

**RISK FACTORS THAT CONTRIBUTE TO FISTULA FORMATION AMONG WOMEN
ATTENDING AT BORAMA NATIONAL FISTULA HOSPITAL SOMALILAND FROM
2011 TO 2014**

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FOR THE DEGREE OF MASTER OF MEDICINE IN OBSTETRICS AND GYNECOLOGY
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DECLARATION

I declare that this dissertation is my original work; it has never been presented in part or whole to any other institution for any purpose.

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DEDICATION

I dedicate my dissertation work to: My beloved husband Dr Mustafa Mohamed Ahmed, for his support, understanding and encouragement, without him I would not have accomplished my study, a special feeling of gratitude to my loving parents, my father Abdillahi Omar Dirie and my mother Safiya Sh: Ibrahim Tubeec whose for their prayers and encouragement, for their laying the foundation for my education and for teaching me that even the biggest task can be accomplished if it is done one step at a time.

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ABBREVIATIONS AND ACRONYMS

WHO	World Health Organization
OF	Obstetric fistula
ANC	Antenatal care
KNH	Kenyatta National Hospital
BNFH	Borama National Fistula Hospital
VVF	Vesicovaginal Fistula
RVF	Rectovaginal Fistula
UNFPA	United Nations Fund for Population Activities
FGM	Female Genital Mutilation
LMIC	Lower and Middle Income Countries

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ABSTRACT

Background:

An obstetric fistula is preventable and in most cases, treatable childbirth injury that causes incontinence, stigmatization and psychosocial effects and often results in isolation from society.

The constant and prolonged **weight of the presenting part of the fetus against the delicate tissues around the vagina, bladder and or rectum during protracted delivery causes ischemic necrosis**, leading to sloughing off of the necrotic area after 3-5 days leading to leakage of urine.

Objective: To determine the factors associated with fistula formation in patients managed for obstetric fistula at Borama National Fistula Hospital (BNFH).

Methods: A cross sectional study was carried out using medical records of all women who were treated for obstetric fistula at BNFH in the period between 2011 and 2014.

Questionnaires were used to collect the information on OF. Data were entered into Microsoft Excel (version, 10) and then transferred to SPSS version 21 (IBM statistics, Chicago Inc.) for analysis. Descriptive analysis was performed to determine the frequencies and proportions of the various outcomes of fistula. **Cross tabulation was used to check associations. Chi-square tests were used and cut off P-values below 0.05 deemed statistically important.**

Results: 234 records of women were used for this study, the mean age of the women with OF at BNFH was 29.6 years (SD \pm 10.1). There were 224 (97.4%) unemployed women, 100 (43.5%) were married, 220 (95.7%) mothers reported that they had no formal education and 142 (62%) resided in rural areas. There were 154 women with VVF 66.1% (95% CI 60 – 72.2%); 54 with RVF 23.2% (95% CI 17.7 – 28.6%) and the remaining 25 women had combined VVF and RVF 10.7% (95 % CI 6.7 – 14.7%). There was no significant association between demographic

characteristics: age ($p = 0.328$), parity ($p = 0.424$), occupation ($p = 0.197$), marital status ($p = 0.052$) or formal education ($p = 0.908$) and the type of fistula. **There was a major connection between** mode of delivery and the type of fistula following delivery ($p < 0.001$). Most 227 (97.8%) mothers underwent repair of fistula and 215 (92.3%) of fistulas were successfully repaired (95% 90% and 82% for SVD, CS and assisted deliveries, respectively). There were 192 (82.4%) repairs succeeding on first attempt.

Conclusion: VVF is the predominant fistula type in BNFH and type of fistula that occurs shows significant association with mode of delivery. Repair of fistulas is frequently successful but successful attempts at repair are lower in combined VVF and RVF type. The findings from this study will assist the Ministry of Health and Borama National Fistula Hospital **to develop strategy for obstetric fistula prevention, management in the country.**

CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

Introduction:

Obstetric Fistula is defined as a hole communicating between the vagina and the bladder (vesico-vaginal fistula) or between the rectum and the vagina (recto-vaginal fistula), or between the bladder and the uterus (vesico-uterine fistula).^{1,2} It mostly happens after extended or obstructed delivery, spontaneous miscarriage or female genital mutilation and causes physiological anomaly, including permanent stream of stool or urine through the vagina, urogenital infections, renal infections and skin inflammation (dermatitis ammonia). In addition, it is frequently followed by other manifestations from the “obstructed labour injury complex” including damage to the pelvic bones or cervix, genital lacerations, amenorrhea (absence of menstruation) and foot drop. Besides, fistula patients develop high levels of disgrace from their communities and families leading to economic and social exclusions, which causes high risks of depression and suicide².

Estimation by World Health Organization (WHO) shows that in developing nations, five million women annually endure severe maternal morbidity mainly due to obstetric fistulae being. Additionally, it is estimated that presently, more than 2 million women are undergo surgery worldwide and about approximately 50 to 100,000 new cases are diagnosed each year mostly in Asia and Africa. In developed countries on the other hand, fistula is related to gynecologic surgery or radiation therapy^{3,4}.

Worldwide, it is estimated that a total number of 600,000 women die annually as a result of complications related to pregnancy, 99% of them occur in the LMIC and for each maternal

death, more than 30% women hail from degrading or disabling injuries such as obstetric fistulae. Even though it is a universal problem, it seems to be predominantly common in Africa - a low resource setting. According to UNFPA, unalleviated obstructed labor, which has nutritional, social and healthcare magnitude, is the chief cause of obstetric fistula.⁵

A systematic review and meta-analysis done by Adler, approximates the prevalence of obstetric fistula in LMIC, found out that the prevalence of fistula is lesser than earlier reported.³

In a study done by Landry,⁶ highlighted that even though the prevalence of OF is high due to lack of quality obstetric care in Africa and Asia; its management and repair were not adequate and this caused under estimation of the OF.

In South Asia and the Sub-Saharan Africa, it is commonly acknowledged that obstetric fistula is very widespread due to limited access and use of emergency obstetric care. What's more, it is complicated to estimate the prevalence and incidence rates of obstetric fistula in developing countries as over 2 million young women live with untreated obstetric fistula in Asia and sub-Saharan Africa. In west Africa, some studies have recommended incidence rates to be between 1 and 3 per 1000 births, with higher rates of between 5 to 10 cases in 1000 births being experienced in pastoral areas of sub-Saharan Africa².

Fistula needs assessment done by UNFPA in Kenya,⁵ found that OF is provoked by lack of education, poverty, women's underprivileged status in society, lack of education and inaccessibility of services to turn away from or treat the condition. Despite these conditions, it was observed in the countries studied that: fistula is not recognized as a major issue, there is a poor referral system and scarce facilities, cultural practices such as early marriage is widespread, awareness of the problem at community level is low and skilled staff to lever fistula are few.

Kazaura did a study in Tanzania and found that from different regions within sub-Saharan Africa, the original factors for OF are regarded as biological, cultural, social behavioral and environmental. Some of the illustrations surrounding these factors are young maternal age at delivery, childhood malnutrition, poverty, genetics, health seeking behavior and illnesses⁷.

Literature Review:

Worldwide, the estimation by WHO shows that around 2 million women have untreated obstetric fistula (OF) with an incidence of 1-2 per 1000 deliveries and greater part of those cases live in sub-Saharan Africa⁸. Formerly Obstetric Fistula (OF) was a universal problem, but has been exterminated in USA/Europe due to enhanced obstetric care. There are many factors associated with OF incidents, the most familiar and significant one is lack of comprehensive emergency obstetric care. A case control study done in Kenya by Roka et al,⁸ identify risk factors associated with developing OF among patients attending 3 different selected hospitals. It was found that these risk factors were postponement in making decision to seek health care delivery service with an average of six hours delayed from onset of labour, taking more than 2 hours to reach a health facility, labour of more than 24 hours and illiteracy are also risk factors. In study conducted in nine African countries by UNFPA,⁹ to assess the rate of OF and its primary causes were found to be; malnutrition, small stature, early pregnancy at young age, inadequate access to obstetric emergency care and the couple's need to deliver at home (in which delivery was conducted by unskilled person). In the same study, it was noted that OF resulted from poorly managed c-section or after hysterectomies. Cultural beliefs can also contribute to obstructed delivery which leads to OF formation, whereby the pregnant women can't seek medical care and needs consent from the husband or male relatives to seek medical help. This predisposes the woman to complications like obstructed labour. Lack of understanding about OF and circumcision are other

factors which take a vital part in its incidence. A study done by Biadgilign investigated the prevalence and factors related with OF in Ethiopia, whereby a sum of 14,070 women of reproductive age took part in the survey, and it was found that only 23.3% had ever heard of OF.¹⁰ Among women who delivered, (1.31%) suffered OF in their life span, which is equal to 10.6 per 1000 women who ever gave birth. The circumcised women had the highest number of OF, while among those who gave birth to 10 or more children had the highest ratio compared to those women who gave birth to 1-4 children. This affects more women who live in rural area and young age.

A study done in India by Gulati analyzed the correlates of occurrence of OF among women in selected states and highlighted that women living in pastoral areas have high chance of developing the problem.¹¹ It was found that those women below 18 years at the time of the first delivery have higher chance of developing OF compared to those above 18years.

Studies have highlighted that the cultural perspective seems also to contribute to the risk of obstetric fistula; these were early marriage and early pregnancy and are often cited as predisposing factors of obstetric fistula.^{12,13} Living in pastoral areas put women at more risk of developing fistula, since they are both marginalized in terms of health infrastructures and live in distant areas away from clinics leading to delayed treatment.^{14,15}

A study done in 5 countries by Landry,⁶ analyzed the experience of women who had undergone fistula repair and a similar picture was found across the countries. They were young, had little education and most of them developed the fistula after first pregnancy (median parity was 2.0).

This study also noted that half of the women attended antenatal clinic (ANC), 50% among those attended to ANC recall that they had been told for signs of pregnancy complications.

A situational analysis done in South Sudan by Adler,¹⁶ estimated the prevalence of OF, and found that there were inadequate fistula repair services in the country and 50-80% of cases seen per year attended episodic campaigns with only about half of them having a fistula repair. In addition, it was highlighted that the routine repair services available do not meet the population's needs. A prospective study done by Raassen,¹⁷ reviewed outcome of first time surgery for obstetric fistulas in East African women found high achievement rates with early surgical repair of obstetric fistulas (<3 months). Several studies have looked into the outcome of OF on the survivors¹⁸⁻²⁰.

Obstetric fistula causes the patients to get a low self-esteem, depression and even suicide. A cross-sectional study was carried out at Kenyatta National Hospital (KNH) Kenya,²⁰ looked at the occurrence of depression and described the linked factors among fistula patients who attend obstetric fistula surgical camp in Kenya. The study found that Women with obstetric fistula were predisposed to high depression levels. Another cross-sectional study done in Tanzania by Mselle,¹⁹ discovered the experience of depression among women experiencing severe birth injuries and exposed that they felt a great loss, in terms of loss of social roles as wives and women, body control, loss of pride, loss of integration in social life, and low self esteem.

Additionally, Zekele¹⁸ also explored depression among women with pelvic organ prolapse and obstetric fistula in northwest Ethiopia and found that women with complex obstetric fistula and pelvic organ prolapse, had high likelihood of depressive symptoms.

A study done in Nigeria by Hassan,²¹ aimed at assessing the awareness of patients who had developed VVF on the cause of the fistula and their stance toward measures that would mitigate future occurrences, it showed that even though the majority (70%) of the patients were aware

about the cause of their fistula from the health talks, others (32%) were adamant to change from risky obstetric behavior. Tebeu,²² also found that the illiteracy level among the obstetrical fistula patients ranged from 19% - 96%. A cross sectional study done in Uganda by Barageine,²³ identified the perceived causes, challenges, and coping mechanism of women living with OF, and found that majority of the women were young, had primary education and lived with OF for 2—9 years. The main known causes of OF being delivery of a big baby, prolonged labor and injury by surgeon. It also found that nearly all women with OF (90%) reported that it had detrimentally affected their health and well-being; 87% women lost their children at birth or within the neonatal period; provision of basic items, and suffered stress; families were affected by high cost of treatment, maintaining strict hygiene, women coped with OF by hiding from the general public, resorting to prayer or ignoring people's comments.

Kasamba,²⁴ conducted a qualitative study in Uganda , evaluated the community awareness about the risk factors, presentation and management of OF for both females and males, and found that majority of the members of the society interviewed were conversant about the risk factors associated with obstetric fistula, while some, predominantly men, had myths and misconceptions about risk factors associated with obstetric fistula as being caused by poor usage of family planning, having sex during menstrual periods, and considered the condition as a curse. Another study done by Kazaura,⁷ explored the awareness and the perceived causes of OF in rural areas of southern Tanzania. He found that although OF does not exist, majority of the interviewees were aware of them..

A retrospective study in Pakistan by Nawaz,⁴ reviewed 213 cases with different types of urogenital fistula, and found that most of the female urogenital fistulae were vesico-vaginal with

majority of the women being in the child bearing age, the most common cause being obstetrical trauma.

Shrethsa²⁵ did a study in Nepal, and noted that sixty million women in LMIC give birth each year without skilled help and that in Nepal, only 19% of deliveries are conducted by skilled birth attendants. Bangser²⁶ and Johnson²⁷ revealed that another major cause of fistula in sub-Saharan Africa is the socioeconomic status of the woman.

Sagna³⁰ analyzed determinants of OF in Uganda, and noted that female genital mutilation –a harmful traditional practice –increases the risk of fistula, in its different forms, female genital mutilation results in impaired female genital tract which ultimately endanger the health of the mother. However, in another study done by Andrew Browning in Ethiopia,³¹ explored the relationship between OF and Female genital Cutting and was found that Type I and Type II female genital cutting are not independent causative factors in the development of obstetric fistulas from obstructed labor.

Situational analysis of OF done in Liberia by the Ministry of Health and UNFPA,³² assessed the magnitude of obstetric fistula, and found that obstetric fistula is a major reproductive health challenge in Liberia, and noted that the contraceptive prevalence rate and delivery by skilled attendants are very low in Liberia.

Tebeu,²² found that recto-vaginal fistula represented 1% - 8% of cases; vesico-vaginal fistula made up 79% - 100% of cases, and combined vesico and recto-vaginal fistula represented 1% - 23% of cases

RATIONALE AND STATEMENT OF THE RESEARCH PROBLEM

RATIONALE FOR THE STUDY

Many years of political instability in the Horn of Africa has led to breakdown of health care delivery and infrastructure, as such there is scarcity of data on (Obstetric Fistula) and its very likely that the incidence of OF has increased over time.

Somalia has been grappling with civil war since 1991 when the government of Siad Bare collapsed. Since then the country's infrastructure, including health services has degenerated and can barely cater for the citizenry's heath needs.



Figure 1.1: Picture taken in Mogadishu, showing effect of civil war, available (<http://www.dailynewsegypt.com/2013/06/19>).

Refugee settlements:



Figure 1.2: Picture taken from refugee settlement in Somalia, available (<http://www.traveladventures.org/continents/africa/mogadishu-refugee-camp03.html>).

The ongoing conflicts in central and south Somalia has made thousands of people to travel to Somalia and settle into informal settlements. Lack of essential infrastructure such as water, health services and sanitation is experienced in these settlements which lead to ill health. Communities that live in remote areas of Somaliland often experience worse health due to higher poverty levels and poor access to health care services. Furthermore, access to maternal health care and particularly emergency obstetric care is inadequate; thus contributing to high incidence of Obstetric Fistula (the delay system).

Somaliland is also a deeply traditional/cultural society with decreased social status of women likely to influence occurrence of OF. Advocacy strategies, education and direct services aimed at reducing the number of women living with fistulas and preventing new cases are presently limited. Because there are no studies on OF in Somaliland, it seems likely that awareness of the extent of the problem is low. This current study is to provide a baseline and extent of OF in

Somaliland. It will assist the Ministry of Health and Borama National Fistula Hospital re-strategize obstetric fistula prevention, re-integration and management in the country. The overall goal is to control obstetric fistula incidence and to help the affected women by offering fistula surgery and reintegration into the local social context.

PROBLEM STATEMENT:

Obstetric fistula is a major public health problem in populations that have health system constraints leading to poor obstetric outcomes and also in communities that practice FGM. Somaliland has significant health system challenges following years of political turmoil. In addition the practice of FGM is highly prevalent in the population making obstetric fistula a particularly urgent priority in Somaliland. Despite recent changes that come with modernization and the heightened advocacy at both national and international levels the practice of FGM still persists in most communities in Somaliland. There are also likely to be other risk factors contributing to the incidence of obstetric fistula in the country. The recognition of this need has led to the establishment of specialized hospitals to deal with obstetric fistula. The response to the obstetric fistula problem will require careful description of the epidemiology of obstetric fistula to determine any transitions that may be occurring and to design appropriate response strategies. This study has analyzed these factors and the treatment outcomes in the main fistula referral hospital in Borama.

RESEARCH QUESTION:

What are the factors that contribute to fistula formation and treatment outcome among women attending Borama National Fistula Hospital from 2011 to 2014?

OBJECTIVES OF THE STUDY

Broad Objective: To determine the factors associated with fistula formation and treatment outcome in patients managed for obstetric fistula at Borama National Fistula Hospital, Somaliland between 2011 and 2014.

Specific Objectives:

1. To determine the socio-demographic characteristics of patients attending Borama National Fistula Hospital.
2. To determine the types of OF among patients presenting at Borama National Fistula hospital.
3. To determine factors associated with fistula formation in patients with OF in Borama National Fistula Hospital between 2011 and 2014.
4. To determine the treatment outcomes of patients with OF managed at BNFH.

CONCEPTUAL FRAMEWORK

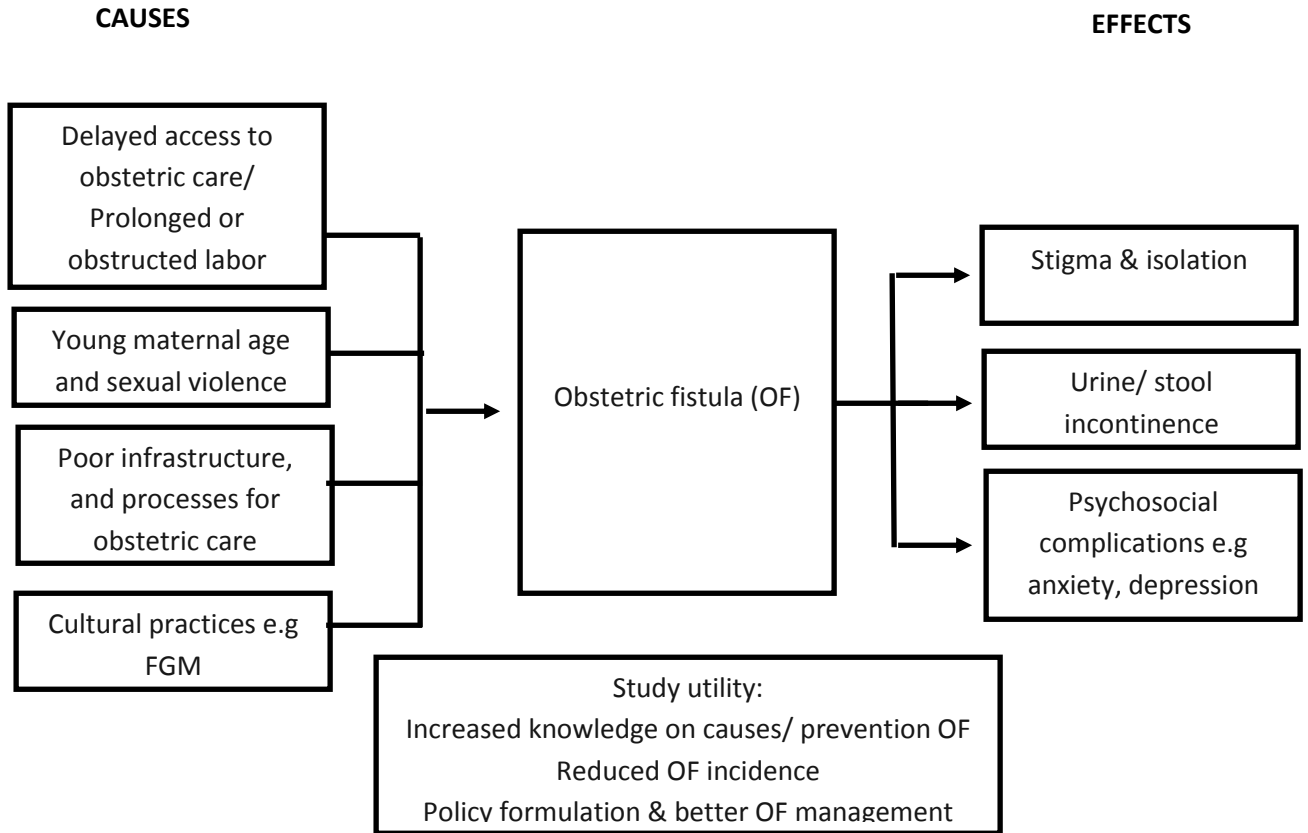


Figure 1.3: Conceptual framework.

CHAPTER TWO

METHODOLOGY

Study design

This was a cross sectional study in which data was collected from medical records of patients admitted to Borama National Fistula Hospital (BNFH) with obstetric fistulas. Patient risk factors were analyzed along with treatment outcomes of Obstetric Fistulas (OF).

Study setting

The study was carried out at Borama National Fistula Hospital (BNFH) in Borama, Awdal region of Somaliland. The hospital is located in Borama Somaliland and is a referral hospital for the fistula patients in the whole of Somalia and it sometimes gets referral cases from across the border of Ethiopia.



Figure 2.1: Picture taken, showing outside BNFH, and the ambulances of the hospital (Photo courtesy: Saciida Omar.)

Borama National Fistula Hospital (BNFH): was established in March 2005, as an independent, non-profit making, non-sectarian institution located in Borama, Awdal region. It is the only hospital in Somaliland dedicated exclusively to fistula treatment and has three full time fistula surgeons who perform 200- 225 surgeries annually. It is dedicated to the complementary goals of patient care and research on the problem of obstetric fistulas.



Figure 2.2: Outpatient and inpatient services at BNFH, adopted from SNN, and Harawonews.com, [<https://fistulahospital.wordpress.com>].

Borama is the Capital of the Northwestern Awdal and the commercial seat of the province. It is situated near the border with Ethiopia.



Figure 2.3: The map of Somaliland and neighboring countries. Adopted from Google maps, available at [<http://www.worldmap1.com/somaliland-map.asp>]

The city has a population of around 39,100 residents (2008). It has been a leading example in community organizing, having been the first area in northwestern Somalia to adopt self-help scheme in the wake of the civil war.



Figure 2.4: Aerial view of Borama town, Somaliland where the study was conducted. (Adopted from (<https://wargeyskasaxafi.wordpress.com>)).

Study population

All women who were treated for fistula at the Borama National Fistula Hospital from 2011-2014

Sample size

The following sample size formula based on Fishers formula with correction applied for finite population proposed by Daniel,³³ was used to estimate the sample size for this study.

$$n = \frac{NZ_{1-\alpha}^2 P(1-P)}{d^2(N-1) + Z_{1-\alpha}^2 P(1-P)}$$

Where

n is the required sample size

$N = 600$ is the population size/ total number of fistula surgeries done between 2011 to 2014 (as per the medical records)

$p = 50\%$ since the prevalence of types of obstetric fistula in Somaliland is unknown

$d = 5\%$ is the margin of error

$Z_{1-\alpha} = 1.96$ for the 95% level of confidence

$$n = \frac{600 \times 1.96^2 \times 0.50 \times 0.50}{0.05^2 \times 599 + 1.96^2 \times 0.50 \times 0.50} = 234$$

Calculated sample size = 234.

Therefore 234 patient files were retrieved.

Study instrument

A questionnaire was designed for use in cross sectional abstraction of data from patient records.

The questionnaire had four sections: socio-demographic data, obstetric information, information

related to fistula formation and treatment outcomes. The questionnaire was pilot tested during a pretest conducted before the study commenced. During the pilot the tool was assessed for validity and reliability. To establish face validity the tool was given to persons involved in questionnaire development and not necessarily medical experts to obtain their view of the questionnaire structure and statement of questionnaire items. Content validity was then evaluated by an independent obstetrician and both supervisors to review the appropriateness of questionnaire content. Questionnaire items were stated in two alternate forms and both forms used to obtain data during piloting to determine the alternate-form reliability of the questionnaire.

Sampling technique

Simple random sampling was used to obtain the study sample from all patient files with OF from 1st Jan 2011 to Dec 31st 2014. To achieve random selection a sampling frame was obtained and all files in the frame assigned identifiers based on sequential numbering. A computer generated random number sequence linked to the identifiers was then generated and used to select 234 files randomly for this study. All files contained in the random sample were retrieved from the records department. A high retrieval rate was anticipated (approximately 90%), based on the fact that this is a specialist hospital with good archiving of patient case records. To account for the non-retrievable files the random sampling scheme was incorporated sampling without replacement.

Inclusion criteria

- All women with OF who had attended, and treated at BNFH, between 2011 to 2014.

Exclusion criteria

- Patients who present with other causes of urine incontinence.
- Grossly incomplete data
- Missing files.

Data collection procedures

Study instrument was a structured questionnaire (appendix I) which was pre-tested prior to the actual commencement of the data collection. This was helped in determining whether the information obtained is actually the intended one. Two Research Assistants were trained for two days on the study and data collection by the Principal Investigator. During the training each assistant was provided with a standard operating procedure manual containing instruction on how responses for every item in the questionnaire should be obtained. The training aim was also to achieve consistency in data collection between the different collectors.

Questionnaires were used to collect information from the medical records. The information was collected by the principal investigator who was assisted by two research assistants. Files of the patients admitted to Borama National Fistula Hospital (BNFH) were reviewed to collect the necessary information. Socio-demographic features such as age, parity, occupation, marital status, place of residence, nationality, level of education, age of onset of fistula, mode of delivery, type of OF, repaired or not, successful repair, number of repair attempts, undergone female genital mutilation was included and was collected from the records. These files were checked for completeness of data. The data was coded and did not bear the patient's names or any identifiers.

Data management and analysis

The gathered data was confirmed for completeness, coded and then entered into computer software, MS Excel and thereafter transferred to SPSS software version 20.0, which was used for the analysis. The data was protected using passwords and backed up using external hard drives such as flash disks. At the end of the study, raw data was destroyed through shredding. Descriptive analysis was performed to determine the frequencies and proportions of the various outcomes of fistula such as numbers of successful fistula repairs and type of fistula. Cross-tabulation was used to determine the factors associated with OF such as age, parity and residence. Chi-square tests were used and P-values of less than 0.05 were deemed statistically significant. The results were presented in form of frequency tables, pie charts and figures together with their descriptions.

Ethical considerations

Confidentiality

The researcher maintained maximum confidentiality for all information including data presented by the respondents. All information collected on the patients was considered confidential and treated as such. The instruments used for the research was void of the patient's names to ensure confidentiality. Documents containing patient's confidential information were neither photocopied nor names of the patients or clinicians recorded. The information on the questionnaire was accessible only to the investigators and the statistician.

Ethical approval

This study was approved by both, the University of Nairobi (UON), KNH Ethics and Research Committee (UoN-KNH-ERC) and the Borama National Fistula Hospital (BNFH). Data collection commenced only after approval was granted.

Study limitations:

- Some files had incomplete data due to poor follow up of the patients. This could possibly be due to poor infrastructure (long distance, poor roads in which the patients taking many days to arrive at the hospital/insecurity).

CHAPTER THREE

RESULTS

Socio-demographic characteristics of patients attending BNFH

A total of 234 files of patients presenting with obstetric fistulas in BNFH were retrieved in this study. The retrieval rate of files with complete or adequate information was 90%. The socio-demographic characteristics of the participants are summarized in Table 1. The mean age of the women was 29.6 years (SD \pm 10.1) with an age range between 15 and 74 years. Majority of the women were aged either 25-29 years 62 (26.5%).

Most 177 (76.6%) women had a parity of between 1 and 3 and there were 21 women with at least 7 or more previous pregnancies with 19 (8.2%) having parity between 7 and 9. There were 224 (97.4%) unemployed women and 6 (2.6%) farmers in the study. Among the women presenting with fistula 100 (43.5%) were married and 122 (53%) were separated from their spouses.

Regarding formal education 220 (95.7%) mothers reported that they had no formal education and the highest educational qualifications reported were secondary education by 2 (0.9%) participants.

The women came from a predominantly rural setting with 142 (62%) reporting that they resided in rural areas. One hundred and sixty-six (72.2%) women were Somali by nationality and the remaining women were either Ethiopians 4 (1.7%) or from Somaliland 60 (26.1%).

Table 1: Socio-demographic characteristics of patients at BNFH

	Frequency (n)	Percent (%)
Age*		
15-19 years	31	13.2
20-24 years	41	17.5
25-29 years	62	26.5
30-34 years	36	15.4
35-39 years	34	14.5
40 years and above	30	12.8
Parity *		
1 to 3	177	76.6
4 to 6	33	14.3
7 to 9	19	8.2
More than 10	2	0.9
Occupation		
Unemployed	224	97.4
Farmer	6	2.6
Marital status		
Married	100	43.5
Separated	122	53
Single	2	0.9
Widowed	6	2.6
Residence		
Rural	142	62
Urban	87	38
Nationality		
Somaliland	60	26.1
Somalia	166	72.2
Ethiopia	4	1.7
Formal education		

None	220	95.7
Lower primary	5	2.2
Upper primary	3	1.3
Secondary	2	0.9

*Ref: Jokhio AH, Rizyi RM, Rivi J, and MacArthur C.³⁴

Types of fistulas among patients at Borama National Fistula hospital

Figure 3.1 shows the prevalence of fistulas according to type of fistula in women at BNFH. There were 154 women with VVF corresponding to a prevalence of 66.1% (95% CI 60 – 72.2%). RVF occurred in 54 women giving a prevalence of 23.2% (95% CI 17.7 – 28.6%) and the remaining 25 women with fistula had combined VVF and RVF corresponding to a prevalence of 10.7% (95 % CI 6.7 – 14.7%).

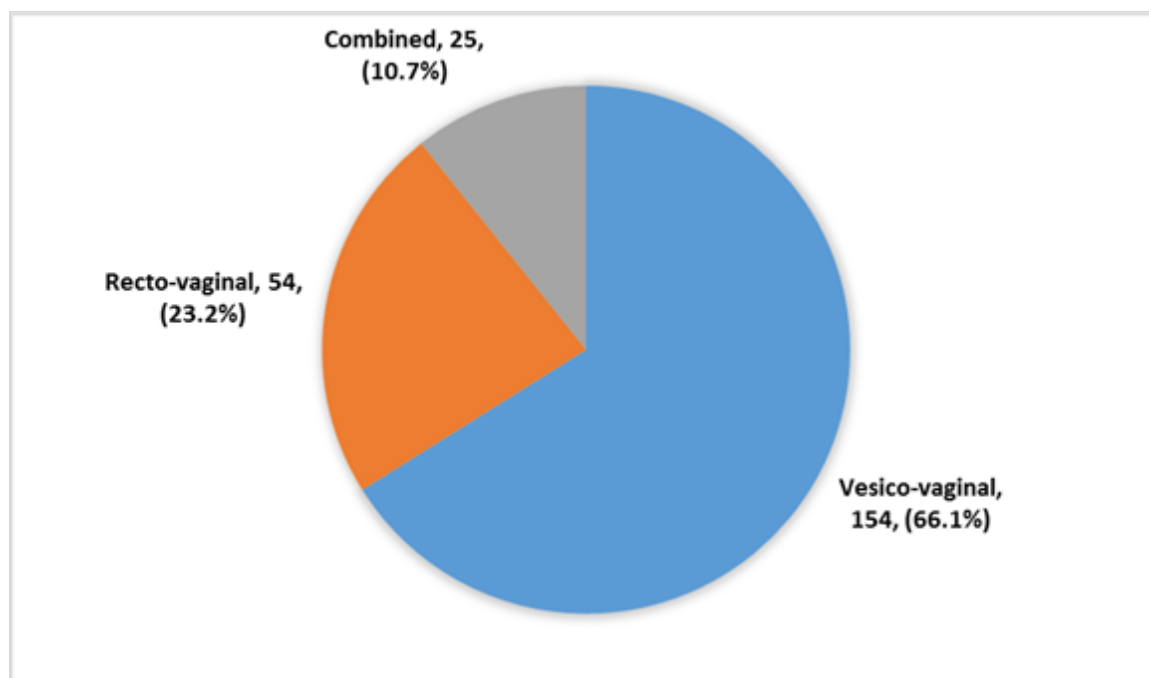


Figure 3.1: Types of fistulas among patients at BNFH

Factors associated with fistula formation

Demographic factors

Table 2 summarizes the associations between demographic characteristics of the participants and the patterns of fistula occurring after delivery. There was no significant association between the demographic characteristics namely age ($p = 0.248$), parity ($p = 0.424$), occupation ($p = 0.197$), marital status ($p = 0.052$) or formal education ($p = 0.908$) and the type of fistula that occurred after delivery.

Most patients within each age group had VVF (at least 60% in patients below 35 years, 52.9% in patients 35-39 years and 73.3% in age group 40 years and above). Most patients were housewives and of these housewives 64.3% had VVF, 23.7% RVF and 11.2% combined RVF and VVF. All the 6 (100%) farmers had VVF.

Table 2: Patient demographic and types of obstetric fistulas at BNFH

	Type of fistula			Chi square	P value
	VVF	RVF	VVF & RVF		
Age					
15-19 years	19(61.3)	5(16.1)	7(22.6)	12.6	0.248
20-24 years	27(65.9)	9(22.0)	4(9.8)		
25-29 years	38(69.1)	12(21.8)	5(9.1)		
30-34 years	30(69.8)	9(20.9)	4(9.3)		
35-39 years	18(52.9)	14(41.2)	2(5.9)		
40 years and above	22(73.3)	5(16.7)	3(10.0)		

Parity					
1 to 3	112(63.3)	42(23.7)	22(12.4)	6	0.424
4 to 6	22(66.7)	10(30.3)	1(3.0)		
7 to 9	15(78.9)	2(10.5)	2(10.5)		
More than 10	2(100.0)	0(0.0)	0(0.0)		
Occupation					
Housewife	144(64.3)	54(24.1)	25(11.2)	3.2	0.197
Farmer	6(100.0)	0(0.0)	0(0.0)		
Marital status					
Married	62(62.0)	31(31.0)	6(6.0)	12.5	0.052
Divorced	82(67.2)	22(18.0)	18(14.8)		
Single	1(50.0)	0(0.0)	1(50.0)		
Widowed	5(83.3)	1(16.7)	0(0.0)		
Formal education					
None	143(65.0)	51(23.2)	25(11.4)	2.1	0.908
Lower primary	4(80.0)	1(20.0)	0(0.0)		
Upper primary	2(66.7)	1(33.3)	0(0.0)		
Secondary	1(50.0)	1(50.0)	0(0.0)		

The prevalence of fistula did not differ according to patient residence ($p = 0.699$). As shown in Table 3 66.9% of rural residents compared to 62.1% of those in urban areas had VVF and commuted RVF and VVF occurred in 11.3 and 10.3% of rural and urban residents, respectively. Similarly there were no significant differences in the prevalence of fistula among women of

different nationalities ($p = 0.072$). Among all three nationalities VVF was the most prevalence fistula type (61.7% in Somaliland nationals, 66.3% among Somalis and 75% in Ethiopians). RVF occurred in between 19.9% and 33.3% of participants from the 3 nationalities (Table 3).

Table 3: Patient residence/ nationality and types of obstetric fistulas at BNFH

	Type of fistula			Chi square	P value
	VVF	RVF	VVF & RVF		
Residence					
Rural	95(66.9)	31(21.8)	16(11.3)	0.7	0.699
Urban	54(62.1)	23(26.4)	9(10.3)		
Nationality					
Somaliland	37(61.7)	20(33.3)	2(3.3)	8.6	0.072
Somalia	110(66.3)	33(19.9)	23(13.9)		
Ethiopia	3(75.0)	1(25.0)	0(0.0)		

Female genital mutilation

The classification of FGM in most patients was class III. Classification of FGM was not significantly associated with type of fistula ($p = 0.08$) as shown in Table 4. However, 62.4% of class III FGM were VVF compared to 81.6% of the fistulas with no specification of FGM that were also VVFs.

Table 4: FGM and types of obstetric fistulas at BNFH

	Type of fistula			Chi square	P value
	VVF	RVF	VVF & RVF		
FGM classification					
III	121(62.4)	49(25.3)	23(11.9)	5.1	0.08
Not specified	31(81.6)	5(13.2)	2(5.3)		

Mode of delivery

There was a significant association between mode of delivery and type of fistula following delivery ($p < 0.001$). Thirty-four (14.7%) mothers had assisted delivery (vacuum 71% [24/34] and forceps 29% [10/34]) were more likely to develop the combined VVF and RVF type (26%) compared to deliveries through SVD (6.8%) and CD (5.9%).

Table 5: Mode of delivery and type of obstetric fistula at BNFH

	Type of fistula			Chi square	P value
	VVF	RVF	VVF & RVF		
Mode of delivery					
Spontaneous vaginal	93(62.8)	44(29.7)	10(6.8)	27.2	<0.001
Assisted vaginal delivery	28(56.0)	9(18.0)	13(26.0)		
Caesarean section	31(91.2)	1(2.9)	2(5.9)		

Age of onset of fistula

The age of onset of fistula was not associated with type of fistula ($p = 0.265$). The age of onset for the different fistula types are shown in Table 6.

Table 6: Maternal age and types of obstetric fistulas at BNFH

	Type of fistula			Chi square	P value
	VVF	RVF	VVF & RVF		
Age of onset of fistula					
15-19 years	32(65.3)	9(18.4)	8(16.3)	12.3	0.265
20-24 years	37(63.8)	14(24.1)	6(10.3)		
25-29 years	25(64.1)	9(23.1)	5(12.8)		
30-34 years	23(57.5)	16(40.0)	1(2.5)		
35-39 years	17(73.9)	3(13.0)	3(13.0)		
40 years and above	14(77.8)	3(16.7)	1(5.6)		

Treatment outcomes of patients with OF presenting at BNFH

Table 7 presents the treatment outcomes of all patients with fistula. Most 227 (97%) admissions underwent repair of fistula and 215 (91.9%) of fistulas were successfully repaired. There was no

information documented within the medical records of 7 (3%) of the patients as to whether fistula repair was conducted or not. Most 192 (82.4%) repairs were attempted once, 32 (13.7%) twice and 9 (3.8%) had three or more attempts at fistula repair.

Table 7: Treatment outcomes of patients with obstetric fistula at BNFH

	Frequency (n)	Percent (%)
Fistula repaired		
Yes	227	97
No (not specified)	7	3
Successful repair		
Yes	215	91.9
No	7	3
Not specified	12	5.1
Number of attempts at repair		
1	192	82.4
2	32	13.7
3 or more	2	3.8

Type of fistula and treatment outcomes

The type of fistula was associated with both treatment outcomes that were assessed: success of repair ($p < 0.001$) and number of attempts at repair ($p < 0.001$). Repairs for VVF (95.8%) and RVF (100) were more likely to be successful compared to combined fistulas (72%). Patients with combined VVF and RVF had more attempts at fistula repair (44% and 24% for 2nd and 3rd

attempts) compared to VVF (9.2% and 1.3% for 2nd and 3rd attempts) and RVF (13% and 0% for 2nd and 3rd attempts).

Table 8: Treatment outcome and types of obstetric fistulas at BNFH

	Type of fistula			Chi square	P value
	VVF	RVF	VVF & RVF		
Successful repair					
Yes	142(92.8)	54(100)	18(72)	20.2	<0.001
No	5(3.3)	0(0.0)	2(8)		
Not specified	6(3.9)	0(0.0)	5(20)		
Number of attempts at repair					
1	136(88.9)	47(87)	8(32)	62.6	<0.001
2	14(9.2)	7(13)	11(44)		
3 or more	3(1.9)	0(0.0)	6(24)		

CHAPTER FOUR

DISCUSSION AND CONCLUSION

Discussion

The purpose of this study conducted in Somaliland was to document occurrence of the three main types of obstetric fistulas within this population. In addition, the established risk factors of obstetric fistulas were explored. To our knowledge this is the first such study to be done in Somaliland. The current study in line with previous studies conducted elsewhere reported that VVF is the most common of the three classifications of obstetric fistulas.⁴ VVF occurred in 2 out of every 3 women presenting with a fistula at BNFH. This prevalence is comparable to reported prevalence of VVF of 62.4% in Pakistan.⁴ Consistent reports in terms of the dominance of VVF among the fistula types have been reported in Liberia over two decade extending from 1987-2008, but in this setting the range of VVF was from 79% to 100%. There possible explanation for higher VVF prevalence and in some cases absence of other forms of fistulas in other populations compared to the Somaliland includes contextual differences related to both health system and cultural factors. For example, the fact that more severe forms of obstetric fistulas are not reported in other populations could reflect differences in rates of FGM, which is particularly high in Somaliland and better equipped health systems that intervene before severe damage occurs to the female urogenital system during child birth.

In terms of demographic characteristics, the present study established that with the exception of a few factors the female population in Somaliland is highly homogenous. More specifically, at least 90% of mothers participating in the study were housewives, with no formal education. Similarly, between two-thirds and three-quarters of all mothers with fistula resided in rural areas

and had had between one and three pregnancies. This finding contrasts with that of previous studies on obstetric fistula in other African countries (Uganda, Guinea, Niger, and Nigeria).⁶ The demographic attributes of most populations are more varied with aspects of socio-economic attainment like occupation and education showing greater spread across levels of these variables. Therefore because of this homogeneity in the population in Somaliland the finding reported in this study that the types of fistula that occur during child birth are not associated with demographics were not surprising. Previous studies in other populations report associations between fistula occurrence and demographic factors. Among the factors that show particularly strong associations with occurrence of obstetric fistulas in literature are lower levels of maternal education, teenage deliveries, rural residence and difficulties in accessing healthcare, and harmful tradition practices including FGM.^{11,29,31} It is important to note two issues in the interpretation of non-significant associations between demographic factors and fistula formation reported in this study in Somaliland. Firstly, most studies that report associations between fistulas and demographic factors,^{11,29,31} examine the demographic characteristic of patients with fistula and contrasts the same with demographics of patients with no fistula. This was not the case in the current study in which all patients had fistulas and the question being addressed was whether demographic characteristics influence the formation of different types of fistulas and not whether demographic factors influence fistula formation, *per se*. The findings therefore mean that demographic factors are not associated with a specific type of fistula, not that demographic factors do not have an association with fistula formation. Secondly, as stated in the preceding section on demographic characteristics the population in Somaliland undergoing fistula repair is highly homogeneous and this makes it difficult to distinguish among the different fistula type. For example with 95% of the population having no formal education and 97% being housewives,

the discriminatory power of education and occupation on type of fistula is greatly reduced. It has been documented in previous studies that up to 99% of women undergoing fistula repair are illiterate.³⁵

Separately, harmful traditional practices like FGM have an established role in fistula formation through well-defined mechanisms predominantly involving obstruction of labor.³¹ It was therefore expected that FGM would show an association with the patterns of fistula formation. Most women in BFNH had undergone FGM, and more so the severe forms of mutilation. It is important to note that though there was no significant association between FGM and fistula type there was a clear pattern towards formation of combined RVF and VVF or RVF in women who had undergone class III FGM compared to those with unspecified FGM classification who tended to have VVF formation. These results however do not imply that FGM is not significantly associated with fistula formation but rather the results show that among women who have fistula the type of fistula is not strongly associated with FGM classification.

The mode of delivery was shown to have a significant association with the type of fistula. Women delivering through assisted delivery and caesarean sections are more prone to develop RVF or combined VVF and RVF compared to women delivering through SVD who are more likely to have VVF as opposed to the other patterns of fistula. These findings are in agreement with previous studies.^{22,23} A major limitation of the cross-sectional design employed in this study is the inability to demonstrate the temporal relation between intervention through CS or assisted birth and fistula formation. In spite of this it is highly probable that by the time of intervention ischemia and trauma had occurred to the female urogenital organs and the association between intervention during birth and fistula reflects complicated delivery rather than a cause-effect relation between intervention and fistula formation.

The treatment outcomes of fistula repair reported here reflect expectations and conform to reports in literature.¹⁷ Similarly high success rates in fistula repair have been reported among East Africa women, previously.¹⁷ Despite the high success rates in fistula repair, the fact that for some patients up to three attempts were made before successful repair confirms that widely adopted periodic campaigns for fistula repair while essential are not sufficient and need to be followed up with provision of sustained routine repair services to meet population needs as suggested by Adler.^{3,16} There were significant association between treatment outcomes and fistula type and also between treatment outcomes and number of attempts at repair. Combined RVF and VVF had lower repair success rates and higher numbers of attempts were made to repair these fistula types.

The limitations of the findings include incomplete information on specific variables. The intended sample size of 234 women was achieved and data were available for most variables. For certain variables e.g occupation four out of the 234 clients did not provide information. There is potential for information bias from the missing data but given the high response rates of over 99% on individual variables the risk of information bias from these missing information is minimal.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- Assisted deliveries were associated with combined RVF and VVF types while mothers delivering through SVD and CS were less likely to have the combined fistulas
- Fistula repairs were commonly reported to be successful but for a significant number of fistula several repairs were attempted before successful surgical repair was achieved
- Treatment outcome in fistula patients was associated with type of fistula with combined RVF and VVF fistulas having poorer treatment outcomes
- With the exception of age of participants and age of onset of fistula the socio-demographic characteristics of women presenting to BNFH were mostly homogeneous
- The most prevalent type of obstetric fistula is VVF followed by RVF. The combined VVF and RVF type occurs less frequently compared to the singular fistula types
- The demographic factors examined among participants in BNFH did not have significant associations with type of obstetric fistula

RECOMMENDATIONS

Based on the objectives and findings of the study the following recommendations are made:

- 1) Since all three types of obstetric fistula (VVF, RVF and combined type) still occur with relatively high prevalence there remains a need to address the underlying causes of

obstetric fistula formation in Somaliland and similar settings. These include physical causes of injury to soft tissue (prolonged or obstructed labor) access to and quality of maternity care and social causes.

- 2) The strong representation of poor socio-demographic attributes e.g. illiteracy and unemployment in the group undergoing fistula repair suggests that targeted or equitable health services intervention among women of reproductive age from low socio-economic status especially in populations at high risk of fistula formation can help to prevent fistulas. It is recommended that health education be targeted towards this group of women especially in communities with traditional and cultural practices that predispose women to fistula formation for example, FGM. These harmful traditional practices that are still prevalent should be discouraged.
- 3) The fact that treatment outcomes of patients with OF depends on type of fistula and successful repair might not occur on first attempt suggests a need to provide good follow up care and support for patients with fistula particularly those with complicated types of fistulas.
- 4) There is need to investigate and address the root cause of the observation that assisted deliveries had high rates of fistula formation compared to SVD and CS including reviewing the adequacy of health worker training and skills in performing assisted deliveries.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

Data collection sheet of risk factors that contribute to fistula formation at Borama National Fistula Hospital From 2011---2014

1. Serial Number

2. Age

3. Parity 0

1--3

4---6

7---9

More than 10

4. Occupation

a. YES House wife

Farmer

Business

Student

b.NONE

5. Marital status

a. Married

b. Divorced

c. Single

d. Widowed

6. Place of residence

a. Rural

b. Urban

7. Nationality

a. Somaliland

b. Somalia

c. Ethiopia

8. Level of education

a. None

b. Lower primary

c. Upper primary

d. Secondary

e. Middle level college

f. University

9. Age of onset of Fistula

10. Mode of delivery

a. Spontaneous vaginal

b. Assisted vaginal delivery

c. Caesarian delivery

d. Other

11. Type of obstetric fistula

a. Vesico-vaginal

b. Recto-vaginal

c. Combination

12. Repaired

a. YES

b. NO

13. Successful repair

a. YES

b. NO

c. Not specified

14. Number of repair attempts

a. 1

b. 2

c. 3

d. More than 3

15. Undergone Female Genital Mutilation

a. YES , if so, which type: I

II

III

b. NO

c. Not specified


APPENDIX II: TIME PLAN

ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
Preparation of Research Proposal	■	■							
Submission Proposal to the department		■							
Submission of final proposal to Ethics		■							
Approval from Ethical committee		■							
Field Study			■	■	■				
Data Collection			■	■	■				
• Application for research Permit, from BNFH Ethics approval.			■	■	■				
• Administration of Research Instruments			■	■	■				
Data Analysis						■	■		
Report Preparation						■	■		
Submission of the 1 st Draft of Study Results, discussion/conclusion.								■	
Submission of Second Draft of the Study								■	■
Final Draft									■


APPENDIX III: BUDGET

Items	Cost Unit kshs	Total Cost Kshs
Typing Services		
Proposal		
Proposal 31 pages	20	620
Photocopy 31 pages (7 Copies)	3	651
Internet Charges		3,000
Binding 7 copies	50	350
300 Questionnaires (4 pages)	3	3,600
Final Project		
Typing 90 pages	20	1,800
Photocopying 14 copies	3	3,780
Spiral Binding (8 copies)	100	800
Hard Cover binding (8 copies)	300	2,400
Stationery		
Assorted Pens		300
Flash Disk		1,000
Hard Cover book		500
Data Collection		
Expenses		26,000
Data Analysis		
Data Coding		15,000
Poster presentation		2000
Contingency 10%		4,183
Total		65,984


APPENDIX IV: LETTER OF ETHICAL APPROVAL



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Dept. of Obs/Gynae
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University of Nairobi

29th June, 2015

Dear Dr. Omar

**Research proposal – Risk factors that contribute to fistula formation among women
Attending Borama National Fistula Hospital Somaliland from 2011 to 2014 (P117/03/2015)**

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 29th June 2015 to 28th June 2016.

This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*)
- Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website www.erc.uonbi.ac.ke

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Ref: KNH-ERC/R/99

29th June 2016

Dr. Kadra A. Omar
Dept of Obs/Gynae
School of Medicine
College of Health Sciences
University of Nairobi

Dear Dr. Omar

Re: Approval of annual renewal – Risk factors that contribute to fistula formation among women attending Borama National Fistula Hospital Somaliland from 2011 to 2014 (P117/03/2015)

Refer to your communication dated 23rd June, 2016

This is to acknowledge receipt of your study progress report and hereby grant you annual extension approval for ethical research protocol P117/03/2015.

The study renewal dates are 29th June 2016 –28th June 2017.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH-UoN ERC before implementation
- c) Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (Attach a comprehensive progress report to support the renewal).
- f) Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
- g) Submission of an executive summary report within 90 days upon completion of the study.
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

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