC compared with none of hospital delivered mothers. This is probably because those who did not attend ANC
were never counseled on birth preparedness including EDD and hence labor started when they were not prepared leading to BBA. The findings of this study are consistent with other studies carried out in other regions which found poor or Non-ANC attendance to be a risk factor for BBA (Zlatko et al, 2011; Parag et al, 2014; Tanwira, 2013).

The study established significant statistical association between timing of ANC attendance and BBA. 20.8% (n=10) of BBA mothers started attending ANC after 6 months compared with 1.9% (n=2) of hospital delivered mothers. This is probably because when they start attending ANC late they do not make the recommended 4 visits and hence are not comprehensively counseled on birth and emergency preparedness. The findings of this study are consistent with other studies that found late ANC attendance to be a risk factor for BBA (Parag et al, 2014; Kumbani et al, 2013). World Health Organization recommends the first ANC visit to occur within the first three months of pregnancy (MOH, 2007).

The study showed significant statistical association between the number of ANC visits and BBA. About a third 27.1% (n=13) of BBA mothers made less than 4 ANC visits compared with 11.3% (n=12) of hospital delivered mothers. This is probably because those who made few visits got into contact with health care provider few times and hence received inadequate counseling on birth preparedness. The findings of this study are consistent with studies done in Kenya and other countries which found few ANC visits to be a risk factor for BBA (Zlatko et a, 2011; Parag et al, 2013; Tanwira, 2013). The WHO recommends a minimum of four ANC visits with the aim of identification of high-risk pregnancies and appropriate referral to an equipped Centre through an efficient referral system (MOH 2007).
The study showed significant statistical association between identification of health facility for delivery and BBA. About a half 47.2% (n=25) of BBA mothers had not identified health facility for delivery compared with 17.9% (n=19) of hospital delivered mothers. This is probably because the mother in labor who had not identified health facility for delivery in advance waste time identifying the facility to attend when in labor and this delays her in reaching the health facility leading to BBA. The findings of this study are consistent with study done by (Tanwira, 2013).

lack of birth preparedness is a risk factor for BBA.

The study established significant statistical association between identification of means of transport and BBA. Slightly over a quarter 28.3% (n=15) of BBA mothers did not identify means of transport compared with 13.2% (n=14) of hospital delivered mothers. This is probably because mothers who had not identified means of transport in advance, start looking for transport when labor starts and this delay them reaching the health facility in time leading to BBA. The findings of this study are consistent with study conducted by Tanwira (2013) which found non-identification of means of transport being a risk factor for BBA.

The study established significant statistical association between knowledge of signs and symptoms of labor and BBA. About a quarter 24.5% (n=13) of BBA mothers did not have knowledge of signs and symptoms of labor compared with 7.5% (n=8) of hospital delivered mothers. This is probably because lack of knowledge of labor makes the mother in true labor not go to the hospital at the right time and only goes to the hospital in second stage of labor. The findings of this study were consistent with studies done by (Alabi et al, 2015), failure to recognize the onset of labor by parturient and their attendants is most important factor in occurrence of BBA.
The study showed significant statistical association between knowledge of EDD and BBA. About a quarter 24.5% (n=13) of BBA mothers did not know their EDD compared with 3.8% (n=4) of hospital delivered mothers. This is probably because unawareness of EDD makes pregnant woman not make arrangement for the period she will be in hospital in advance to prevent delay when labor starts. The findings of this study were consistent with study done by Tanwira, (2013) Lack of birth preparedness is significantly associated with the risk of having BBA.

The study showed significant statistical association between financially prepared for hospital delivery and BBA. 17.0% (n=9) of BBA mothers were not financially prepared for hospital delivery compared with 3.8% (n=4) of hospital delivered mothers. This is probably because mother not financially prepared for hospital delivery, starts looking for finances when the labor starts delaying her in reaching the hospital leading to BBA. The findings of this study were consistent with a study done in Kenya which found lack of financial preparation for hospital delivery to be a risk factor for BBA (Kitui et al, 2013).

The study established significant statistical association between basic supplies for birth and BBA. 15.1% (n=8) of BBA mothers did not have basic supplies for birth compared with none of hospital delivered mothers who did not have. This is probably because mothers lacking supplies for birth were not prepared for birth. The findings of this study were consistent with another study conducted in Coast General hospital which found birth preparedness to be a risk factor for BBA (Tanwira, 2013).

5.1.5. BBA and hospital Birth outcome.

The study showed significant statistical difference between BBA and hospital delivered babies on neonatal birth outcome. Slightly over a half 52.8% (n=28) of BBA neonates had advanced birth outcome compared with 15.1% (n=16) of hospital
delivered neonates. This is probably because BBA deliveries occur in unhygienic places without skilled attendants and resuscitation equipment and this makes BBA babies prone to infection and hypothermia. The findings of this study were consistent with studies done by Tanwira, (2013) and Bassingthwaigte et al, (2013), whose studies found significant association between BBA and the risk of having advanced neonatal birth outcome.

The study established significant statistical difference between BBA and hospital delivered on perinatal outcome. 5.7% (n=3) of BBA perinatal outcome were perinatal deaths compared with none of hospital delivered neonates. During the study period there were one stillbirth and two neonatal deaths amongst the BBA neonates. This is probably because mothers had prolonged labor leading to stillbirth or birth asphyxia and no skilled attendant present to resuscitate the neonates. The findings of this study were consistent with a study done by Bassingthwaigte, et al (2013), whose study demonstrated higher mortality in the immediate postnatal period in BBA neonates compared with hospital delivered neonates.

The study showed significant statistical difference between BBA and hospital delivered on babies admitted in hospital. About a half 49.1% (n=26) of BBA babies were admitted compared with 15.1% (n=16) of hospital delivered neonates. This is probably because the BBA babies were delivered in unhygienic places and those needing resuscitation were not resuscitated. The findings of this study were consistent with a study conducted by Zlatko et al, (2011), whose study found high rate of perinatal morbidity for BBA deliveries compared to hospital deliveries.

The study established the indication for admission in order of frequency to be; Birth asphyxia, Neonatal sepsis, prematurity and Hypothermia. The findings of this study were consistent with studies conducted by Tanwira, (2013) and Bassingthwaigte et
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...al, (2013) whose studies found the indication for admission being the same as for this study, but the order of frequency differs.

5.2. Conclusion.

The study found Socio-demographic risk factors associated with BBA among postnatal women in Tharaka Nithi County to be; marital status, low level of education, low monthly income and high parity, while Occupation is not associated with BBA.

The physical risk factors associated with BBA among postnatal women in Tharaka Nithi County are; long distance to the health facility, unavailability of means transport, poor status of the road and night delivery. Cost of hospital delivery is not associated with BBA.

The Obstetric risk factors associated with BBA among postnatal women in Tharaka Nithi County are precipitate labor, abnormal mode of previous delivery, and failure to recognize onset of labor. Gestation age at delivery is not associated with BBA.

The ANC compliance and birth preparedness factors associated with BBA among postnatal women in Tharaka Nithi County are; non-ANC attendance, starting attending ANC late, few number of ANC visits, lack of knowledge of signs and symptoms of labor, lack of knowledge of EDD, failure to identify health facility for delivery, failure to identify means of transport, failure to financially prepare for hospital delivery and lack of basic supplies for birth.

5.3. Recommendations.

5.3.1. Socio-demographic risk factors associated with BBA.

Tharaka Nithi county Government, through responsible departments, to use the new knowledge from this study to improve focused antenatal care during the ANC visits,
girl child education and economically empower women to reduce or eliminate Socio-demographic risk factors associated with BBA, in order to reduce BBA deliveries.

5.3.2. **Physical risk factors associated with BBA.**
Tharaka Nithi County Government through responsible departments, to use the new knowledge from this study to improve roads and distance from one facility to the other to reduce physical risk factors associated with BBA, in order to reduce BBA deliveries.

5.3.3. **Obstetric, Antenatal Care compliance and birth preparedness risk factors associated with BBA.**
Tharaka Nithi Count. Government through department of health services to use the new knowledge from this study to improve focused antenatal care (FANC) by ensuring mothers with obstetric risk factors and Antenatal care compliance and Birth preparedness risk factors associated with BBA are counseled during the ANC visits, in order to reduce BBA deliveries.
REFERENCES.


APPENDICES.

Appendix 1: Ethical considerations

Approval and permission

i. Approval was sought from Kenyatta University Graduate school

ii. Ethical approval was sought from Kenyatta University Ethical and Review Committee (KUERC).

iii. Research permit was sought from National Commission for Science, Technology and Innovation (NACOSTI)

iv. Permission to collect data was obtained from management of department of health services, County director of education and County Commissioner Tharaka Nithi County.

v. Consent was obtained from study respondents

Care and protection of research participants

i. Voluntary Withdraw from study did not have consequences to the services offered to the participant and she was free to do so at any stage of the study and accepting or declining to participate in the study did not influence the treatment offered to the mother or her baby.

ii. The medical care and treatment initiated by hospital to the mother and the baby were not to be stopped or changed during study period.

iii. No drug or any medical agent was administered to research participants by researcher during the study.

iv. Research participants were not to incur any financial costs during the study

v. No rewards were to be given to research participants

Protection of research participant confidentiality

i. The information obtained in this study was handled with confidentiality throughout the study period. No names were used in the questionnaire to identify the participant and data was de-identified before analysis

ii. The information obtained in this study was only used for this study and will not be accessed by anybody else for any other purpose.
Community consideration in the research.

i. During designing of the research Tharaka Nithi community was consulted on extent of BBA, number of hospitals, number of deliveries per month per hospital and during pretesting, post-natal mothers were involved.

ii. This research will be relevant in Tharaka Nithi since the incidence of BBA is high. The research result will capacity build health workers and community on risk factors associated with BBA. In the Antenatal clinic (ANC) health workers will be counseling mothers on risks of BBA and this will reduce BBA as well as maternal and neonatal morbidity and mortality.

iii. BBA is a problem that affect the community and the result of the study will assist in reducing this problem, hence, the community will influence individuals to give consent.

iv. Tharaka Nithi County community was requested for; permission to collect the data, informed consent and patients’ records. Health workers, key informants, research participants and their relatives were consulted during the study.

v. Risks of BBA will be made one of components of Focused Antenatal care and all the Antenatal mothers will be counseled on the risk of BBA during ANC visits.

vi. The participants together with the community will be brought together in a central place for dissemination of research results.
Appendix 2. General Patient information and Informed Consent

My name is John Murrithi Mbogo. I am a master’s student from Kenyatta University. I am conducting a study on “Risk factors associated with Born Before Arrival (BBA) and birth outcome among postnatal women in Tharaka Nithi County”. The information will be used by the Ministry of Health to improve access and quality of maternal and neonatal services in hospitals in Tharaka Nithi County as well as in other regions of Kenya.

Procedures to be followed

Participation in this study will require that I ask you some questions about you and your baby. I will record the information from you in a questionnaire.

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

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

You may refuse to respond to any questions and you 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 hospital or any other organization now or in the future.

Discomfort and Risks

Some of the questions you will be asked are on intimate subject and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may interfere with time you receive your routine services.
Benefits
If you participate in this study, you will help us to learn how to provide effective antenatal services that can improve the health of women and neonates and reduce maternal and neonatal mortality and morbidity. You will also benefit from being assessed for risk of BBA and if you are found to be at risk you will be counseled and advised accordingly.

Reward
No reward will be provided for agreeing to participate in this study, but we shall say thank you.

Confidentiality
The interviews will be conducted in a private setting within the hospital. Your name will not be recorded on the questionnaire. The questionnaires will be kept in a locked cabinet for safe keeping at Kenyatta University. Everything will be kept private.

Contact information
If you have any questions you may contact

Supervisors;

Prof. Margaret N. Keraka  Mobile  0721817521
Dr. Peterson N. Warutere  Mobile  0721993833

OR

The Kenyatta University Ethical Review Committee Secretariat;

chairmankuerc@ku.ac.ke
Secretarykuerc@ku.ac.ke
Ercku2008@gmail.com
**Participant’s statement**

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions 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 hospital today or that I will get from any other hospital 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 -

Interviewer signature - Date -
Appendix 4. QUESTIONNAIRE

Serial NO-----------------------------------

Hospital--------------------------------------

CASE (BORN BEFORE ARRIVAL)   

CONTROL (HOSPITAL DELIVERY)    

SECTION A: PHYSICAL FACTORS DATA

1. How far is hospital from your house?

Tick appropriate box/es

☐ More than 20km
☐ Less than 20km

2. Was mean of transport available from home to hospital?

Tick appropriate box/s

☐ NO
☐ Yes

3. What was status of the road/s from your house to the hospital?

☐ Poor
☐ Good

4. Was delivering in the hospital affordable?

☐ No
☐ Yes

5. What was the time of delivery?

☐ Night
SECTION B: OBSTETRIC DATA

6. How long did labor pains take?

*Tick appropriate box/s*

☐ Less than 5 hours

☐ 5 hours and more

7. What was the mode of Previous delivery/s?

*Tick appropriate box/s*

☐ Abnormal (BBA, Preterm birth or Precipitate/Fast delivery)

☐ Normal

8. Were labor pains recognized at home/hospital?

*Tick appropriate box/s*

☐ No

☐ Yes

9. What was Gestation age at birth? .................
SECTION C: ANTENATAL CARE (ANC) COMPLIANCE AND BIRTH PREPAREDNESS.

10. Did you attend ANC?

☐ No
☐ Yes

11. If yes, when did you start attending ANC?

*Tick appropriate box/s*

☐ Above 6 months
☐ 6 months and Below

12. How many ANC visits did you make? ................ ..............

13. Did you know the signs and symptoms of labor?

☐ No
☐ Yes (Specify)

14. Did you know the danger signs in pregnancy and delivery?

☐ No
☐ Yes (Specify)

15. Did you know your expected date of delivery?

☐ No
☐ Yes

16. Did you identify health facility for delivery?

☐ No
☐ Yes

17. Did you identify mode of transport to place of delivery?
18. Were you financially prepared for hospital delivery?

☐ No
☐ Yes

19. Did you have basic supplies for birth?

☐ No
☐ Yes

SECTION D: NEONATAL BIRTH OUTCOME

20. What was perinatal outcome?

Tick appropriate box/s

☐ Perinatal death
☐ Alive

21. What was the birth outcome?

☐ Advanced neonatal outcome
☐ Good neonatal outcome

22. What was birth weight in grams? .....................
23. What was the baby’s response upon delivery?

Tick appropriate box/s

☐ Cried immediately upon delivery

☐ Delayed crying (more than 2 minutes of delivery)

☐ Hasn’t cried

24. For controls, what was the baby’s APGAR score? ......................

25. Was the baby admitted to NBU/ward?

☐ Yes

☐ No

26. What was indication for admission?

Tick appropriate box/s

☐ Birth asphyxia

☐ Neonatal sepsis

☐ Hypothermia

☐ Prematurity
SECTION E: SOCIO DEMOGRAPHIC DATA

27. What is your age in years? ..............................

28. What is your Marital status?

Tick appropriate box/s

☐ Single
☐ Married

29. What is your highest education level?

Tick appropriate box/s

☐ None
☐ Primary
☐ Secondary
☐ Tertiary

30. What is your Occupation?

Tick appropriate box/s

☐ House wife
☐ Unemployed
☐ Self employed
☐ Employed

31. What is your family average monthly income?

☐ Less than ksh20,000
☐ ksh20,000 and above

32. What is your parity (Number of deliveries)? .....................
Appendix 5: Map of Kenya showing the location of Tharaka Nithi County