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SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

RISK FACTORS FOR OBSTETRIC FISTULA AMONG WOMEN SEEKING CARE IN THE TAMALE METROPOLIS

BY

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(10082019)

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DECLARATION

I hereby declare that this dissertation is the result of my own original work and that, no part of this dissertation has been presented for another degree in this university or elsewhere. References to other people's work have been duly acknowledged:

…….. ……..

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(ACADEMIC SUPERVISOR)

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DEDICATION

This work is dedicated to the several thousands of women who are living in shame, pain and destitution because of Obstetric fistula.

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ACKNOWLEDGEMENT

My heartfelt gratitude goes to the Almighty God for his guidance. Dr. Samuel Sackey is the best academic supervisor any student can get. This work would not have been possible without his supportive supervision.

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Finally, I am grateful to my wife Joyce Nuertey and my daughter Michelle Nuertey not forgetting my parents Mr. and Mrs. Nuertey for their prayers and support in seeing this work completed.

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ABSTRACT

Obstetric fistula is a devastating form of maternal morbidity. It is characterized by an abnormal communication between the vagina and the lower urinary/ gastrointestinal structures or both. It is a result of injury due to pregnancy and its related complications with the resultant effect of continuous leakage of urine or faeces or both into the vagina. It remains a problem in Africa. This study sought to identify predisposing factors to obstetric fistula among women seeking care in the Tamale metropolis. In this matched case control study, cases were from the Tamale fistula center. Controls were matched on the year of delivery, region and district of index delivery. A total of 151 participants made up of 51 cases and 100 controls participated. This study identified three major factors for obstetric fistula; age below 20 years, total labour duration more than 24 hours and height 150 cm and below. It further identified four minor factors which are still birth, delivery by caesarean section, residence in a rural area and lack of formal education. Across both study groups, there is lack of adequate knowledge about obstetric fistula. Findings in this study agree with the literatures that, majority of women who suffer obstetric fistula are young, poor, illiterate, of short stature, resident in remote areas and labour more than 24 hours. Based on the associated factors, an obstetric fistula forecast score (OFFSCORE) was proposed, which is composed of three major criteria, the presence of each which is scored 2 and zero otherwise and four minor criteria each scored one and zero otherwise. A total OFFSCORE of four and above classified as high risk has a sensitivity of 90.2% and a specificity of 86.0% for predicting obstetric fistula. This study recommends immediate prophylactic urethral catheterization for high risk for obstetric fistula post-partum women.

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LIST OF ABBREVIATIONS

ANC	Ante-natal Clinic
cm	Centimeter
C/S	caesarean section
GHS	Ghana Health Service
OF	Obstetric fistula
OL	Obstructed Labour
RVF	Recto-vagina fistula
SD	Standard deviation
SVD	Spontaneous vaginal delivery
TFC	Tamale Fistula Center
TTH	Tamale Teaching Hospital
VVF	Vesicovaginal fistula
WHO	World Health Organisation

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CHAPTER ONE

1.1 Background

Obstetric fistula is a devastating maternal morbidity (WHO, 2006, Danso et al., 2007, Wall, 2006, Angioli et al., 2003, Dhillon, 2009, Lassey, 2007, Singh et al., 2009, Tebeu et al., 2011, UNFPA, 2003). It is the presence of an abnormal communication (hole) between the vagina and the lower urinary structures or any part of the gastrointestinal tract or both arising as a result of injury due to pregnancy and its related complications (UNFPA, 2003, Wall, 2006, Wall and Arrowsmith, 2007, Lassey, 2007). The resultant effect of the fistula is continuous leakage of urine or faeces or both into the vagina. This leaves the women with offensive smell which is characteristic of ammonia and or faecal smell. It is a completely avoidable as well as eradicable condition. However, it still remains a problem in Africa.

Obstetric fistula is found mainly in all developing countries (Tebeu et al., 2011). Many authors have shown that the condition is almost or has completely been eradicated from most developed countries. Even in Sub-Saharan Africa, majority of the obstetric fistula are confined to "the fistula belt" (Tebeu et al., 2011). The fistula belt is a region across the northern half of sub-Saharan Africa from Mauritania to Eritrea. The northern region of Ghana falls within this fistula belt. The incidence has not been accurately determined but estimated at 50,000 to 100,000 new cases annually; and a worldwide prevalence of 2 million cases of obstetric fistulas.

Fistulas in general can arise from obstetric origin, malignancy, radiation, genital mutilating pubertal rites. However in Africa, commonest cause is of obstetric processes (Singh et al., 2009, (UNFPA, 2003). Obstetric fistula occur as part of an injury

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mechanism known as the "obstructed labour injury complex" (Wall, 2006) and it has been described as "a near miss maternal mortality"(Singh et al., 2009).

Risk factors for obstetric fistula can be assessed from the technical/ service provider perspective as well as from the client perspective. Whichever the perspective used, useful insight can be generated to help reduce the incidence of obstetric fistula.

Management options for obstetric fistula ranges from simple urethral catheterization to complex surgical procedures. While the complex surgical procedures have been associated with complications and significant failure rates, it is known that early (before epithelialization of the fistula) management with urethral catheter alone for three weeks is associated with significant cure rate for the simple fistulas of size within 1cm. But the challenge is that, in our part of Africa, there is significant delay in seeking care. For example, Leye et al.(2012) in a study of women suffering from obstetric fistula in southeastern Senegal concluded that the average time between the occurrence of Obstetic fistula and the first consultation was 50.7 months (Leye et al., 2012). The question therefore is: how can this category of fistula be prevented with the slow paced health related development? It is therefore important to carry out research which can aid classifying immediate postpartum client into high risk, moderate and low risk for obstetric fistula and instituting measures to prevent fistula which we suggest could be prophylactic postpartum urethral catheterization for high risk for fistula patients.

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1.2 Problem statement

Obstetric fistula remains a problem in the developing world of which Ghana is prominently represented particular in its three Northern regions (Wall, 2006, Angioli et al., 2003, Danso et al., 2007, Dhillon, 2009, Lassey, 2007, Singh et al., 2009, Tebeu et al., 2011, UNFPA, 2003). In Ghana it is seen as the most dreaded maternal condition (Danso et al., 2007, Wall, 2006). Yet obstetric fistula is fairly common in Ghana. It is believed that many are still hiding, while many new cases continue to emerge from their hideout each day. Even in the urban areas of Ghana, there is significant evidence of relatively high incidence of obstetric fistula with incidence in the Komfo Anokye Teaching hospital within the period 2002-2004 estimated as 66 per 100000 births (Danso et al., 2007).

WHO standard guidelines ranked obstetric fistula as a single most important visible indicator of the enormous gap in maternal healthcare between the developed and the poor resource countries (WHO, 2006). High prevalence of obstetric fistula in Ghana is indicative of poor maternal care in Ghana. Studies in Africa have demonstrated that, data on risk factors for obstetrical fistula are controversial. For example, in the northern region, the use of "kaligotim" in pregnancy is generally accepted as a risk factor but this has not been formerly proven to carry any significant risk.

It is known that early diagnosis (before epithelialization of the fistula) and management with urethral catheter alone for three weeks is associated with significant cure rate for the simple fistulas of size within 1cm. But the challenge is that, in our part of Africa, there is significant delay in seeking care. It is therefore important to carry out research which can aid classifying postpartum client into high risk, moderate and low risk for obstetric fistula. We argue that if early fistula can be cured with only

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urethral catheterization, then it is possible that prophylactic urethral catheterization for high risk for fistula postpartum client can prevent significant number of obstetric fistula.

1.3 Conceptual framework

Obstetric fistula is known to exist as a result a complex interplay of biological, social, economic and many other factors (Wall, 2006). Some of these factors require great infrastructural development to mitigate their effects. The main factor in the etiology has been described to be from cephalopelvic disproportion (CPD). If CPD persists without prompt intervention, the labour can be termed as obstructed labour. Obstructed labour in general can be managed. Its management requires the availability of emergency obstetric care. In the absence of emergency obstetric care or delay in accessing emergency care leads to a myriad of injuries that has been described as obstructed labour injury complex (Arrowsmith et al., 1996, Wall, 2006). Some of the problems include gynecological problems, multiple urological problems, dermatological and neurological problems which can worsen the social and stigmatization problems associated with the leakage of urine and / or feces by women with obstetric fistula.

Low socio-economic status of women and a host of socio-economic factors that affect ability to seek emergency health care have been blamed as a contributing factor to the development of obstetric fistula. Some of these socio-economic factors include lack of basic education, poverty and early marriage. Biological or medical factors that has been associated include the following; young age, short stature, large fetus, malnutrition, mal-presentation and maternal medical diseases. Family planning is

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believed to be protective as it prevents pregnancy. Figure 1.1 is the conceptual framework.

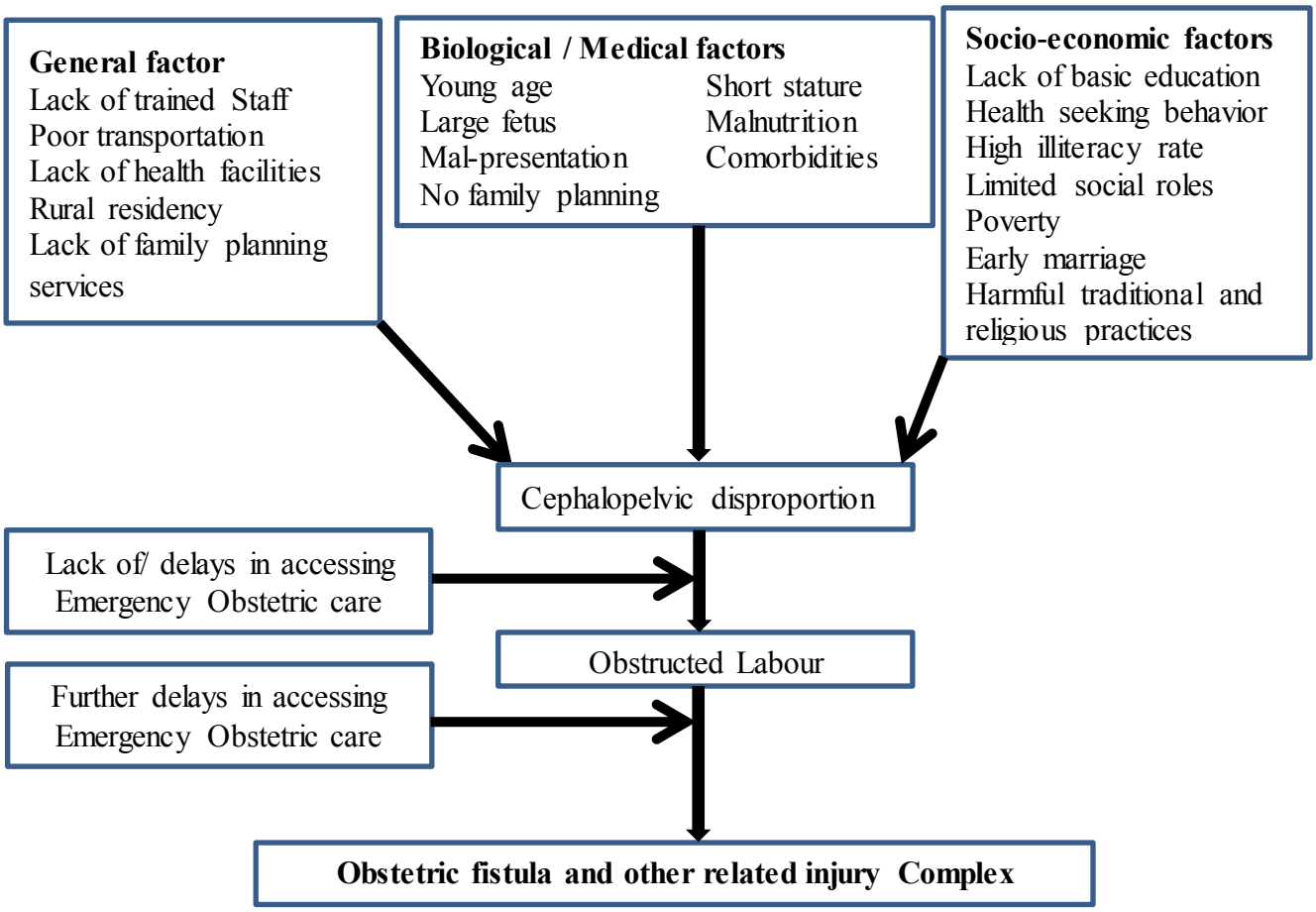

Figure 1.1 conceptual framework

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1.4 Justification of the study

This research draws its justification from the fact that obstetric fistula is associated with several risk factors, and they appear to be preventable. Some of these attributed risk factors (for example *kaligotim* usage in pregnancy) have not been formerly proven in any research to be responsible for obstetric fistula in the Northern region. The level of association that would be established by this research would affect policy that may be beneficial in reducing and further possibly eradicating obstetric fistula in the Northern region.

The list of variables that would be investigated as possible risk factors can be profiled to help identify women of high risk, moderate risk, or minimal risk for obstetric fistula so as to facilitate the prompt management of such patients when they report at the hospitals for medical attention or even facilitate the decision on which method is appropriate for delivering of the pregnant woman (Caesarean section or vaginal delivery). Also the classification of post-partum clients as high, moderate and low risk for obstetric fistula will facilitate prophylactic post-partum urethral catheterization for the high risk for obstetric fistula patients.

Furthermore, knowledge that would be generated may be used in strengthening the preventive strategy both at the health facility and at the community level which will aim at making obstetric fistula a thing of the past. By doing this, the gap between the developed countries and the developing countries in terms of healthcare would be bridged.

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1.5 Objectives of the study

1.5.1 General objectives

The main objective of this study is to identify factors which predispose women to obstetric fistula among women seeking care in the Tamale metropolis.

1.5.2 Specific Objectives of the study

1. To identify factors associated with obstetric fistula among women seeking care in the Tamale metropolis.

2. To determine the causes ascribed to obstetric fistula among women seeking care in the Tamale metropolis

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CHAPTER TWO

2.0 Literature review

2.1 Fistula

A fistula is an abnormal communication between two organs lined by epithelia tissue. Fistulas can arise in most parts of the human body but the commonest type of fistulas in Africa includes vesico-vaginal and the recto-vaginal fistula. Fistula in general could also arise from several factors including obstetric origin, malignant disease and its management (chemotherapy and radiotherapy). It can be as a result of complications of surgery particularly during caesarean section and hysterectomies (Wall, 2012b,Wall, 2012a, Wall, 2012c). Other causes include trauma, sexual abuse or coital injury in teenage girls, infection particularly with lymphogranuloma venereum, and by harmful traditional practices such as female genital cutting or other forms of unwarranted surgery. Vesico-vaginal fistula and recto vaginal fistula can be found in all parts of the world.

2.2 Obstetric fistula

Obstetric fistula is the presence of an abnormal communication (hole, passage) between a woman's genital tract and the urinary tract or between the genital tract and the lower gastrointestinal tract or both (Tebeu et al., 2012a, Browning, 2006, Tebeu et al., 2012b, Wall, 2012a, Wall, 2012b, Arrowsmith et al., 1996). There are many types of fistulas broadly classified based on cause and location. Obstetric fistulas are the group of fistulas that arise as a result of pregnancy and delivery complications. It is mostly due to obstructed labour and is broadly divided into vesico-vaginal fistula and recto-vaginal fistula. The vesico-vaginal fistula is characterized by the leakage of the urine from the bladder through the vagina, and recto-vaginal fistula is characterized by the leakage of flatus and stool from the rectum through the vagina. The resultant effect

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of the leakage of urine, or stool or both through the vagina opening is a continuous and persistent offensive odor leading to the social stigma and most often ostracizing of these affected women (Khisa and Nyamongo, 2012, Siddle et al., 2012, Wall, 2012a, Umoiyoho et al., 2012).

2.3.1 Geographical distribution of Obstetric fistula

Wall (2012a) argued that the developed countries were once having these obstetric fistula but they have successfully eradicated this category of fistulas. Obstetric fistula is now found in all developing countries including Ghana (Tebeu et al., 2012b, Tebeu et al., 2011). Globally, obstetric fistulas are confined to Africa, and in the developing countries of the Middle East Asia. This is located in poor resourced countries making obstetric fistula the single most important visible indicator on WHO rankings which showed the enormous gap in maternal healthcare between the developed and the poor resource countries (WHO, 2006).

In Africa however, the majority of obstetric fistulae are confined to the "fistula belt". Though they can be found in almost every part of Africa, majority of cases are confined to the region in Africa described as the fistula belt (Tebeu et al., 2012a). The fistula belt is a region across the northern half of sub-Saharan Africa from Mauritania to Eritrea and in the developing countries of the Middle East Asia. The three northern regions of Ghana forms part of this fistula belt and continue to produce obstetric fistula each year. Currently there are several obstetric fistula patients on the waiting list awaiting repair.

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2.3.2 Incidence and prevalence

Several population-based estimates of obstetric fistula have been presented in the obstetrical literature. But the reliability of these estimates remains questionable. The most frequently cited estimate is the one introduced by Waaldijk (1993) as cited by (Tebeu et al., 2011) where he gave an incidence rate of 1 to 2 per 1,000 deliveries. There are some challenges with regards to estimating accurately the incidence and prevalence of obstetric fistula in the communities. Despite these challenges, estimates from the WHO burden of disease study suggested an annual incidence of at least 130,000.

Incidence of obstetric fistula in Africa is largely unknown although several writers have argued that majority of the world's new fistula cases occur each year in Africa. The situation is described to be worse in sub-Saharan Africa especially along the fistula belt of West Africa. A population based survey of severe obstetric morbidity conducted recently which admittedly is considered by many writers as being conservative concluded that there are at least 33 000 new cases each year of obstetric fistula in sub-Saharan Africa (Wall, 2006, Wall, 2007, Wall et al., 2005).

In Ghana, there is lack of adequate data on the incidence of obstetric fistula. However, a study conducted by Danso et al. at the Komfo Anokye teaching hospital in 2006 estimated the incidence in the teaching hospital over a 2 year period to be 66 per 100,000 live births. This estimate admittedly does not take care of the numerous home deliveries that exist in that region of the country as well as the fistulas existing in other hospitals within the same locality. There is no national figure of incidence of obstetric fistula in Ghana. It is however stated that, the three northern regions of Ghana which

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forms part of the fistula belt of Ghana have the highest incidence of obstetric fistula in Ghana. The exact estimates are however not known.

One writer Fortney as cited by (Wall, 2006) argued that for every one maternal mortality in the following countries; Indonesia, Bangladesh, India, and Egypt, there are an estimated 149, 259, 300, and 591 serious maternal injuries occurred respectively in these countries. A recent study that highlighted the lack of a scientific basis for some of the reported incidence and prevalence in literature likewise estimated that in West Africa, the prevalence of fistulae is 188 per 100,000 women aged 15 to 49 years in South Saharan Africa and emphasized the need for population-based studies. Some countries have made progress in estimating their country specific prevalence rate for obstetric fistula. For example, a study conducted in Malawi cited the prevalence to be 1.6 per 1000 women (Kalilani-Phiri et al., 2010)

In Ghana, there is no such data on the prevalence of obstetric fistula. It is however known that there are many hiding with the disease and many on the waiting list for fistula repair just as it exist in similar west African countries (Umoiyoho et al., 2012). It is therefore necessary to conduct a study to get the right prevalence of this maternal morbidity to enable appropriate intervention. Many writers have advocated the need for a population based study to determine with accuracy the incidence and prevalence of obstetric fistula because many think the values being estimated are gross underestimation (Cook et al., 2004, Rushwan et al., 2012, Stanton et al., 2007).

2.3.3 Distribution of Obstetric fistula by persons

Obstetric fistula is a problem that primarily affects females only; particularly females in the reproductive age group. It has been well documented that, majority of women who suffer obstetric fistula are young, poor, illiterate women who live in remote areas

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(Capes et al., 2011, Muleta, 1997, Muleta et al., 2010, Muleta, 2004, Miller et al., 2005). Among the young age group, almost half of all obstetric fistula patients were of ages less than 20 years. The age range reported vary from study to study but it is agreed among writers that teenage is an observed feature of obstetric fistula (Tebeu et al., 2012a). Age range in that has been documented in literature ranges from 9 to 65 years (Creanga and Genadry, 2007). Some writers have reported a bi-modal distribution of the age for obstetric fistula with a teenage and an age within the third decade of life (Wall, 2006).

Another characteristic of patient with obstetric fistula is short stature. Most obstetric fistula patients are short compared to the non-fistula patients. For example a study among women in Ethiopia found the mean height of fistula patient 149 cms (sd=8) (Muleta, 2004). The explanations given is that, the shorter the woman, the narrower the pelvis which may result in obstructed labour from cephalopelvic disproportion which in turn leads to obstetric fistula when combined with delayed intervention.

Another frequent characteristic of obstetric fistula patients is the high rate of illiteracy (Muleta, 2006, Muleta et al., 2007, Ijaiya and Aboyeji, 2004, Donnay and Weil, 2004, Kalilani-Phiri et al., 2010, Ndiaye et al., 2009). High illiteracy has been attributed with limited social role as well as low socio-economic power. Other factors that are associated with obstetric fistula patients include primigravida status and young age at marriage.

2.3.4 Distribution of Obstetric fistula by time

There is no documented seasonal variation in the formation of obstetric fistula. But it can be argued that, more fistulas can be expected in this part of Africa during the raining season where some communities become completely isolated by rivers that

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over flow. Most of such communities in Ghana with the history of being transformed into "islands" in the raining season often lack well equipped health facilities with capabilities of emergency obstetric care. These may give a seasonal variation in fistula formation; however extensive search of the fistula literature did not give any data on that.

2.4 Other risk factors for obstetric fistula

There are other factors that have been identified among fistula patients as risk factors to obstetric fistula. Poverty is one main factor that has been attributed to the formation of obstetric fistula. A study reported that, 62% of fistula patients owned nothing valuable (Muleta, 2004). Poverty can play an important role in the decision to seek care. These increases the chances of developing obstetric fistula from obstructed labour. Antenatal clinic attendance has been documented as an important intervention that improves maternal health outcomes. Antenatal clinic attendance is associated with reduced risk of obstetric fistula. In a study conducted by Tebeu et al in 2009 found out that 50% of women reported that they had received no prenatal care.

Increased duration of labour has been attributed with high incidence of obstetric fistula. Labour for more than 24 hours is attributed with significantly increased incidence of obstetric fistula (Tebeu et al., 2009). Most fistula patients labour for more than 24 hours at home before going to the hospital.(Mselle et al., 2011). A systematic review reported average duration of labour at home ranging from 2.5 to 4 days (Creanga and Genadry, 2007). Other risk factors include home delivery, unskilled attendant at birth and malnutrition, lack of health facility. In a research conducted in Niger by Ndiaye in 2009 it was found that majority of obstetric fistula patients came from the southwest region of the country (accounting for up to 85%), and more than

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half belong to the Djerma, suggesting that, ethnic background poses a risk to the development of obstetric fistula.

2.5 Causes of Obstetric fistula

Causes of obstetric fistula can be classified into three prominent groups (Tebeu et al., 2012b). The first cause of obstetric fistula identified in literature includes ischemia of the soft tissue between the vagina and the urinary tract or between the vagina and the rectum by compression of the fetal head. The second most common cause of obstetric fistula is the direct tearing of the soft tissue between the vagina and the urinary tract during precipitous delivery. Another common cause is from iatrogenic causes arising from complex obstetric maneuvers (Demirci et al., 2012). The last and least common cause is as a complication of elective abortion (Tebeu et al., 2009).

2.5.1 Client perceived causes

There is extreme paucity of literature on the factors that fistula patients ascribe to the causes of obstetric fistula. Information on what women in general ascribe to obstetric fistula is equally lacking. Knowledge into the factors that fistula patients ascribe to the causes of obstetric fistula may be a great tool in curbing this unfortunate morbidity in Africa. There is no consensus about the knowledge of fistula patients about the causes of the disease. Some studies report that, fistula patients have little or no knowledge about obstetric fistula. In such studies, women cite causes like curse, spiritual attack and punishment as the cause of obstetric fistula. In such findings, illiteracy has been blamed as a contributing factor of such perception (Tebeu et al., 2008). Despite the widespread lack of understanding about the causes of obstetric fistula among patients with obstetric fistula, other studies in Africa have shown adequate understanding of the causes of obstetric fistula with causes ascribed by women similar to those of current

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teaching about obstetric fistula. One of such studies in Addis Ababa, Ethiopia found out that, majority of fistula patients mentioned distance as a main problem for the delays. Other factors mentioned in that study included lack of money, poor knowledge and delay in referral (Muleta, 2004). In another study conducted by Banger in Tanzania and Uganda, they found women testimony consistent with physical, socio-economic and cultural constraints, as well as health system failures, that led to fistula formation (Bangser, 2006).

Even though there is limited amount of information on client perceived causes of obstetric fistula, there is evidence that is suggestive of varied client attributed causes of obstetric fistula. The story in Ghana is largely unknown as no formal studies have been conducted on factors that women ascribe to obstetric fistula in Ghana.

2.6 Complications

There are myriads of associated possibilities that can complicate obstetric fistula. These associated conditions are multi-systemic. Some of the systems that suffer these injuries include the gastrointestinal, the genito-urinary and musculoskeletal systems. One most common complication of the obstructed labour that is associated with obstetric fistula is still birth. It is frequently reported in literature that the antecedent delivery usually ends in a stillbirth (Browning, 2009).

Some other complications associated with obstetric fistula are the presence of skin disease emanating from direct irritation of urine and/ or feces or both. Dermatitis from the former can be irritating and difficult to manage in this case without addressing the fistula problem.

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2.7 Psycho-Social effect/ plight

There is abundant literature on the considerable social and psychological effects of obstetric fistula on affected individuals (Browning et al., 2007). Some of the psychological problems include depression (Browning, 2007) and suicidal ideation (Muleta et al., 2008). It is noted that the psychosocial circumstances of these women can be more devastating and damaging when compared to the physical injury of fistula (Wall, 2012b). The challenge this women feel has not been fully researched. But it is known that most of the women with fistula become unemployed and often described as unemployable because they cannot do any work that require appearing in public. They are shunned by their friends and family. It is noted that, initially the families are supportive but later reject the women suffering from obstetric fistula and are left to fend for themselves. Complicating the social problems is the sexual problems and frequent divorce that follow the fistula. The resultant effect of this and further economic hardship and malnutrition often leads to mental problems described as depression, anxiety and other forms of mental dysfunctions (Wall, 2006).

2.8 Prevention of Obstetric fistula

Several approaches to prevention have been described based on the intended effect. The best and comprehensive prevention strategy would be development of the communities and bridging the gaps between maternal health care of the developed and developing nations. Some strategies include creation, implementation and review of governmental policy aimed towards reducing maternal mortality/morbidity and increasing availability of skilled obstetric care through comprehensive training and awareness creation among policymakers, service providers, and women and their partners in the communities where they live (Capes et al., 2011).

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Another approach recommended by a WHO guiding principle for clinical management and program development of obstetric fistula is the urethral catheterization of all women with obstructed labour. This is currently not being practiced. Some suggested reasons include the justification of urethral catheterization for all women with obstructed labour. It is known that only 2% of the 7 million obstructed labour worldwide develop into obstetric fistula. Even though obstructed labour is worldwide, obstetric fistula is confined to certain regions of the world. Why put all women into the discomfort of having to keep urethral catheter for up to four weeks if 98 % of such women catheterized would not develop fistula any way. It is for this reason that this research seeks to profile immediate post-partum women into high risk for obstetric fistula, moderate risk, and low risk for obstetric fistula based on certain risk factors that would be identified and based on the research findings recommend the prophylactic urethral catheterization to women with high risk for obstetric fistula.

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CHAPTER THREE

3.0 METHODS

3.1 Study Design

Risk factors for obstetric fistula were studied from two perspectives; the technical perspective as well as the client perspective. The technical perspective of risk factors for obstetric fistula was studied using a case control study. This gave information on the factors associated with obstetric fistula in the northern region. To achieve this objective, patients from the Tamale fistula center served as cases whiles controls were drawn from mothers without obstetric fistula who have delivered during the same time period as the cases and from the same region and district as cases but currently seeking care from the Tamale metropolis. Tamale fistula center admits, assess, counsel and repair fistula. Fistula patients due for surgery are educated, taken through strategies to aid their post repair integration into the communities.

3.2 Study Area

The study took place in the Tamale metropolis from 15th May, 2013 to 30th June, 2013. The fistula patients were taken from the fistula center in Tamale whiles the controls were drawn from the Tamale Teaching hospital. These centres are located in the Northern Region of Ghana. The Northern region is the largest region of Ghana with a land surface area of about 70,384 sq. km corresponding to 29% of the land area of Ghana. It is located within latitude “8 30" and 10 30" N” thus making it a full savannah zone region. It foreign borders are Togo and La Cote D'Ivoire located on its East and West respectively while the local borders are the Brong Ahafo and the Volta Regions to the south, the Upper West and the Upper East regions to the north.

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Figure 1.2 Map of the northern region highlighting Tamale metropolis

Source: 2005 Annual report, GHS Northern regional directorate

The 2010 population and housing census gives the northern regional population as 2,468,557 (10.2% of population share) with males and females constituting 1,210,702 and 1,257,855 respectively. The Northern region recorded the largest increase in growth rate of 36 percent within the 10 year period and has a current population density of 35 per Square Kilometer (GSS, 2012).

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3.3 Study Variables

Association between various suspected risk factors for developing obstetric fistula as well as risk factors identified in literature for other geographical areas were explored to determine the level of association and also to establish if indeed these factors play a role in the Tamale metropolis. The dependent variable was the development of obstetric fistula. The independent variables explored in this study included the following:

1. Use of herbal concoction with suspected uterotonic activity (kaligotim)
2. Antenatal clinic attendance
3. Place of delivery (home versus institutional delivery)
4. Parity
5. Age (Age at marriage, current age and age at first delivery)
6. Educational status
7. Height
8. Smoking habits
9. Alcohol use
10. Contraceptive use (hormonal contraceptive use, any form of contraceptive use)
11. Geographical access to health care
12. Religion
13. Occupation
14. Social class/ poverty/ economic status then
15. Gainful or lack of gainful employment

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16. Place of residence (rural or urban)
17. Medical condition in pregnancy (diabetes mellitus, others)
18. Mode of delivery and outcome (previous pregnancies, latest pregnancy)
19. Duration of labour (at home, in health facility)
20. Marital status
21. NHIS status
22. Distance to hospital with capabilities of caesarean section
23. Fare (public transportation charges) from residence to nearest hospital with capabilities of emergency caesarean section

3.4 Study Population

The source population for this research was women seeking care in the Tamale metropolis. The study population in this study included all women who have delivered and are seeking care at the fistula center in Tamale and matched controls seeking care in the Tamale Teaching hospital. Women with fistula from the three northern regions and the Upper Volta, seek care for fistula in the Tamale metropolis. The Tamale Fistula Center is located within the premises of the Tamale Central Hospital.

3.4.1 Eligibility criteria

Eligibility criteria for the cases in the case control study were as follows; the woman must be diagnosed as having obstetric fistula after a standard examination by a specialist/ consultant obstetrician gynecologist. A fistula patient is eligible as a case if the fistula resulted from a baby delivery event. However, fistula patients that have gone through previous fistula repair were excluded from the research. The eligibility criteria for the controls were as follows; controls were women who have delivered

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safely in Ghana and without obstetric fistula. Eligible controls must have delivered within the region and district of the respective case.

3.4.2 Matching in the case control studies

Cases and controls were matched on the following parameters; Firstly, Cases and controls must deliver in the same year or within a year's interval. This was done to control for infrastructural and socioeconomic development with time that may confound the relationship. Secondly, cases and controls were matched on the region and district of last delivery in Ghana. The region and district of delivery is being considered here for matching because of the assumption that people from the same geographical area may think alike and act alike and are usually likely to have the same taboos and socio-cultural practices. Also, matching on region and district of delivery would control for socio-economic factors in the environment that are likely to confound the relationships.

3.5 Sampling

3.5.1 Sample size

All fistula patients admitted into the Tamale fistula center during the period of the study were admitted into the study after satisfying the eligibility criteria. In all 51 cases were admitted in to the study. It was anticipated that a ratio of one case to two controls would give a good balance between meeting the time constrains and yet increasing the power of the study. 100 controls were obtained after careful matching based on the matching criteria. It was not possible to obtain a second control for two of the cases that were from the Volta region. Hence the total number of study participants in this study was 151.

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3.5.2 Sampling method

There are significant stigmatization and psychosocial problems associated with obstetric fistula that makes it difficult to recruit fistula patients for study (Roush et al., 2012, Roush, 2009, Bangser, 2006, Bangser et al., 2011, Ahmed et al., 2007, Ahmed and Holtz, 2007, Turan et al., 2007). All obstetric fistula cases admitted at the Tamale fistula center were eligible to take part in the study. The controls were however carefully selected following the research protocols so as to minimize bias. The investigator maintained a list of all cases specifying the criteria that must be fulfilled by a potential control to satisfy as a match for the case. In the instance where more than two controls match the case, the name of each eligible control that satisfy all the matching criteria (matched on year and district of index delivery) for a particular case was written on a plain white paper cut into the size of five centimeter by five centimeter. These papers were folded into two folding so as to obtain a quarter of the original size with the writing concealed in the folding. The writing on these papers is "yes" or "no". All the folded papers were pooled together and thoroughly mixed. A ballot without replacement was carried out to identify the controls that would be admitted into the study for that particular case. Potential controls that picked yes in the ballot were admitted into the study. There were instances that only one control satisfied the matching criteria at the time of search; in this case, the control was admitted into the study.

3.6 Data collection methods and tools

Data collection for the cases started on 15th of May, 2013 while that of the controls started on the 22nd of May 2013. All the data was collected by the principal investigator with the help of trained research assistant. In instances of language barrier, the help of interpreters were accessed. The data collection technique that was used in

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this research was an interview. The research team fills the questionnaire based on the response of the study participants. Height measurements were taken using a tape measure affixed to a wall for all study participants. Study participants were asked to remove footwear and stand upright with feet together and arms by the side. Participant then stood with upper back against the wall. A ruler was place horizontally on the head of the patient so as to mark the height on the tape measure fastened to the wall. The height was read in centimeters.

3.7 Quality control Measures

To ensure the maximum quality of data and minimize bias as much as possible, the following quality control mechanisms were ensured. Questionnaires were pre-tested in Tamale central hospital and all necessary revisions and corrections made. Training in data collection and ethics was organized for the research assistants. Some issues emphasized include the need to be objective in an interview, ethics in human subject research, and quality control measures in data recording. The research work was supervised by a supervisor. Questionnaires were checked for completeness before each study participant leaves. About 5% of the administered questionnaires were sampled and rechecked by the PI. Besides this manual checks, the questionnaire were also checked during data entry. Double entry of the data was carried out using Epidata 3.1 and validation carried out. Instances with inconsistent data were re-checked by pulling out the particular data capture form and the necessary corrections made.

3.7.1 Anticipated sources of bias and techniques used to minimize

These steps were taken to minimize and in some instances avoid all forms of systematic error in the design, conduct and analysis of the study which is likely to result in mistaken estimate of the measure of association between dependent and the

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independent variables. To avoid selection bias, all fistula patients admitted to the fistula center having satisfied the eligibility criteria were admitted into the study. Selection of controls was carried out in strict adherence to the research protocol.

Information bias was minimized by ensuring that respondents were not primed with leading questions. Enough time was allocated for interview to minimize recall bias. Maximum privacy was given to respondents during interview to ensure that they were able to express themselves freely without holding any relevant information.

3.8 Data processing and Analysis

The data generated in the research were entered into Epidata 3.1 and exported into STATA/MP 11.0 (copyright 2004-2009) for analysis. The data was cleaned, and consistency checks carried out. Recoding was carried out. The primary outcome in the study is development of obstetric fistula. All study participants with complete data and responses on the questionnaire were included in the analysis. The background characteristics of the respondents was obtained by cross tabulating variables age groups, marital status then and now, educational background, religion, rural or urban residence, occupational status then and now. Logistic regression was used to analyze the risk factors for development of obstetric fistula. First, the association between each of the potential risk factor and the development of obstetric fistula was examined ignoring other variables. This analysis was important because it gave a fair idea as to which of the variables are strong predictors of obstetric fistula. Second to construct a model with risk factors that is independently associated with obstetric fistula, each of the independent variable was a candidate provided that the p-value was 0.1 or less. To investigate whether the relationship between obstetric fistula and a continuous covariate was non-linear, likelihood ratio test was used to compare the fit of the

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models when the continuous covariate was included as continuous or a categorical variable. Age and height was also considered as categorical variable by categorizing age as; less than 18 years, 19-25 years, 26 – 32 years and above 33 years. Height likewise was categorized as less than 150 centimeters, 151-155 centimeters, 156-160 centimeters, 161-165 centimeters, 166-170 centimeters and above 170 centimeters.

In checking for confounding, first, the association between the potential confounder and the outcome variable was assessed as well as the degree of association between the potential confounder and the primary exposure variable (which is total duration of labour) was explored. If the potential confounder satisfies the criteria of being related to both the exposure and the outcome variable, then likelihood ratio test was used to assess the exposure outcome relationship seen in the strata of the confounding variable to find out if it is in the same magnitude and direction as that seen in the crude analysis. Finally, likelihood ratio was used to assess if the exposure outcome relationship seen in the crude analysis is similar in magnitude and direction as that seen when potential confounder has been adjusted for in the analysis. If it differs by 10%, then the potential confounder was considered a confounder.

The significant risk factors found in the analysis were profiled to give a risk profile. This profile afforded classification of immediate post-partum women into highest risk for obstetric fistula, moderate risk for obstetric fistula and lowest risk for obstetric fistula based on the independent risk factors for obstetric fistula present in the post-partum woman. Sensitivity and specificity were calculated using the formulae true positives/ true positives + false negatives, and true negative/ true negative + false positives expressed as a percentage respectively. Results were also presented using

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appropriate charts and tables. Epimap 8 was used to display a case cluster of the distribution of obstetric fistula by district of index delivery.

3.9 Ethical considerations/ Issues

Approval was obtained from the ethical review committee of the Ghana Health Service, Research and Development division, Accra. Approval was also obtained from the Fistula Center in Tamale and the Tamale Teaching hospital.

There were no potential risks or benefits directly to study participants. However, the benefits of the research if findings are implemented would be harnessed by participants as well as all women during delivery. Consenting by study participants aged 18 years and above was by informed consent after fully explaining the aims, objectives and requirements of the study to the patients. Accent by participants less than 18 years and consent from caretakers were obtained for study participants less than 18 years. Consent was voluntary and each study participant had the right to withdraw at any stage of the study process. Uttermost privacy and confidentiality were maintained. No compensation or payments were made to any study participants. Data files were password protected. Hard copy and electronic data were stored in locked file cabinets, and access was limited to the PI. Each interview lasted not more than fifteen minutes. The PI had no conflict of interest in this study. This study was funded solely by the PI, with supervision and technical support from the School Of Public Health, College of Health Sciences, University of Ghana.

3.10 Pre-test of research tools

The questionnaires used in the study were pre-tested in the Tamale Central Hospital. Ten questionnaires were used in the pretest and the questions that appeared ambiguous were re-framed. The fare or public transportation charges from participants home to

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the nearest hospital with capability of caesarean section was added to the questions to supplement answers being obtained for the question; what is the distance in miles that you have to travel to the nearest hospital with capabilities for caesarean section. This was necessary because of the difficulty of estimating the distance by participants. The transportation charge was fairly known. The pre-test was carried out by the PI conducting this research and the research assistant. Also most of the open ended questions were closed after the pre-test.

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CHAPTER FOUR

4.0 RESULTS

4.1 Background characteristics of cases and controls

A total of 151 participants were included in this matched case control study. This was made up of 51 cases and 100 controls. A one case to two controls was the target. At the end of the data collection, it was not possible to get a second control for two of the cases because of the matching criteria. Cases and controls were matched on year of delivery of index child and the region and district of birth of the index child. All cases and controls were seeking care in the Tamale metropolis at the time of the study.

Age at index delivery less than 20 years, height 150cm and below, total duration of labour (combined duration of labour at home and hospital), lack of formal education, outcome of delivery (life baby or still birth) reported high odds ratio in the univariate univariable conditional logistic regression. Deliveries at home, use of "kaligotim", medical disease in pregnancy were found to be protective in the unadjusted analysis. Smoking status was dropped from the analysis because proportion of women with smoking history was insignificant (1.3% of all respondents).

Likelihood ratio test for the determination of independent risk factors for obstetric fistula proved the following variables to be possible risk factors for obstetric fistula: height, index age at delivery, mode of delivery (operative delivery versus spontaneous vaginal delivery), total labour duration in hours, educational status, residential type (urban versus rural) and available mode of transport to hospital in case in case of emergency.

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Table 4.1: Comparison of characteristics of Cases and Controls

Participants characteristics	Controls N	(%)	Cases N	(%)	Unadjusted Matched* Odds Ratio (95% CI)+	
Number of participants	100		51			
Characteristics at index birth						
Parity						
Multiparous	82	(82.0)	34	(66.7)		
Primiparous	18	(18.0)	17	(33.3)	2.48	(1.06 - 5.81)
Age at first delivery in years						
20 and above	65	(65.0)	24	47.1)		
Less than 20	35	(35.0)	27	(52.9)	2.05	(1.02 – 4.14)
Age at index delivery in years						
20 and above	96	(96.0)	36	(70.6)		
Less than 20	4	(4.0)	15	(29.4)	13.09	(2.97 - 57.69)
Area of residence						
Urban	52	(52.0)	9	(17.6)		
Rural	48	(48.0)	42	(82.4)	5.47	(2.22 - 13.46)
Height in centimeters						
Above 150	96	(96.0)	27	(52.9)		
150 and below	4	(4.0)	24	(47.1)	11.77	(4.08 – 33.94)
Religion						
Christian	44	(44.0)	33	(64.7)		
Islam	50	(50.0)	17	(33.3)	0.49	(0.24 - 0.99)
Traditional	6	(6.0)	1	(2.0)	0.25	(0.03 – 2.33)
Employment status						
Employed	65	(65.0)	10	(19.6)		
Non-employed	35	(35.0)	41	(80.4)	13.20	(2.98 – 43.76)
Educational status						
Formal education	54	(54.0)	3	(5.9)		
No formal education	46	(46.0)	48	(94.1)	13.9	(4.21 – 45.88)
Health insurance status						
National Health Insurance client	82	(82.0)	23	(45.1)		
Cash and Carry	18	(18.0)	28	(54.9)	5.28	(2.36 – 11.78)
Marital status						
Married	87	(87.0)	36	(70.6)		
Single/Cohabiting/divorced	13	(13.0)	15	(29.4)	2.55	(1.23 – 5.76)
Distance in miles to nearest hospital with capabilities for caesarean section (C/S)						
0 to 10	85	(85.0)	21	(41.2)		
11 to 20	7	(7.0)	10	(19.6)	10.84	(2.63 – 44.74)
21 and above	8	(8.0)	20	(39.2)	11.77	(3.78 – 36.56)
Public transport fare in GH. Cedi from home to nearest hospital with capabilities for C/S						
Less than 1	42	(42.0)	14	(27.5)		
1 to 2	51	(51.0)	25	(49.0)	1.45	(0.68 – 3.10)
More than 2	7	(7.0)	12	(23.5)	4.34	(1.50 – 12.50)
Available means of transport to hospital in case of emergency						
Car/ Ambulance	90	(90.0)	33	(64.7)		
Bicycle/tricycle/motorcycle	9	(9.0)	13	(25.5)	3.88	(1.43 – 10.48)
Walking	1	(1.0)	5	(9.8)	14.29	(1.57 – 130.1)

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Place of delivery						
Hospital	55	(55.0)	40	(78.4)		
Home/ TBA	45	(45.0)	11	(21.6)	0.24	(0.08 – 0.64)
Antenatal Clinic attendance status						
Attended	83	(83.0)	43	(84.3)		
Did not attend	17	(17.0)	8	(15.7)	0.88	(0.33 – 2.35)
Diagnosed of disease/complications in pregnancy						
Not diagnosed	66	(79.5)	44	(97.8)		
Diagnosed	17	(20.5)	1	(2.2)	0.08	(0.01 – 0.65)
Drinking of *kaligotim*** in Pregnancy						
No *Kaligotim*	64	(64.0)	39	(76.5)		
Drunk *Kaligotim*	36	(36.0)	12	(23.5)	0.54	(0.25 – 1.17)
Total duration of labor in hours						
Up to 12 hours	46	(46.0)	5	(9.8)		
13 to 24 hours	37	(37.0)	9	(17.7)	1.53	(0.45 – 5.19)
25 to 48 hours	11	(11.0)	16	(31.4)	9.40	(2.40 - 36.6)
49 to 72 hours	4	(4.0)	12	(23.5)	10.9	(2.61 – 44.6)
More than 72 hours	2	(2.0)	9	(17.7)	10.0	(1.98 – 50.5)
Delivery Mode						
Spontaneous vagina delivery	87	(87.0)	18	(35.3)		
Operational delivery	13	(13.0)	33	(64.7)	9.19	(3.82 – 22.12)
Delivery outcome						
Baby born alive	85	(85.0)	8	(15.7)		
Still birth	15	(15.0)	43	(84.3)	32.9	(7.92 – 136.7)
Sex of Baby						
Male	59	(59.0)	34	(66.7)		
Female	41	(41.0)	17	(33.3)	0.66	(0.31 – 1.42)
Baby weight						
Baby weighs less than 4kg	81	(81.0)	29	(56.9)		
Baby weighs 4kg and above	19	(19.0)	22	(43.1)	3.23	(1.4 – 6.98)
Other factors prior to index pregnancy						
History of modern family planning method						
Never used family planning	74	(74.0)	47	(92.2)		
Used family planning	26	(26.0)	4	(7.8)	0.25	(0.08 – 0.76)
Self-Ranked Economic Status						
Rich/average	62	(62.0)	16	(31.4)		
Poor / extremely poor	38	(38.0)	35	(68.3)	4.12	(1.83 – 9.29)

* Matched Matched on region, district and year of birth
** *Kaligotim* Herbal concoction with suspected uterotonic activity
+ (95% CI) 95% confidence interval

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Other factors include self-rated economic status, parity, marital status, distance to nearest hospital with capabilities for caesarian section and health insurance status. Some factors showed association in the univariable analysis but were however found not to be independent risk factors for obstetric fistula in a likelihood ratio test (likelihood p-value > 0.1). These factors include baby sex, baby weight, contraceptive use, alcohol consumption, smoking history, religious status, previous employment status, age at first delivery, ante-natal clinic attendance, maternal disease in pregnancy and use of *kaligotim* in pregnancy.

Place of index delivery was initially found to be a risk factor (LR p-value < 0.05) but after adjusting for delivery mode, it became insignificant (LR p-value > 0.3). Also, parity was initially found to be associated with obstetric fistula where primiparous women were found to be of higher risk (MOR = 2.48, 95% CI =1.06 - 5.81) however adjusting for age at index pregnancy, parity became insignificant (LR p-value > 0.5).

Adjusting for duration for total duration of labour, age and mode of delivery, the odds of obstetric fistula in women of height 150centimeters and below is about 18 times that of women with height above 150 centimeters (p-value < 0.0001). Educational status, distance of woman from the nearest hospital with capability of emergency caesarean section, self-rated economic status and having health insurance were identified as confounders in the relationship between total labour duration in hours and the risk of obstetric fistula. However, the above confounders could not be included in the final adjusted analysis due to small sample size and their inclusion which makes the standard deviations highly unstable with large odds ratio and in some instances no confidence interval.

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Table 4.2: Multivariable conditional logistic regression of independent risk factors for obstetric fistula (Likelihood ratio p-value < 0.0001)

Risk factors	Adjusted MOR*	(95% CI)
Total labour duration more than 24 hours	5.43	(1.63 – 18.11)
Height of 150 centimeters and below	18.71	(2.60 – 134.76)
Age at index delivery less than 20 years (teen mother)	12.70	(1.39 – 115.95)
Mode of delivery by Caesarean section	4.88	(1.46 – 16.31)

MOR* Matched odds ratio
95% CI 95% confidence interval

Table 4.3: illustrating interaction between age and height on obstetric fistula development (Likelihood ratio of no effect p-value > 0.8)

Variables	MOR*	95% CI**
Age at index delivery less than 20 years	29.01	3.78 – 223.77
Height 150 centimeters and below	19.97	4.52 – 88.29
Age less than 20 years and height 150cm and below	581.17	26.35 – 12819.83

* Matched odds ratio
** 95% confidence interval

4.2 Factors related to descriptive epidemiology of obstetric fistula patients

98.1% of all fistula cases presenting at the Tamale fistula center are of obstetric origin. Of this, 98.04% are of the vesicovagina fistula type with about 1.96% being both vesico-vagina and rectovagina fistula type.

4.2.1 Factors related to place

Majority of women with fistula seeking care in the Tamale metropolis had the fistula occurring in the Northern region (82.4%). This was followed with the northern part of Volta region (9.8%), the upper east region (5.9%) and Ashanti region (1.96%). Figure 4.1 is a case cluster map displaying the geographic distribution of districts within which the fistula cases occurred. Fistula patients were more likely to be resident in rural part of their districts (OR=5.47, 95%CI=2.22 - 13.46).

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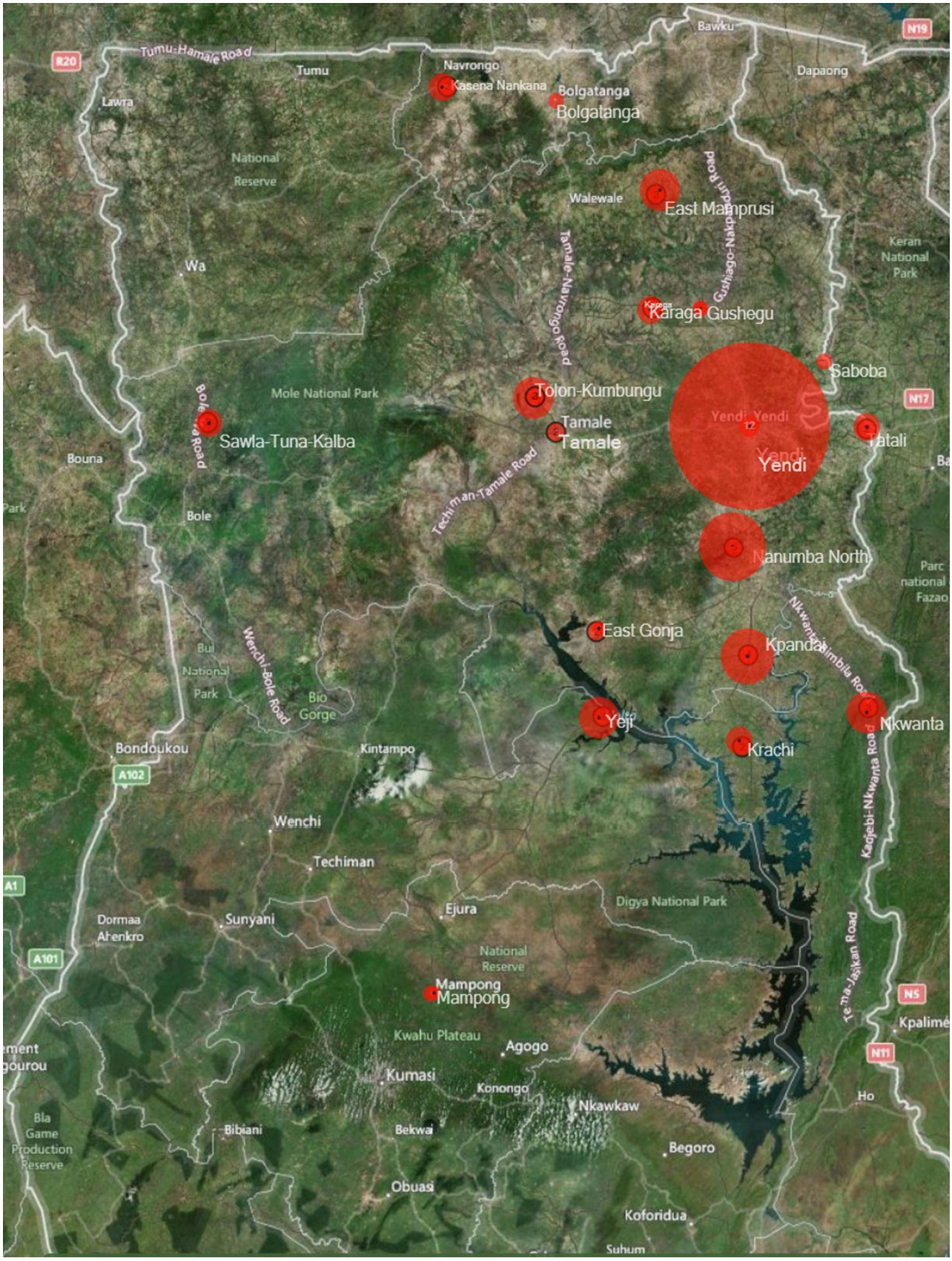

Figure 4.1: Case cluster of the distribution of obstetric fistula cases by district of index delivery

Source: EPIMAPS, MPH student's field work

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Fistula patients were more likely to be staying further away from the nearest hospital with capabilities for caesarean section compared to women without fistula (mean difference of 12.8 miles, p-value < 0.0001) and hence more likely to pay higher public transport fare to access care compared to controls (mean difference = 0.78 GH cedi, p-value < 0.0005). Also, fistula patients live in places where the available means of transport to the nearest hospital in time of emergency is most likely to be by motorcycle/tricycle/bicycle or walking (OR= 4.8, 95%CI =1.9 – 12.3). Fistula patients were more likely to have delivered in a hospital (home /TBA delivery appear to be protective OR =0.24, 95% CI=0.08 – 0.64)

4.2.2 Factors related to person

The current median age of fistula patients seeking care in the Tamale metropolis is 30 years (interquartile range=8 years). Fistula patients were more likely to have obtained the fistula at an age less than 20 years, MOR = 5.47 (p-value < 0.0001). Fistula patient seeking care have carried the fistula for a median 4 years (interquartile range= 6years) ranging from 3months to 19 years. Fistula patients have a greater odds of being primiparous (OR=2.48, 95%CI=1.06 - 5.81). Fistula patients were relatively shorter and were more likely to be of height less than 150cm (OR=11.77, 95% CI=4.08 – 33.94). They were less likely to be Muslims (OR= 0.49, 95% CI = 0.24 - 0.99), unemployed (OR = 13.2, 95% CI = 2.98 – 43.76). Also, they have more odds of no formal education (OR =13.9, 95% CI =4.21 – 45.88). Also fistula patients have higher odds of being without national health insurance (OR = 5.28, 95% CI =2.36 – 11.78), and currently single or cohabiting (OR=2.25, 95% CI =1.23 – 5.76).

Fistula patients were more likely to have attended ante-natal clinic (OR= 0.88, 95%CI= 0.33 – 2.35), were less likely to be diagnosed of any medical disease/ complication of pregnancy during all trimesters of the pregnancy (diagnoses of

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medical condition in pregnancy is protective, OR=0.08, 95%CI=0.01 – 0.65) and were less likely to have used herbal concoctions with suspected uterotonic activity (kaligotim) during the pregnancy or labour period (OR=0.54, 95% CI=0.25 – 1.17)

Fistula patients were more likely to have delivered by operative delivery (caesarean section, instrumental delivery) when compared to controls. (OR=9.19, 95%CI=3.82 – 22.12). In most cases, the outcome of the index delivery is still birth (OR=32.9, 95% CI=7.92 – 136.7). Finally, fistula patients were less likely to have used a modern family planning method and more likely to rate themselves poor or extremely poor in a self-ranked economic status rating (OR=4.12, 95% CI =1.83 – 9.29).

4.2.3 Factors related to time

Fistula patients were more likely to have laboured longer hours compared to controls. Mean difference between total duration of labour in hours is 27.6 hours (95% CI 20.6-34.6hours). They were also more likely to have spent more hours at home before getting to the hospital (mean difference=9.2 hours, 95% CI=4.5-13.9 hours).

Time interval from delivery to onset of fistula ranges from one day to sixty days. The median however is 2 days (interquartile range=8 days). They have kept the fistula for a median five month (interquartile range= 23 months) before reporting it to a health-worker. From time of onset to time of surgery, fistula patients have suffered fistula for an average 5.17 years (SD 4.3 years).

4.3 Causes of obstetric fistula from women perspective

Sixty-one percent of controls have never heard or seen an obstetric fistula patient and were not in the position to tell what the causes are. Of the controls that have some ideas about obstetric fistula, 66.7% think God or the gods are responsible for the fistula. The fistula patients however think otherwise. Majority of fistula patients blame

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lack of health facilities as the main cause of obstetric fistula (52.9%). Health workers related errors ranked 3rd among both fistula and control women. Overall test of significance shows that, there exist significant difference between the perception of fistula patients and controls with regard to the causes of cases (Pearson chi square 35, p-value < 0.05).

Table 4.4: Multiple response analysis of what women perceive as cause of obstetric fistula

		Proportions and percentages of		
Rank	**Perceived cause**	**Controls**	**Cases**	**combined**
1	God/ gods	22 (66.7)	26 (51.0)	48 (57.1)
2	Lack of health facilities	18 (54.6)	27 (52.9)	45 (53.6)
3	Health worker related errors	18 (54.6)	22 (43.1)	40 (47.6)
4	Poverty	11 (33.3)	12 (23.5)	23 (27.4)
5	Big Baby	10 (30.3)	11 (21.6)	21 (25.0)
6	Spiritual problem	9 (27.3)	7 (13.7)	16 (19.1)
7	Work of enemies	8 (24.2)	7 (13.7)	15 (17,9)
8	Curses/ punishment	6 (18.2)	4 (7.8)	10 (11.9)
9	Kaligotim intake	5 (15.2)	2 (3.9)	7 (8.3)

4.4 Some impact of fistula

Among women married prior to the index child, there is higher incidence of divorce among cases compared to that of controls. Divorce rate among cases over the period is 36.1% while that among the controls is 2.4%. Among fistula patients who were cohabiting prior to index child, all were currently separated. While employment status remained unchanged over the period among controls, it rather improved among cases as there was a 15% reduction in unemployment rate and a commensurate increase in self-employment among cases. Alcohol consumption had increased among cases compared to that of controls such that fistula women were more likely to be currently using alcoholic drinks compared to controls (OR=5.3, 95% CI= 1.4 – 19.7). 37.3% of women with fistula tried alternative treatment for their condition before going to the

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hospital. Of this number, 65% visited spiritual churches and prayer camps, 30% visited the herbalist and tried various concoctions and 5% visited the traditionalist for rituals.

4.5 Predicting Obstetric fistula

Some factors were identified as major factors for predicting Obstetric fistula and hereby referred to as major criteria. The presence of each of these factors was each scored two and zero otherwise. These three major factors were; total labour duration more than 24 hours, age less than 20 years and height 150 cm and below. The minor factors identified in this study were each scored one when present and zero otherwise. These four factors were referred to as minor criteria; still birth, residency in a rural area, lack of formal education and operative delivery mode at index pregnancy.

The sum of all major and minor factors produced the Obstetric fistula forecast score (OFFSCORE). The maximum OFFSCORE is ten and the minimum is zero.

Table 4.5: Major and Minor criteria of proposed OFFSCORE (obstetric fistula forecast score)

Criteria at index pregnancy	Score
Major criteria	
Age less than 20 years	2
Height 150 centimeters and below	2
Total duration of labour more than 24 hours	2
Minor Criteria	
Delivery by caesarean section	1
Lack of formal education	1
Residency in a rural area	1
Still birth	1
Maximum OFFSCORE	**10**

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CHAPTER FIVE

DISCUSSION

5.1 Risk factors for Obstetric fistula

Findings in this study completely agree with the literatures that, majority of women who suffer obstetric fistula are young and illiterate (Capes et al., 2011, Muleta, 1997, Muleta et al., 2010, Muleta, 2004, Miller et al., 2005). Young age, particularly age less than 20 years was significantly associated with obstetric fistula in this study (adjusted matched Odds ratio of 12.7). Other studies report a bi-modal age distribution of obstetric fistula with peaks at teenage and age within the third decade of life (Wall, 2006). This bi-modal pattern was not immediately obvious in this study, rather what could be described as a tri-modal distribution with peaks at ages 19, 25 and 29 years.

Fistula patients were relatively shorter and were more likely to be of height less than 150cm (OR=11.77, 95% CI=4.08 – 33.94). This also agrees with the study among women in Ethiopia which found the mean height of fistula patients to be 149 cm (SD=8Cm) (Muleta, 2004). In this study however, the mean height of fistula patients was 152.4 Cm (SD= 5.2Cm).

One unique characteristic of obstetric fistula in this study contrary to other works outside Ghana is the strong association of Obstetric fistula with skilled attendant at delivery. Key factors in published work done outside Ghana seem to be conclusive on the fact that, OF patients were more likely to have delivered at home with unskilled attendant at birth. This was not the case in the Northern sector of Ghana where OF patient were more likely to have delivered in a hospital (home /TBA delivery appear to be protective OR =0.24, 95% CI=0.08 – 0.64). Also OF patients were more likely to have delivered the index child through caesarean section. (Adjusted matched odds

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ratio 4.88, 95% CI - 1.46 – 16.31). Because of the distance to the nearest hospital and challenges in obtaining means of transport to the nearest hospital, most pregnant women would normally deliver at home/ TBA with the difficult obstructed labour cases transferred to the hospital. This gave the initial impression that delivery at home or TBA's place is protective compared to hospital delivery. However adjusting for mode of delivery, place of delivery (home versus hospital place of delivery) became insignificant. Mode of delivery remains significant after adjusting for all other variables depicting higher odds of Obstetric fistula among women delivered by caesarean section compared to those delivered by spontaneous vaginal delivery. It is not clear the caliber of doctors performing these caesarean sections, further studies in this area can make this clear. However it is most likely injury occurring in surgery contributed to the formation of fistula among the study participant.

Total labour for more than 24 hours was significantly associated with development of Obstetric fistula in this study. This agrees with other works that attributed labour more than 24 hours with significantly increased incidence of obstetric fistula (Tebeu et al., 2009). A systematic review reported average duration of labour at home to range from 2.5 to 4 days (Creanga and Genadry, 2007). In this study however, duration of labour at home ranges from 1 hour to 72 hours and the mean difference between hours of labour at home among cases and controls was 9.2 hours (95% CI=4.5-13.9 hours). Fistula patients laboured on the average, nine hours more at home before going to hospital or achieving home delivery compared to controls. The increased total duration of labour among fistula patients compared to controls can partly be explained by obstructed labour (OL). OL is associated with hypoxic tissues that require delicate handling during surgery as well as considerably high surgical experience to successfully handle the tissues during surgery. This could explain why there is an

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observed increased association of obstetric fistula with caesarean section even after adjusting for total duration of labour.

Some factors are known to directly contribute to increase total duration of labour. The three delays: delay in decision making, delay in getting to the hospital, delay in the hospital all play a part in the increased total duration of labour. Health seeking behavior is a known factor that influences the decision making process that result in delays at home before getting to the hospital. Rural residency, distance from the nearest hospital with capabilities for caesarean section, high transport fare more than 2 GHC (1Dollar) from home to the nearest hospital with capabilities for caesarean section as well as lack of ambulance or car in case of emergency were found in this study to be significantly associated with increased duration of total labour in hours. Also lack of any formal education, poor or extremely poor self-ranked economic status was also associated with increase duration of labour at home.

Fistula patients were more likely to be resident in rural part of their districts (OR=5.47, 95%CI=2.22 - 13.46). Residency in rural areas where there is lack of good access roads and health facilities contribute to the delays in getting to the hospital. This factor is not peculiar to this study group. Research done elsewhere has demonstrated that fistula patients were more likely to be resident in remote areas prior to the development of Fistula (Capes et al., 2011, Muleta, 1997, Muleta et al., 2010, Muleta, 2004, Miller et al., 2005).

With regards to the economic status of fistula patients, the finding in this research agrees with the literature that women who suffer obstetric fistula are poor. For example, a study reported that, 62% of fistula patients owned nothing valuable (Muleta, 2004). In this study, obstetric fistula patients were more likely to rank their

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economic status on a 5-point- likert scale as poor or extremely poor. Admittedly, there are difficulties in deciding what is valuable by a researcher. Using a self-rated economic status is likewise not devoid of these challenges. What is valuable to one person may not be valuable to another because of socio-cultural differences.

Another factor associated with obstetric fistula which was not disputed by this study is the high rate of illiteracy (Muleta, 2006, Muleta et al., 2007, Ijaiya and Aboyeji, 2004, Donnay and Weil, 2004, Kalilani-Phiri et al., 2010, Ndiaye et al., 2009). High illiteracy has been associated with obstetric fistula and is believed to correlate well with low social role as well as low socio-economic power which complexly influence delay at seeking care. In this study, OF patients had higher odds of no formal education (OR =13.9, 95% CI =4.21 – 45.88).

A study conducted by Tebeu et al in 2009 found out that 50% of women reported that they had received no antenatal care. We found contrary to the above, findings suggesting that, antenatal clinic attendance is protective against obstetric fistula. OF patients in this study were more likely to have attended antenatal clinic compared to controls (OR= 0.88, 95%CI= 0.33 – 2.35).

Age less than 20 years is associated with about 29 times the odds of developing obstetric fistula. Height less than 150 centimeters is also associated with about 20 times the odds of developing obstetric fistula when compared to controls. However, having both characteristics (age less than 20 years and height less than 150 centimeters) is associated with 581 times the odds of obstetric fistula compared to controls.

There were some limitations inherent in some of the variables on which data was collected. Measures were taken to reduce their effects. First, distance from the nearest

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hospital was based on estimates and could not be precise. However, a proxy to distance considered in this study was the transport fare from participant's residence to the nearest hospital with capabilities for caesarean section. Even though distance and the transport fare described above correlated well with each other, the transport fare when used in the analysis resulted in insignificant p-values. Second, National Health Insurance (NHI) status with regards to pregnant women is of limited information because of Ghana's free maternal health policy which means all pregnant women without health insurance can access care for free. Hence data on the NHI status were not considered in the final analysis.

5.2 Predicting obstetric fistula

One immediate application of this study would be in correctly predicting which immediate post-partum women would develop obstetric fistula and instituting measures to prevent it. No such predictive model exists in this part of the world. Based on this study and the literature, certain factors were consistently associated with obstetric fistula and had high odds ratios.

Setting the cutoff point for identifying high risk for OF and subsequent intervention to prevent OF was based on certain consideration. First the penalty for missing OF is relatively high. Even though OF is not immediately fatal or contagious, it is associated with high level of maternal morbidity and intense psychosocial plight that is difficult to heal even after corrective surgery for obstetric fistula. There is currently no gold standard test for predicting OF. The suggested intervention for preventing Obstetric fistula among high risk group is also not devoid of complications. It is therefore necessary that this predictive test should have a good balance of high sensitivity and specificity.

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Setting a cutoff point at OFFSCORE 4 seem to have most desired balance of high sensitivity and specificity. Cutoff at OFFSCORE 3 would give a sensitivity of 100% and a specificity of 78%. This would pick all potential fistula patients but would be associated with about 22% false positive which is relatively high for a non-fatal and non-contagious condition. A cut off OFFSCORE of five is associated with a sensitivity of 80.4% and a specificity of 94.0%. This means the screening tool would miss two out of 10 which is not desirable. Setting the OFFSCORE cut off at four is associated with a sensitivity of 90.2% and a specificity of 86.0% which is a good balance. In this study, using the OFFSCORE 4 is associated with a positive predictive value of 76.7% and a negative predictive value of 94.5% among the study participants.

The OFFSCORE cutoff point of four was used in the classification of immediate post-partum women as high, moderate and zero risk for obstetric fistula. OFFSCORE of four and above was classified as high risk for OF. OFFSCORE in the range of one to three was classified as moderate risk for obstetric fistula. There is little to zero risk of obstetric fistula if OFFSCORE is zero.

5.3 Preventing Obstetric fistula

Obstetric fistula is best prevented by improving the maternal healthcare in developing countries. WHO standard guidelines ranked obstetric fistula as a single most important visible indicator of the enormous gap in maternal healthcare between the developed and the poor resource countries (WHO, 2006). While we find ways to accelerate the slow paced gap-bridging between maternal care in the developed and the poor resource countries, it is recommended that, identified high risk for obstetric fistula women (OFFSCORE above 3) are put on prophylactic urethral catheterization for about two to three weeks. It is known that early diagnosis (before epithelialization of the fistula) and management with urethral catheter alone for three weeks is associated with significant

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cure rate for the simple fistulas of size within 1cm. It is in this respect that, two to three weeks prophylactic urethral catheterization is recommended for high risk for fistula post-partum women. The discretion of the attending medical practitioner is required for moderate risk for fistula immediate post-partum women, however zero risk for OF women generally do not require prophylactic urethral catheterization.

Time interval from delivery to onset of fistula among OF women ranges from one day to sixty days with a median of 2 days (interquartile range=8 days). It therefore calls for immediate intervention within few hours post-partum, for post-partum women classified as high risk for fistula women. It is anticipated that early intervention would be associated with higher success rate.

5.4 Causes of Obstetric fistula from women perspective

There was paucity of knowledge of women about obstetric fistula. 60% of controls have no knowledge about the causes of obstetric fistula. This suggests that about 60% of women who develop fistula have no idea what the causes are. Among those who claim to have knowledge about the causes, most of the answers were not adequate. Even among fistula women, the leading ascribed cause of Obstetric fistula is God/ gods. Even though some studies have reported adequate knowledge of women about the causes of obstetric fistula (Muleta, 2004; Bangser, 2006), this study agrees with studies citing lack of adequate knowledge of women on causes of Obstetric fistula (Tebeu et al., 2008).

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CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study identified three major criteria for obstetric fistula; age below 20 years, total labour duration more than 24 hours and height 150 cm and below. It further identified four minor factors which are still birth, operative delivery, residence in a rural area and lack of formal education. An OFFSCORE of four and above puts immediate post-partum woman into high risk for obstetric fistula. A total OFFSCORE of four and above has a sensitivity of 90.2% and a specificity of 86.0% for predicting obstetric fistula. There was an unacceptably high odd of obstetric fistula among women being delivered by caesarean section. Kaligotim was observed not to be associated with increased odd of developing OF. Its usage rather associated with shorter duration of total labour. Across both study groups, there was lack of adequate knowledge about obstetric fistula. About 60% of women who develop fistula have no idea what caused the obstetric fistula. The leading ascribed cause of Obstetric fistula among women in both study groups is God/ gods.

6.2 Recommendation

This study recommends that, healthcare workers attending to delivery should carry out immediate prophylactic urethral catheterization for high risk for obstetric fistula post-partum women. Whenever possible, caesarean sections on women crossing the OFFSCORE cutoff point of four prior to delivery should be attended by the senior-most doctor in the team. By way of further research, there is the need for a large study in to the risk factors for obstetric fistula. A larger study would be more informative as it will take response from whole of Ghana which would make available a national

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figure on the incidence and prevalence of Obstetric fistula which is lacking. Also it will afford more reliable estimates. A cohort study on prophylactic urethral catheterization for obstetric fistula using the OFFSCORE criteria would be necessary to refine the OFFSCORE criteria. Also health workers were significantly perceived as responsible for OF, there is a need for a study to determine if it is just a blame game or reality. Finally, this study recommends widespread education of women on the causes of obstetric fistula during antenatal clinic by midwives and community health nurses in the northern sector of the country. The national commission for civic education should develop programs to educate the population on Obstetric fistula and how to prevent.

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Appendix 1: Informed consent form for questionnaire administration

INFORMED CONSENT FOR QUESTIONNAIRE INTERVIEW

Project title: **Risk factors for obstetric fistula among women seeking care in the Tamale metropolis.**

My name is Dr. Benjamin Nuertey, a student from the school of public health of the University of Ghana. I am in this facility to carry out a study on the risk factors for obstetric fistula among women seeking care in the Tamale metropolis. I will be measuring your height and asking you some few questions. This is an academic research in fulfillment of the requisite for the award of a master of public health. There is no wrong or correct answer. Your responses would be treated with uttermost confidentiality. Your privacy is assured throughout this research process. The interview would take approximately 20 minutes.

There are no potential risks or benefits directly to study participants. However, the benefits of the research if findings are implemented would be harnessed by participants as well as all women during delivery. Participation is voluntary and has nothing to do with the treatment you would be receiving in this facility. You have the right to withdraw at any stage of the study process if the interview is found to be interfering with your health. There shall be no compensation or payments to you for participating in the study. Data files will be password protected. Hard copy and electronic data will be stored in locked file cabinets, and access will be limited to the PI and the Supervisor of the study. Recorded tapes from the in-depth interview would be destroyed by burning three months after the study.

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You can ask any questions now for clarification. Further questions with regards to the research can be directed to the administrator, Ghana health service ethical review committee, Miss Nana Abena Kwaa Addai Donkor. She can be reached on 233 244712919.

Respondent's consent:

This is to certify that, I have read and/or the words of this consent form has been read to me and duly explained. I now understand fully the contents of this consent form and hereby decided on my own accord without any intimidation or inducement to be a study participant in this study.

Witness my hand this day …….

Signature/ thumbprint …….

PARTICULARS OF PERSON OBTAINING CONSENT

Name of person obtaining consent ……

Signature……..

Date……

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Appendix two: Questionnaire for cases and controls

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCE

UNIVERSITY OF GHANA

QUESTIONNAIRE FOR CASES AND CONTROLS

Name/ initials ☐ ID ☐

PART ONE: PERSONAL / DEMOGRAPHIC CHARACTERISTICS

Participant type ☐ case ☐ control

1. Parity; Para ☐ Number alive ☐

Number of Miscarriage/Abortions ☐

2. Height in centimeters measured by interviewer ☐

3. Current **age** in years ☐ Age at first delivery ☐ Age at delivery ☐

4. Area of residence ☐ rural ☐ urban

5. Religion ☐ Christian ☐ Muslim ☐ Traditional ☐ Others

6. Employment status before last pregnancy ☐ Employed ☐ Non-employed ☐ Self employed

7. Current employment status ☐ Employed ☐ Non-employed ☐ Self Employed

8. Educational status ☐ None ☐ Primary ☐ Secondary ☐ Tertiary

9. How did you **finance** your medical bills during the last pregnancy?

☐ NHIS ☐ Cash and Carry ☐ private mutual health insurance

10. Currently **Marital status** ☐ married ☐ divorced ☐ cohabiting ☐ Single never married

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11. Before last pregnancy ☐ married ☐ divorced

☐ cohabiting ☐ single not married

12. What is your distance to nearest hospital with capability of caesarean operation …….....milest

13. What is the public transport fare from home to the nearest hospital with capabilities of caesarean section…….GH¢

14. What is your mode of transport to the nearest health facility?

☐ Walking ☐ bicycle ☐ motorcycle ☐ tricycle ☐ car

PART TWO: DETAILS OF YOUR LAST PREGNANCY

15. In which region of Ghana was your last delivery…….

16. Please specify district of last delivery ……..

17. Place of delivery: ☐ Home ☐ Hospital

18. Did you attend Antenatal clinic during your last pregnancy ☐ yes no ☐

If yes how many times……..

19. Were you diagnosed of any maternal disease in the last pregnancy yes ☐ no ☐

If yes specify……..

20. Did you use "kaligotim" in your last pregnancy ☐ yes ☐ no

20A. If yes specify ☐ black ☐ red ☐ both

20B. If yes, how many times in the entire pregnancy period……..……

21. How many months did you carry your last pregnancy……months

22. How long did you labour in hours

At home/TBA …….. In hospital…….. Total……

23. What was your mode of delivery: ☐ Spontaneous Vaginal delivery

☐ Caesarean Surgery ☐ Forceps/ Vacuum delivery

24. Outcome of delivery: ☐ live birth ☐ still birth (☐ fresh ☐ macerated)

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22b.**Sex of baby** ☐ male ☐ female

25. Birth weight ☐ big baby (above 4kg) ☐ Normal weight (2.6 – 3.9 Kg)

☐ Low birth weight (less than 2.5 kg)

PART THREE; OTHER FACTORS

26. Do you use any modern contraceptive ☐ yes ☐ no

If yes please specify; ☐ hormonal (eg pills and injectables)

☐ barrier (eg condom) ☐ all of above

27. Do you drink alcohol ☐ yes ☐ no

28. Were you smoking during the last pregnancy ☐ yes ☐ no

29. How would you describe your economic status prior to last pregnancy

☐ Very Rich ☐ Rich ☐ Average ☐ poor

☐ Extremely poor

30. What do you think causes obstetric fistula (multiple ticks allowed)

☐ Curses ☐ spiritual forces ☐ Health workers/TBA big baby

☐ kaligotim ☐ poverty ☐ lack of health facilities

☐ Work of enemies ☐ punishment from the gods

Others (please specify)……

PART FOUR; FOR FISTULA PATIENTS ONLY

31. How many days after delivery did you notice the leakage of urine and/ or feces……

32. How long did it take you to seek medical care from the time you first noticed the leakage of urine or feces ……

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33. Did you access any alternate medical care for your current condition? ☐ Yes

☐ No

34. Alternate methods of treatments used (multiple ticks allowed)

☐ Traditionalist ☐ Herbalist ☐ Church/prayer camps

☐ Others (please specify)……