MODELLING THE EFFECTS OF SURGICAL OBSTETRIC FISTULA REPAIRS ON THE SEVERITY OF DEPRESSION AND ANXIETY AMONG WOMEN WITH OBSTETRIC FISTULA IN ETHIOPIA

by

Bekele Belayihun Tefera

Submitted in accordance with the requirements

for the degree of

DOCTOR OF LITERATURE AND PHILOSOPHY

in the subject

HEALTH STUDIES

at the

UNIVERSITY OF SOUTH AFRICA

Supervisor: Prof. AH. Mavhandu-Mudzusi

November 2017

DECLARATION

I declare that *MODELLING THE EFFECTS OF SURGICAL OBSTETRIC FISTULA REPAIRS ON THE SEVERITY OF DEPRESSION AND ANXIETY AMONG WOMEN WITH OBSTETRIC FISTULA IN ETHIOPIA* is my own work and that all sources that I have used or quoted have been indicted and acknowledge by means of complete references and that this work has not been submitted before for any other degree at any other institution.

_____

Bekele Belayihun Tefera

November 2017

Date

MODELLING THE EFFECTS OF SURGICAL OBSTETRIC FISTULA REPAIRS ON THE SEVERITY OF DEPRESSION AND ANXIETY AMONG WOMEN WITH OBSTETRIC FISTULA IN ETHIOPIA

STUDENT NUMBER: **58551417**
STUDENT: **BEKELE BELAYIHUN TEFERA**
DEGREE: **DOCTOR OF LITERATURE AND PHILOSOPHY**
DEPARTMENT: **HEALTH STUDIES, UNIVERSITY OF SOUTH AFRICA**
SUPERVISOR: **PROF AH MAVHANDU-MUDZUSI**

ABSTRACT

Obstetric surgical repair is the common therapeutic intervention available to women with obstetrical fistula. While surgical repair can address the physical symptoms, it may not end the psychological challenges that women with fistula face. This longitudinal study investigated the effects of surgical obstetric fistula repairs on the severity of depression and anxiety associated with obstetric fistula among 219 women admitted at six fistula hospitals in Ethiopia. Data was collected through structured Likert-scale questionnaire both on admission (prior to surgical obstetric fistula repairs) and on discharge (post obstetric fistula repairs).. Statistical Package for Social Science plus Analysis of Moment Structures (SPSS-AMOS) version 20 was used for data analysis.

Findings indicate that women with obstetric fistula have higher psychological distress such as depression (91%) and anxiety (78%) pre-surgical repair than post-surgical repair. These psychological distresses were exacerbated by poor social and psychological support of women with obstetric fistula by the family and health care professionals. The findings were used to develop integrated mental health treatment model for women with obstetric fistula in order to address psychological health needs of this population.

Keywords: *Anxiety; depression; modelling; mental health, obstetric fistula; surgical repairs; women*

ACKNOWLEDGEMENTS

Dedication

I would like to dedicate this study to my heavenly Wife Edelawit, for the gift of life and giving me the resilience to move on even when the going was tough. Thank you Edelawit for giving me such a wonderful encouragement to be what I am now.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXES

LIST OF ABBREVIATIONS AND ACRONYMS

AGFI	Adjusted Goodness of Fit
AIC	Akaike Information Criterion
AMOS	Analysis of Moment of Structures
AVE	Average Variance Extracted
CBT	Cognitive Behavioural Therapy
CDC	Center for Disease Control
CFI	Comparative Fit Index
CMB	Common Method Bias
CVI	Cross-Validation Indices
DF	Degree of Freedom
DHS	Demographic Health Surveys
ECVI	Extract Cross-Validation Indices
EDHS	Ethiopia Demographic Health Survey
EPIDATA	Epidemiological Data
FMOH	Federal Ministry of Health
GFI	Goodness of Fit Index
GLS	General list Square
ICC	Inter-class Correlation Coefficient
KMO	Kaiser-Mayer-Olkin
MI	Modification Indexes
MICS	and Multiple Incidence Cluster Surveys
MLE	Maximum Likelihood Estimation
MNCH	Maternal, Neonatal and Child Health
MSV	Mean Square Variance
CR	Critical Ratio
OPD	Out Patient Department
PTSD	Post-Traumatic Stress Disorder
RMSEA	Root Mean Square Error of Approximation
SE	Standard Error

SD	Standard Deviation
SEM	Structural Equation Modelling
SPSS	Statistical Program for Social Science
ULS	Unweighted Least Squares
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNISA	University of South Africa
USAID	United States Agency for International Development
WHO	World Health Organization

CHAPTER 1

ORIENTATION OF THE STUDY

1.1. INTRODUCTION

Obstetric fistula has become one of the most serious and tragic complications of childbirth affecting between 50,000 to 100,000 women worldwide each year (World Health Organization [WHO] 2014:1). The highest incidence of obstetric fistula is found in low-income countries of Asia and sub-Saharan Africa. It is recorded that more than two million young women in these low-income countries live with untreated obstetric fistula (WHO 2014:1). Hamlin (2015:1) indicated the prevalence of fistula injuries of 39 000, and an annual incidence of 3,700 among women in Ethiopia.

There are several demographic characteristics, which increase the risk for obstetric fistula. The identified demographics include poverty, lack of education and certain cultural practices. These demographic factors influence child marriages and subsequent childbearing while the pelvis is still immature (Alio, Merrell, Roxburgh, Clayton & Salihu 2011:376). Other factors associated with obstetric fistula are a delay in seeking delivery services and reaching a health facility, prolonged labour, stillbirth and poor access to maternal health care services (Cowgill, Bishop, Norgaard, Rubens & Gravett 2015:6; Roka, Akech, Wnzala, Omolo, Gitta & Waiswa 2013:4-5).

This chapter provides the background to the research topic, states the research problem, and explains the purpose and objectives of the study. The chapter also provides the significance of the study and defines the key terms used in the study. The theoretical foundation of the study and methodology of the study are also highlighted. The final section provides an outline of the structure of the thesis.

1.2. BACKGROUND OF THE RESEARCH PROBLEM

Obstetric fistula has great physical and psychosocial impact on the lives of women in sub-Saharan Africa. A study conducted in eastern Africa reported women with obstetric fistula were affected by extremely high rates of physical and psychosocial morbidity. The morbidities includes mental health dysfunctions, post-traumatic stress disorder, loss of body control (incontinence), shattered sex life, loss of self-worth, loss of babies during labour, loss of fertility, damages to the delicate hormone centres in the brain and breach of social network (Byamugisha, Ayadi, Obore, Mwanje, Kakaire, Barageine, Lester et al 2015:1-2; Siddle, Mwambingu, Malinga & Fiander 2013:1215). The increased social and psychological effect of fistula on the sufferer has noted from time to time. Women with obstetric fistula experience depression, social isolation and rejection by family and local society; breach of social network and marginalisation from the society (Alio et al 2011:371; Mohameda, Amirb & Ng'ang 2016:402; Mselle, Moland, Olsen, Mvungi & Kohi 2011:8-11). It is likely that such social, biological and psychological factors may lead to mental health problems.

Obstetric fistula can qualify as a traumatic event leading to the development of depression and anxiety (general anxiety and post-traumatic stress) disorders. Studies in low-income countries, including Ethiopia, report that women with obstetric fistula have significantly higher symptoms of depression, somatisation, post-traumatic stress disorder (PTSD), poor psychosocial functioning and general anxiety (Megabiaw, Awoke, Adefris, Azale & Awoke 2013:3; Wilson, Sikkema, Watt & Masenga 2015:610). According to Weston, Mutiso, Mwangi's, Qureshi, Beard and Venkat (2011:31) finding, psychological distress symptoms are significantly associated with unemployment, lack of social support following fistula and living with fistula.

Obstetric surgical repair is the common therapeutic intervention for obstetric fistula: There is evidence suggesting that following fistula repair surgery, women experienced a decrease in psychological distress. A study conducted in Tanzania by Wilson, Sikkema, Watt, Masenga and Mosha (2016:944) reports that psychological distress, including depression, PTSD and poor social functioning of women with fistula significantly decreased from admission to post-surgery. Qualitative findings support this evidence, showing that women with fistula relate

experiences of improved quality of life, and social functioning and overall level of happiness after fistula repair (Drew, Wilkinson, Nundwe, Moyo, Mataya, Mwale &Tang 2016:11; Maulet, Keita & Macq 2013:531-2). Despite of the total positive effect of surgery on psychological distress, there is also evidence that some women continue to experience distress after repair, which necessitated further empirical investigation (Kayondo, Wasswa, Kabakyenga, Mukiibi, Senkungu, Stenson & Mukasa 2011:8; Wilson et al 2016:943). Surgical outcomes may interact with social factors to influence psychological functioning, social standing, and social behavior of women with obstetric fistula. There is a need to investigate the effects of surgical obstetric fistula repairs on the severity of depression and anxiety associated with obstetric fistula in Ethiopia in order to provide comprehensive and holistic care to women with obstetric fistula.

1.3. STATEMENT OF THE RESEARCH PROBLEM

Women with obstetric fistula are socially stigmatised and marginalised, psychologically affected and economically deprived (Alio et al 2011:371; Mselle et al 2011: 8-11; Wilson et al 2015:610). These situations are correlated with mental health problems (Rahm, Rency & Ringsberg 2013:269). These mental health problems are present in the form of depression and anxiety disorders (Kinser & Lyon 2014: 670; Kuo, Chen & Tzeng 2014:3). Obstetric fistula associated with mental health problems is one of the most burdensome illnesses among women in early productive years of life.

Obstetric surgical repair is the common therapeutic intervention available to women with obstetrical fistula in Ethiopia. It poses a challenge for health care professionals who often fail to diagnose the associated mental health problems. The continued focus on physical intervention means that women will continue to suffer the salient burden of the associated mental health, which can compromise the recovery process. Despite this burden to health systems in most of the developing sub-Saharan Africa countries, including Ethiopia, there is limited comprehensive literature on the effects of surgical obstetric fistula repair on the severity of depression and anxiety. The concern is the fact that, health care providers and policy makers neglect the psychological problems of women with obstetric fistula. The psychological treatment of obstetric fistula is under-resourced, and the hospitals need to be

properly resourced and develop a strategy in order provide psychological therapy service for women with obstetric fistula.

1.4. RESEARCH PURPOSE

Research purpose is a concise, clear or declarative statement of a researcher's overall goal or aim of the study that is generated from the research problem (Burns & Grove 2011:146). The purpose of this study is to determine the effects of surgical obstetric fistula repairs on the severity of depression and anxiety associated with obstetric fistula and to develop an integrated mental health treatment model for women with obstetric fistula in Ethiopia.

1.5. RESEARCH OBJECTIVES

Burns and Grove (2011:145-6), define research objectives as clear or concise, declarative statements developed from the research problem and purpose. In quantitative research, the research objectives assist in clarifying the variables and population to be studied. The study focused on the following objectives:

- To describe the prevalence and severity of depression and anxiety among women awaiting surgical repairs of obstetric fistula in Ethiopia.
- To describe the prevalence and severity of depression and anxiety among women who have undergone surgical repairs of obstetric fistula in Ethiopia.
- To determine the variations in the severity of depression and anxiety between pre and post-surgical obstetric fistula repairs.
- To determine changes in the severity of depression and anxiety attributed to obstetric fistula repair surgery.
- To develop an integrated mental health treatment model for women with obstetric fistula in Ethiopia.

1.6. RESEARCH QUESTIONS

Polit and Beck (2012:765) define a research question as a clear or concise interrogative statement of the specific queries, which a researcher wants to answer in addressing the research problem. A research question provides guidance for the type of data, which should be collected during a study. The PICO (Respondents, Intervention, Control, and Outcome) approach was used in formulating the research questions (Bettany-Saltikov 2012:2). The research questions of this study were as follows:

- What are the prevalence and severity of depression and anxiety among women with obstetric fistula in Ethiopia?
- What is the severity of depression and anxiety among women with obstetric fistula who undergo surgical repairs in Ethiopia?
- What is the variation in the severity of depression and anxiety outcome between pre and post-surgical repairs?
- What is the change in the severity of depression and anxiety attributed to obstetric fistula repair surgery?
- What model can be used to ensure integrated mental health treatment approach for women with obstetric fistula in Ethiopia?

1.7. DEFINITIONS OF KEY CONCEPTS

The purpose of defining concepts is to present the abstract or the theoretical meaning of the concepts being studied (Polit & Beck 2012:722). The following are the definitions of key concepts used in this study:

1.7.1. Anxiety

Anxiety is a set of psychological worry that is characterised by the feelings of fear, and worry about the current and even future events (American Psychiatric Association (APA) 2013:63). In this study, anxiety is a state in which a woman with obstetric fistula is unable to respond appropriately to situations or inability to control her response. The forms of anxieties which will be considered include general anxiety and PTSD regardless of severity.

1.7.2. Depression

Depression is characterised by feelings of extreme sadness and hopelessness that can affect a person's thoughts and behavior (APA 2013:63). In this study, depression is the situation where a woman with obstetric fistula feels, depressed for most of the time during the day, and for most of the day over at least two weeks' period. Additionally, they may experience symptoms such as changes in appetite, loss of interest or motivation for their usual activities, hopelessness and make plans or attempts to cause harm to themselves. The researcher had categorised depression from mild to severe in order to embrace the changes and severity of symptom based on the endorsed criteria.

1.7.3. Mental health

"Mental health is a state of well-being in which an individual can realize his or her own abilities, interact positively with others, cope with the stressors of life and study, work productively and fruitfully, and contribute to his or her family and community." (Federal Ministry of Health) [FMOH] 2012:10; WHO 2005a:7). In this study mental health is a level of psychosocial well-being or absence of mental disorder or behavioral change.

1.7.4. Modelling

A model is an analytic method that accounts for events over time and across populations, that is based on data drawn from primary and /or secondary sources, and whose purpose is to estimate the effects of an intervention on valuing health consequences (Weinstein, O'brien, Hornberger, Jackson, Johannesson, Mccab & Luce 2003:10). Bailey (1984:322) cited in De Vos (2011:36) defines a model as a copy, replica or analogy that differs slightly from the real-life situation with the aim of providing guidelines about a phenomenon and/or to show relationships between critical elements of the phenomenon. In this study, a model refers to a schematic representation of how the integrated mental health treatment service can be organised to address the mental health needs of women with obstetric fistula.

1.7.5. Obstetric fistula

Obstetric fistula is an abnormal connection between the vagina and bladder/ or rectum resulting in uncontrollable leakage of urine and/or stool and often resulting from prolonged obstructed labour (Kayondo et al 2011:1). In this study, obstetric fistula is a hole between the vagina and rectum or bladder that is caused by prolonged obstructed labour, leaving a woman with incontinence of urine and/ or stool.

1.7.6. Surgical repair

Surgical repair is defined by Smeltzer, Bare, Hinkle and Cheever (2010:56) as an operation technique on a patient to investigate and/or treat a pathological condition such as disease or injury, to help improve bodily function or appearance or to repair unwanted ruptured areas. In this study, surgical repair refers to the operation conducted to repair obstetric fistula.

1.8. THEORETICAL FRAMEWORK OF THE STUDY

The theoretical framework is the "blueprint" of the entire dissertation inquiry. It serves as a guide for building and supporting the study (Lysaght 2011:572). Theoretical framework also provides the structure to define how the researcher understands the problem, purpose, significance and research questions, which are tightly aligned and intricately guide the research design and data analysis (Grant & Osanloo 2013:17). In certain instances, theoretical frameworks can be utilised together with the conceptual framework. The conceptual framework offers a logical structure of connected concepts that help to provide a picture or a visual display of how ideas in this study relate to one another within the theoretical framework. It identifies and constructs for the reader of this study; the thoughts and actions of the author in relation to the selection of a topic, research questions, the literature review, the design approach, relationships between variables and analysis plan of this study (Anderson, Day & Mclaughlin 2006:154; Grant & Osanloo 2013: 16-7; Luse, Mennecke & Townsend 2012:145). In this study, the researcher used both the structural conceptual framework and the theoretical framework. The structural conceptual framework used is modified mental disorder and social capital, and the theoretical framework is systems theory.

1.8.1. Modified mental disorder and social capital structural conceptual framework

The researcher used the modified mental disorder and social capital structural conceptual framework (Baingana et al 2005:11; Kinser & Lyon 2014:667; WHO2005b:48). The researcher chose this model because it holds the important concept that could determine the surgical repair effect on mental health outcomes of women with obstetric fistula. The framework of this study provides an overview of the effect of surgical repair on depression and anxiety severity; explore the bidirectional links between socio-demographic factor, fistula history, psychological distress (depression, anxiety, and PTSD), and psychosocial consequences of obstetric fistula. This conceptual framework was utilised to investigate the interrelationship between variables with multiple causations and multiple effects of depression and anxiety. In this study, the researcher describes the association between these phenomena and understands how they mediate and influence one another in the development of mental health. The model will be important to develop an integrated mental health treatment model for women with obstetric fistula in Ethiopia and provide guidance in the choice of analysis methods. It recognizes that psychological distress is influenced by traumatic events such as the history of obstetric and surgical outcome, the level of social support, personal factors such as socio-demographic status, childhood development factor, and economic status. Figure 1.1 presents a mental disorder and social capital structural conceptual framework, showing the interrelationship between social interaction, personal factor, traumatic event and psychological distress (depression and anxiety) and also posttraumatic stress disorders of women with obstetric fistula.

Personal factors
- Socio demographic
- Childhood development

Traumatic event
- History of obstetric fistula
- Surgical outcome

Psychological distress (*anxiety& depression*)

Social interaction
Social support

Post-traumatic stress disorder (PTSD)
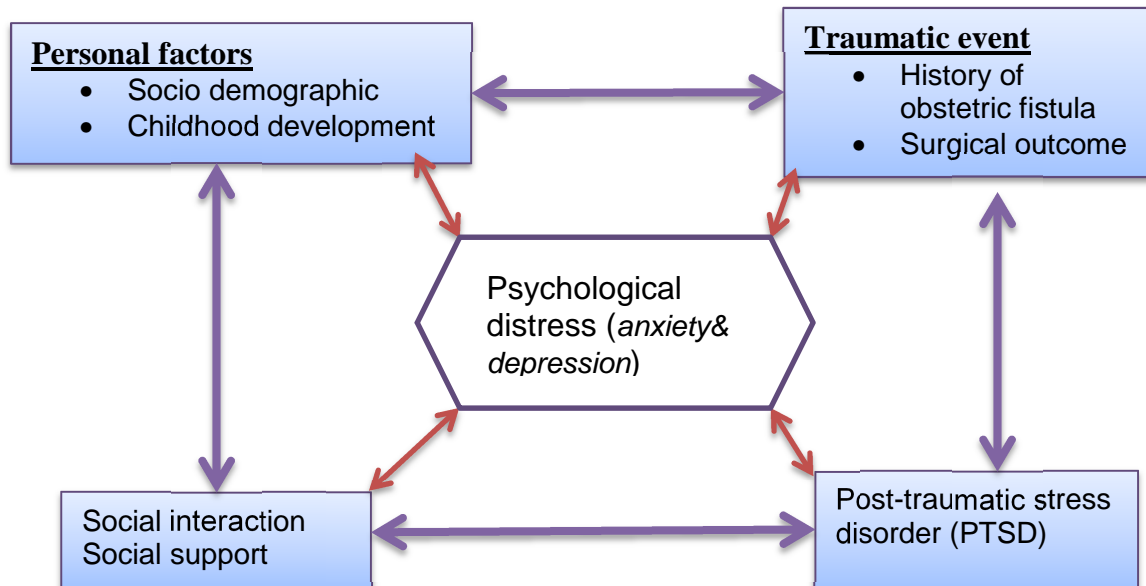
Figure 1.1: Modified mental disorder and social capital structural conceptual framework

1.8.2. Systems theory

The systems theory formed the basis for the model development phase of this study. According to Ravitz, Sapirstein, Pharm and Doyle (2013:355), a system refers to a collection of different elements or parts that together produce results that cannot be obtained from the relevant individual elements in isolation. The emphasis of this theory is on the interdependence and interconnectedness of different parts of a system. The system theory is a collection of different parts that cannot independently produce results (Ravitz et al 2013:355). For Ibadin (2015:1), this theory has four basic components: inputs, process, output, and feedback. The author posits that there is a dynamic interaction between these systems to bring about holism to the entity. Leddy and Pepper (1998:168) state that the systems theory is one concerned with changes due to interactions among variables in a situation. This implies a dynamic relationship between a person and the environment. Auger (1976) in Leddy and Pepper (1998:169) states that the systems theory aims at understanding the interaction among parts of a system and not functions. According to WHO (2012:105), a well-functioning health care system calls for inputs such as governance, leadership, health information systems, human, material and financial resources for the system to produce service delivery (output). Echoing similar sentiments, Meyer and O' Brien-Pallas (2010:2831-2833) and Ibadin (2015:1) posits that systems are made of four components: inputs (drive

applied in the system), processes (actions that take place to bring about the change to the input), outcome (results from the processes), feedback (information used to evaluate or monitor the actions of a system). The dynamic interconnectedness or interaction between the parameters brings about the completeness of the system.

The researcher used the systems perspective to underpin the research study. The rationale for using the systems theory was enhanced by the fact that as a point of departure the world is viewed as a system made up of sub-systems that were interconnected and interdependent to form an integrated and holistic system. The study was carried out in a health care institution (fistula hospital) which is composed of different units, departments, and programmes. One of those programmes is obstetric fistula surgical repair, which is interconnected and interrelated to its environment. The obstetric fistula surgical repair is a sub-system of the whole health care system and is influenced by the environment and context (WHO 2012:104-110). According to Ravitz et al (2013:354), dysfunctionality in any of the sub-systems affects the whole system. The researcher perceives that a network of interconnected elements acting on each other and inducing a change in them and a serial arrangement of input, throughput, and outcome. In this study, input refers to the resource (financial, human, Physical infrastructure and material) that is required to achieve the purpose of a system. Throughputs determine different processes of transforming the resource to a usable product. These lead to the outcome, which is the end result or product. The same elements of the system theory assisted the researcher in organising the developed the model.

1.9. RESEARCH METHODOLOGY

The research methodology is a way to systematically solve the research problem (Rajasekar, Philominathan & Chinnathambi 2013:5). To achieve the research objectives, the researcher conducted the study in two phases, namely empirical phase and model development phase.

1.9.1. Empirical phase

This phase highlights the research paradigm, approach, design, and methods used for obtaining empirical data.

1.9.1.1.   Research paradigm

Patton (2002) in Chilisa and Kawulich (2012:1) states that, the paradigm is a way of describing a worldview that is informed by philosophical assumption about the nature of social reality (ontology), ways of knowing (epistemology), ways of ethics and value systems (axiology), and ask certain questions and use appropriate approaches to systematic inquiry (methodology). Polit and Beck (2012:11), define a paradigm as a worldview, a general perspective on the complexities of the world. In this study, the researcher used the "Positivism" paradigm. Positivism (also known as logical positivism) is an objective based scientific method, techniques and procedures used in the natural sciences. It offers the best framework for investigating the cause and effect relationship, and is independent of the researcher interest (Polit & Beck 212:12; Chilisa & Kawulich 2012:7). Eichelberger (1989) in Chilisa and Kawulich (2012:8) states that positivism is a belief or fact that can be tested empirically, confirmed or verified or disconfirmed based on the concepts such as the data values, predicted result, objective of the study, and tested theory. It may also find the strength of relationships between variables or a cause and effect relationship. It is for the aforementioned characteristics that the researcher chose positivism paradigm to measure changes of depression and anxiety symptoms before and after surgical repair. Additionally, it was chosen to determine the causal relationships between surgical repair and severity of depression and anxiety symptoms. This positivism paradigm is discussed in more detail in Chapter 3.

1.9.1.2.   Research approach

The research approach is a plan and procedures for a research, which spans the steps from the broad assumption of research design, data collection method, analysis, and interpretation of data (Creswell 2014:3). The researcher used a quantitative research approach. According to Creswell (2014:188), quantitative research entails formal objectives, research question/

hypothesis, the purpose of the study, systematic process of numeric data collection and statistical modelling of the data analysis. Burns, Grove and Gray (2013:54) point out that quantitative studies seek to describe and investigate relationships among variables, and determine cause and effect relationships between variables. The variables are recorded as numbers and statistical methods are used to measure relationships between and among them. Data in quantitative studies are collected using structured questionnaires and can be summarised numerically. It is on the aforementioned merits that the researcher chose a quantitative research approach to measure the severity of depression and anxiety before and after surgical repair and their causal relationship.

1.9.1.3.   Research design

A research design is an outline for conducting a study that maximizes control over factors that could interfere with the validity of the findings (Burns et al 2013:195). Therefore, the researcher used longitudinal study design. The longitudinal study design is a quantitative research study that involves repeated observations of the same variables from the same respondent over a specific time period,, the data collected with the combination of exposure and outcome without any external influence (Edward, Marius, Jules & Piergiorgio2015: 537). It allows the researcher to detect changes in the women with obstetric fistula over the period, determine causal relationships between surgical repair and severity of depression and anxiety symptoms. More details regarding this concept are discussed in Chapter 3.

1.9.1.4.   Data collection method and procedures

According to Polit and Beck (2012:725), data collection is the gathering of information to address a research problem. In this study, data was collected from 219 respondents using a consecutive sampling method by a structured questionnaire. The questionnaire was structured into four parts composed of socio-demography, the social history of the respondents, childbearing characteristics, and Likert scale questionnaires for symptoms of depression, anxiety, and post-traumatic stress disorder (PTSD).

1.9.1.5. *Data management and analysis procedures*

The researcher assessed the quality, accuracy, and completeness of the questionnaires using range plausibility and cross-validation checks, and double data entry using epidemiological-data software (EPIDATA) version 3.32for ascertaining the accuracy and consistency of the entered data with subsequent cleaning to maximise its quality. After completing data entry, checking, and cleaning, the data was transferred to Statistical Package for Social Science plus Analysis of Moment Structures (SPSS-AMOS) version 20. Details of the process will be discussed in Chapter 3. The findings from the data analysis guided the development of integrated mental health treatment model for women with obstetric fistula, which formed the basis of phase two of this study.

1.9.2. Model development phase

The second phase of this study developed integrated mental health treatment model for women with obstetric fistula in Ethiopia. This phase builds on the finding of the empirical phase using Chinn and Kramer (2011:27) process of model development. For rigor and trustworthiness, the researcher utilised the principles of Chinn and Kramer (2011:237) as well as a modified version of the Delphi technique for expert and peer review (Hasson & Keeney 2011:1696). A detailed description of the above processes provided in Chapter 3.

1.10. ETHICAL CONSIDERATION

Ethical practice in research requires respect for individual respondents and institutions (Creswell& Plano-Clark 2011:191). To ensure anonymity and confidentiality, the respondents were informed about not to write their name in the questionnaire and instructed to put the completed questionnaire in locked cabinet/boxes. The researcher made efforts to comply with the ethical principles and rules as discussed in Chapter 3.

1.11. SCOPE OF THE STUDY

This study focused to analyse the effects of surgical repair on the severity of depression and anxiety associated with obstetric fistula among women in Ethiopia. The researcher measured changes of psychological distress before surgery (baseline) to right before discharge after

surgical repair. This study did not attempt to study the long-term mental health outcomes, which might occur after their discharge. The variation and the change of severity of depression and anxiety of obstetric fistula focused only between admission and their discharge. Findings from the longitudinal design of the study were used to develop an integrated mental health treatment model for women with obstetric fistula to address their mental health needs.

1.12. STRUCTURE OF THE THESIS

This thesis consists of six chapters and sub-sections. The highlighted descriptions of each of these chapters are presented below to allow readers to follow and understand discussions on issues.

Chapter1: Orientation of the study

This chapter provides an introduction and background information about the research problem, purpose, objective, and the research question of the study. The chapter also defines the key concepts, the methodology, theoretical framework, ethical consideration and highlights the scope of the study.

Chapter2: Literature review

This chapter focuses on literature reviewed. It highlights the importance of literature review, literature review paradigm, literature search strategy, appraisal of identifying literature and themes that emerged from the literature reviewed. The chapter also presents the epidemiology of obstetric fistula, factors associated with obstetric fistula, the impact and surgical repair of obstetric fistula. The last section of this chapter includes limitation of the existing literature while highlighting the gaps in the existing literature, which necessitated the conducting of the study.

Chapter 3: Research methodology

The study was carried out in two phases, namely empirical phase and model development phase. This chapter provides detailed information regarding the methodology for each phase. Phase one provides detailed information regarding research paradigm, approach, design, and methodology of the study. This chapter presents a description of the study site, sample,

and sampling method, data collection method, data management and analysis, measures taken to ensure the validity and reliability and ethical issues related to the study. A similarly detailed description of the process followed for model development in phase two is also given

Chapter 4: Analysis, presentation, interpretation, and discussion of research findings

The analysis, presentation, interpretation, and discussion of the research finding are described in this chapter. The chapter also presents steps taken to conduct structural equation modelling to ensure that the data set fit sample theory of measuring the severity of depression and anxiety. This discussion will inform the basis for the development of the relevant model, which will explain, and guide the improvement of mental health needs.

Chapter 5: Integrated mental health treatment model for women with obstetric fistula

This chapter gives an overview of the model. It provides a description of the model, assumption, purpose, and structure of the model, in relation to the systems approach, in the context of addressing the mental health needs of women with obstetric fistula.

Chapter6: Conclusions, limitations, and recommendations

In this chapter, the conclusions of the main research findings are presented in relation to the research objectives. The chapter highlights the contribution and limitations of the study. The chapter also presents the recommendations drawn from the study.

1.13. CONCLUSION

This chapter provides an overview of the whole study. The chapter highlights background, problem statements, and purpose of the study as well as research questions. The researcher gave a brief outline of the theoretical framework of the study. The research methodology is briefly discussed and its application is presented in Chapter 3. The review of the literature presented in Chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

In the previous chapter, the researcher provided an orientation to the study, including the background of the research topic, statement of the problem, the purpose, and objectives of the study. The chapter also stated the scope of the study and defined the key variables in the study. In this chapter, the researcher analyses, compares and synthesis prior research related to the research topic, question, and key study variables. This chapter reviewed relevant literature that was conducted to generate an image of what is known and not known about the experiences of women with obstetric fistula and the impact of surgical repair. This review brings out gaps in the existing literature, thereby establishing the concept of the study. The information is organised along the main concepts in the study: the importance of reviewing literature, the paradigm and strategy of organizing literature review, and literature appraisal. This chapter also states the themes of obstetric fistula that emerged from the reviewed literature; the epidemiology of obstetric fistula and associated factors, the impact of obstetric fistula (physical, psychological), and the effect of surgical repair on mental health outcomes. The last section of the chapter presents the limitation of existing literature.

The main sourcing of literature also described. Several data sources were searched include BMC Health Service Research, Google Scholar, and SAGE. The literature search focused on national (Ethiopia) and International guidelines. The process also involved updating the reviewed literature according to the latest guidelines and protocols.

2.2. THE IMPORTANCE OF CONDUCTING LITERATURE REVIEW

The purpose of conducting literature review is to generate an understanding of what is known about a particular situation, phenomenon, or problem and to identify knowledge gaps that exist (Burns et al 2013:40). The literature review is both summary and explanation of the complete articles, books and other documents, which state the current knowledge on a specific topic; providing detailed and relevant knowledge about the problem (Burns et al 2013:707; University of Guelph 2013:1).

The literature review provides a description, summary, and critical evaluation of books, scholarly articles and any other sources relevant to the research problem being investigated (Fink 2014:130). The literature review provides an overview of sources explored while researching a particular topic. It also demonstrates to the readers and researchers on how the current research fits within a larger field of study (Fink 2014:30).

A literature review puts one's research into context by a critical analysis of a segment of a published body of knowledge through summary, classification, and comparison of prior research studies, review of the literature and theoretical articles (University of Wisconsin 2013:1). According to Jill (2011:10) and Diana (2012:3), a literature review generally consists of a summary of key sources and considers the following points:

- Provide a new interpretation of old material or combine new with old interpretations;
- Trace the intellectual progression of the field, including major debates;
- Depending on the situation, evaluate the sources and advise the reader on the most pertinent or relevant research; and
- Identify where gaps exist in how a problem has been researched to date.

The literature review is not a description of what other researchers have published, but it is a critical discussion that presents insight different arguments and approaches and also theories related to the specified research problem. For this reason, De Vos, Delport, Fouche and Strydom (2011:134) define literature review as an approach that generally aims at contributing to a clearer understanding of nature and the meaning of the problem that is identified. According to Polit and Beck (2012:95), a literature review of a research study provides context, confirms the need for new research, and demonstrates the writer's ownership of the literature. The main purpose of conducting a literature review is to learn from others, to generate new ideas, to summarize what is known and to integrate what is found in the present, to identify the methodology in discovering what is missing and to initiate familiarity and establish credibility in the field of knowledge (Neuman 2011:124). The literature review helps in minimizing the chances of duplication. It also increases chances of coming up with new information.

Based on the above arguments, the researcher has conducted a literature review related to the effect of surgical treatment of obstetric fistula on the severity of depression and anxiety.

This was done to identify what already exists in order to avoid duplication, to check the methodology used and identify gaps in the literature.

2.3.   LITERATURE REVIEW PARADIGMS

According to Polit and Beck (2012:236) and Booth, Sutton and Papaioannou (2016:10) there are different literature review paradigms to carry out health care research. There are ongoing discussions about the superior or inferior approaches of the literature review paradigms for decades, but they tend to focus mainly on the validity and reliability of research studies. In this study, the researcher used different literature review paradigms, which include argumentative, integrative, historical, methodological, systematic, and theoretical reviews. Each paradigm has its own strengths and weaknesses. In this study, the researcher has combined all the paradigms. The reason for combining all the paradigms is to maximise on the strengths of each paradigm, and with hopes that the weaknesses of one will be made up for by the strengths of the other. The combination of all the different review paradigms was used in order to get a broader view regarding sampling of women with obstetric fistula, appropriate study design, data collection, data analysis method in order to determine the effect of obstetric fistula treatment on mental health outcome (Onwuegbuzie & Frels 2016:24). Integrating different paradigms for literature review also helps the researcher highlight ethical issues taken into consideration, which the researcher should be aware of and consider throughout the study.

2.3.1. Argumentative review

The argumentative review examines literature selectively in order to support or refute an argument, deeply embedded assumption, or philosophical problem already establishes in the literature (Kathleen & Murowchick 2014:3-11). The purpose of using the argumentative review in this study is to develop a body of literature that established a contradictory viewpoint. However, the argumentative review can also introduce problems of bias when it is used to make summary claims of the sort found in systematic reviews (Kathleen & Murowchick 2014:3-11).

2.3.2. Integrative review

Integrative review: is a review that critiques and synthesises the representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated (Onwuegbuzie & Frels 2016:30). The body of literature includes all studies that address related or identical hypotheses or research problems (Onwuegbuzie & Frels 2016:30). The purpose of employing this literature review paradigm is to address or identify the research problem by reviewing representative literature.

2.3.3. Historical review

The historical review focuses on examining research throughout a period of time (Diana 2012:24). This type of review often starts from the time when an issue, concept, theory; or phenomena emerge in the literature for the first time and then continues tracing its evolution within the scholarship of a discipline. The purpose of historical review is to place research in a historical context in order to show familiarity with state-of-the-art developments and to identify the likely directions for future research (Diana 2012:24). In this study, historical review was employed to review the historical progress of obstetric fistula before and after surgical repair to understand the change or variation in the severity of depression and anxiety.

2.3.4. Methodological review

The methodological review approach is focused on methods used for conducting the study. This type of review does not usually focus on what someone finds, but what they used as a method of analysis (Onwuegbuzie & Frels 2016:24). Reviewing method of analysis provides a framework for understanding how researchers draw upon a wide variety of knowledge ranging from the conceptual level to practical documents for use in fieldwork. In this study, this review paradigm focused on the methodological limitation of the prior studies, including theory, research approaches, and data collection and analysis techniques.

2.3.5. Systematic review

The systematic review consists of an overview of existing evidence pertinent to a clearly formulated research question. It uses pre-specified and standardised methods to identify and critically appraise relevant research, and to collect, report, and analyse data from the studies that are included in the review (Onwuegbuzie & Frels 2016:25). The systematic review focuses on a very specific empirical question often formulated in a cause and effect form (Booth et al 2016: 10; Onwuegbuzie & Frels 2016:25). For this study, the question posed was "to what extent does a surgical treatment of obstetric fistula contributes to the severity of depression and anxiety?"

2.3.6. Theoretical review

Theoretical reviews examine the corpus of theory that has accumulated about the issue, concept, theory, and phenomena (Diana 2012:30. The theoretical literature review helps to establish what theories already exist, the relationships between them, to what degree the existing theories have been investigated, and to develop new hypotheses to be tested. This type of review assists in identifying appropriate theories or reveal the gaps in current theories in relation to explaining new or emerging research problems. The unit of analysis in the theoretical review may be a theoretical concept, a whole theory or framework (Diana 2012:30). The objectives of the study should be informed by current theory and knowledge, while the researcher's decisions about what theory and knowledge are relevant to the study depend on the research objective and questions. In this study, the researcher focused on what is already known about the effect of obstetric fistula and surgical treatment on mental health outcomes for women with obstetric fistula and the theoretical concepts and structural models that can be applied to the study.

The use of all literature review paradigms enriches the researcher with basic knowledge about obstetric fistula, mental health, specifically depression and anxiety, health service access and benefits that are accessible to them based on the purpose and objectives of the study. To enrich the basic understanding of the users, the researcher also included some unique information assumed important about women with obstetric fistula in Ethiopia. The researcher

also noted that it is often this third layer of knowledge that is cited as "true" even though it often has only a loose relationship to the primary studies and secondary literature reviews.

2.4. SEARCH STRATEGY AND ORGANIZING LITERATURE

In order to integrate different literature review paradigms, the researcher used systematic approach (integrated literature review paradigms) for exploring all possible sources of literature. The researcher has used books, peer-reviewed journals, case studies and other relevant documents from the University of South Africa library that are related to obstetric fistula with mental health, risk factors of obstetric fistula, and obstetric fistula surgical repair. The researcher used electronic databases like PubMed/Medline, BMC/Cochrane review/trial register database; hand searched the hard copies available at the Ethiopia UNISA library, personal references, and emails to experts' review list, and web such as Google Scholar. The following words and phrases were used as search terms: "obstetric fistula", "surgical impact", "depression", "anxiety", "obstetric fistula associated with mental health" and "structural modelling". Each of the search terms was initially used individually, and then combined using the following structure to guide the literature review process:

- An overview of the subject, issue, or theory under consideration, along with the objectives of the literature review;
- Division of works under review into themes or categories;
- An explanation of how each work is similar to and how it varies from the others;
- Conclusions as to which pieces are best considered in their argument as most convincing of their opinions, and make the greatest contribution to the understanding and development of obstetric fistula with mental health and also the effect of treatment on the severity of depression and anxiety outcomes.

Before writing the literature review, the researcher clarified the following issues:

- How many sources should be included?
- What types of sources should be used in review (book, journal articles, websites; scholarly versus popular sources)?
- Summarised and analysed sources by discussing a common theme or issue
- Evaluate the sources of subheadings and other background information

During the review of the literature, the researcher evaluated each literature considering the following points:

- *Provenance:* what are the researcher's credentials? Are the researcher's arguments supported by evidence; historical material, case studies, narratives, statistics and recent scientific findings?
- *Methodology*: were the techniques used to identify, gather, and analyse the data appropriate to addressing the research problem? Was the sample size appropriate? Were the results effectively interpreted and reported?
- *Objectivity*: is the author's perspective even-handed or prejudicial? Is contrary data considered or is certain pertinent information ignored to prove the researcher's point?
- *Persuasiveness*: which of the researcher's theses are most convincing or least convincing?
- *Value**: are the researcher's arguments and conclusions convincing? Does the work ultimately contribute in any significant way to an understanding of the subject?

During the process of the literature review, the researcher considered the following basic stages:

- Problem formulation: which topic or field is being examined and what are its component issues?
- Literature search: finding materials relevant to the subject being explored
- Data evaluation: determining which literature makes a significant contribution to the understanding of the effect of obstetric fistula treatment on the severity of depression and anxiety
- Analysis and interpretation: discussing the findings and conclusions of the pertinent literature

Inclusion criteria for searching the literature

- Studies that explored the magnitude of obstetric fistula globally, sub-Saharan Africa and national perspective,
- Studies that examined factors that influence the development of an obstetric fistula,
- Studies that explored the impact of obstetric fistula on physical, psychological, and social well-being,

- Studies that explored the effect of surgical repair of obstetric fistula on mental health specifically depression and anxiety,

- Studies published since 2011,

- Studies that were published in English

2.5. APPRAISAL OF IDENTIFIED STUDIES

After applying each of the above criteria, more than 200 articles met the criteria for inclusion in the review. All the papers selected were critically examined. The process of reviewing each study was based on established and validated models of critical appraisal (Polit & Beck 2012:342). A mixture of appraisal frameworks must be used for appraising the aforementioned paradigm research sources, as these literature sources are inherently different in terms of the quality of evidence they offer. In essence, the review of individual studies was weighted on the knowledge contribution made to the current understanding of obstetric fistula associated with depression and anxiety. To be more specific, the studies were evaluated in terms of their rigour, validity, reliability, dependability, and transferability (Polit & Beck 2012:342). Further attention was given to the handling of data within each of the reviewed sources, including how well researchers addressed potential limitations of their studies. Several themes emerged during the execution of this review.

2.6. EMERGENT THEMES

The researcher followed the chronological approach and thematic (conceptual categories) to organise the results. With the chronological approach, the researcher focused on when the materials were published (Riessman 2007:57). With regard to thematic (conceptual categories) reviews of literature, the researcher organised the findings around the research topic rather than the progression of time (Riessman 2007:54). However, the progression of time is still an important factor in thematic reviews and was considered by the researcher. The following themes emerged from the literature sources reviewed:
- Epidemiology of obstetric fistula in the global, African, and Ethiopian context
- Factors associated with obstetric fistula
- The impact of obstetric fistula (physical, psychological and social)

- Surgical repair of obstetric fistula

- Limitation of existing literature

- Theoretical framework

- Conclusion

2.6.1. Epidemiology of obstetric fistula

Obstetric fistula is an abnormal opening between a woman's vagina and bladder and/ or rectum through which her urine and/or faeces continually leak (Tunçalp, Tripathi & Ahmed 2015:60). Classifications of fistula vary, but generally, fistula from obstetric causes includes Vesicovaginal fistula (VVF) and rectovaginal fistula (RVF) (Adler, Ronsmans, Calvert & Filippi 2013:1). An obstetric fistula caused by continuous pressure exerted on the vaginal wall, bladder, and rectum, by the impacted head of the flutes, which leads to decreased circulation and breakdown of vaginal tissue. Over time, the tissue gives way, leaving a hole through which urine or stool leak uncontrollably. It is also possible for a woman to have an iatrogenic fistula, caused by a surgical error during obstetric or gynaecological surgery (Raassen, Ngongo & Mahendeka 2014:1699; Onsrud, Sjoveian & Mukwege 2011:14). It is estimated that 13.2 percent of genitourinary fistula results from provider error. Hysterectomy is the most common gynecological procedure leading to fistula (Raassen et al 2014:1701).

Reliable data on obstetric fistula is limited because of the stigma associated with the condition. The WHO estimated that more than 2 million young women throughout the world live with untreated fistula and that between 50,000 to 100,000 new women are affected each year. Obstetrics fistula commonly occurs in sub-Saharan Africa, where the women face challenges in obtaining quality health care (WHO 2014:1). These statistics originated from countries' rapid needs assessments and physicians' reports, mostly available in the grey literature, and not from epidemiological studies using robust design.

Fistula has devastating consequences, particularly in low-income countries where women have less geographical and financial access to appropriate surgical care for repair (Alder et al 2013:1). The prevention and treatment of obstetric fistula still remain a concern and a challenge in low-income countries where access to emergency obstetric care and skilled birth

attendance are insufficient (Tayler-Smith, Katiezachariah, Rony, Marcel, Wilma et al 2014:165; Osotimehin 2013:1703). Though obstetric fistula is also devastating in high-income countries, their impact is limited as they are very rare and surgery to repair them occurs more rapidly.

2.6.1.1. *Epidemiology of obstetric fistula in Africa*

Obstetric fistula (OF) is one of the major potential complications of childbirth in low-income countries, with more than 90% of fistula cases occuring because of prolonged and unrelieved obstructed labour (Allen, Lakin, Shobeiri 2011:469). It is difficult to estimate the number of women who are living with fistula due to limited documentation. The other challenge of finding women with fistula is that most of the women are often in hard to reach areas. Prevalence is estimated to be greatest in parts of sub-Saharan Africa and South Asia because of poor health systems and limited access to skilled delivery and emergency obstetric care (Kayondo et al 2011:2; Tunçalp et al 2015:60). In these high burden countries, the vast majority of fistula cases are caused by prolonged and obstructed labour (Tebeu, Fomulu, Khaddaj, Bernis, Delvaux & Rochat 2012:389).

In sub-Saharan Africa, obstructed labour is one of the leading causes of maternal mortality. It is estimated that for every maternal death, 20-30 women develop serious obstetric complications including fistula (Ahmed & Tunçalp 2015:243). Though there is no actual statistics related to women who die of obstetric fistula, the high maternal mortality ratio is used to estimate the prevalence of this condition (Adler et al 2013: 2).

However, it is estimated that less than 1/1,000 women of reproductive age in low –and middle-income countries are living with an obstetric fistula. The prevalence rises to 1.6/1,000 women who live in sub-Saharan Africa and 1.13/1,000 women living in South Asia (Alder et al 2013:7). The pooled incidence of fistula was 0.09 per 1,000 recently pregnant women (Alder et al 2013:8). In another systematic review report from sub-Saharan Africa and the Middle East, 79.4% and 100% of reported fistula cases were obstetric, respectively (Tebeu et al 2012:392). Compared to other low-income countries, sub-Saharan African countries appear to have the highest incidence and prevalence of obstetric fistula. In sub-Saharan

Africa alone, a recent review of obstetric fistula showed that the fistula has been most often related to pregnancy (90.4%), followed by pelvic operations (5.3%), and sexual assault (4.3%) (Maheu-Giroux, Fillippi, Samadoulougou, Castro, Maulet, Meda et al 2015: 275). However, a review by Maheu-Giroux et al (2015:275), estimates the prevalence of women with fistula because of sexual violence to be higher (22%). This was the highest prevalence of sexual assault-related fistula, compared with an overall prevalence of 4.3. It was estimated that 3 in every 1000 women have had symptoms of obstetric fistula in their lifetime. In a study of the prevalence of vaginal fistula symptoms in 19 sub-Saharan countries through a meta-analysis of Demographic Health Surveys (DHS) and Multiple Incidence Cluster Surveys (MICS), the rate ranged from 0.4 fistulas per 1,000 women of childbearing age in Burkina Faso to 19.2 fistulas per 1,000 women of childbearing age in Uganda (Maheu-Giroux et al 2015: 275).

Given the difficult geopolitical situation in sub-Saharan Africa, the relative prevalence of obstetric fistula remains difficult to accurately assess. The incidences of new fistula cases fluctuate because of conflict or outbreaks of infectious disease. It is, however, important to note that only limited epidemiological data describing obstetric fistula exist due to the fact that the victims are ostracised or living in remote resource-limited settings (Tuncalp et al 2015:60).

2.6.1.2. *Epidemiology of obstetric fistula in Ethiopia*

Ethiopia is among the few countries with a high prevalence of untreated obstetric fistula. This is because the majority of women in Ethiopia deliver their babies at home (Central statistics Agency [CSA] 2016:23). This report revealed that only 28% of women received skilled delivery assistance. Different structural barriers such as distance to the health facility and transportation cost further compounded by socio-cultural preferences for home deliveries limit access to and uptake of key maternal health services.

In the absence of reliable and routine data-collection of birth outcomes orcommunity-based surveys, the most commonly cited projections of current incidence and prevalence of obstetric fistula are based on modelled estimates generated through a USAID situation

assessment conducted in 2013 (Duby & Hailey 2013:46). This assessment estimated a fistula incidence of 3,500 per year with a prevalence of 37,500 untreated fistula (range 36–39,000) and 161,000 urinary incontinence cases in 2010 (Duby & Hailey 2013:46). Biadgilign, Lakew, Redaand and Deribe (2013:4-5) estimated lifetime prevalence rate of obstetric fistula at 10. 6 and 7.3 per 1000 women aged 15-49 years who had ever given birth and given birth in Ethiopia respectively. By analysing the information collected on demographic and health survey, and multiple indicator surveys in 19 countries of sub-Saharan Africa, Maheu-Giroux et al (2015:273) estimated that 7.1 in every 1000 women have had symptoms of obstetric fistula in their lifetime in Ethiopia.

The Ethiopian Government, with the support of development partners, has in recent years, rapidly expanded access to Maternal, Neonatal, and Child Health (MNCH) services. Although reliable and recent data for obstetric fistula is not available, such improvements in maternal and childcare services are very likely to be contributing to a reduction in the number of new fistula cases. However, the incidence of obstetric fistula is thought to be declining in Ethiopia, from 1% in 2005 to 0.4% in 2016 (CSA 2016:26). The reduction is related to the rapid expansion in access to reproductive and maternal health services. Another study found that among women of reproductive age, the prevalence of obstetric fistula was 0.06% (6 per 10,000 reproductive-aged women) and 0.02% (2 per 10,000 reproductive-aged women) for untreated fistula (Ballard, Ayenachew, Wright & Atnafu 2016:3). Accurate Figures of the prevalence of obstetric fistula are also difficult to obtain, as women are often reluctant to disclose their condition and tend to isolate themselves.

2.6.2. Factors related to obstetric fistula

Several demographic characteristics increase the risk for obstetric fistula. Examples of those factors include low or no educational attainment, delay in seeking delivery services, prolonging labour, cultural practices, stillbirth and poor access to maternal health care (Alio et al 2011:376; Cowgill et al 2015:6; Roka et al 2013:4-5).

Other socioeconomic factors such as gender inequality, oppression of women forced adolescent and teen marriages; low education levels for girls, male control of money, and the

need for women in obstructed labour to get the permission of their husband to seek care are common findings which contribute to high fistula rate (Roush, Kurth, Hutchinson & Van Devanter2012:88). Gender power imbalance has been implicated in food insecurity for women, higher rates of malnutrition, unsafe abortion and sexual violence, which are factors that have been associated with obstetric fistula (Roush et al 2012:97). These risk factors are largely preventable and knowledge of them should inform targeting of preventive measures. According to Tebeu et al (2012:394) report, sub-Saharan Africa has the highest level of adolescent childbearing, with more than 50% of women giving birth before the age of 20 years. In a systematic analysis, 8.9-86% of women with fistula were teenagers. The report also indicated that about 31-66.7% fistula occurs during the first pregnancy (Tebeu et al 2012:387).

Many of sub-Saharan Africa women with obstetric fistula have delivered at home because the health facilities are far away, cultural beliefs regarding hospital delivery, unfriendly health care services especially for teenage girls who might even shy away from the facilities. About 57.6-94.8% of women with obstetric fistula have delivered at home and were secondarily transferred to the health facility (Tebeu et al 2012:392). In cases where labour ended in a home delivery, 9-84% of the cases develop obstetric fistula (Tebeu et al 2012:392). Among women with fistula, 20-95.7% of women had laboured for more than 24 hours and the mean duration of labour ranged from 2.5 to 4 days (Tebeu et al 2012: 392).

Women who develop fistula usually experience multiple days of painful labour, commonly resulting in the death of their baby and other physical complications such as infection and infertility (Roka et al 2013:3). Bangser, Mehta, Singer, Daly, Kamugumya, and Mwangomale (2011:93) suggest that 90 percent of fistula cases are accompanied with stillbirth or neonatal death at the time of delivery.

Obstetric care for obstructed labour through caesarean section is essential in preventing the obstructed labour complex including fistula (Raassen et al 2014:1703). Poor surgical skill has been shown to actually lead to obstetric fistula. It is estimated that 13.2 percent of fistula results from provider error. In one review, four out of five fistulas developed following surgery for obstetric complication such as caesarean section, ruptured uterus repair or hysterectomy

for ruptured uterus (Raassen et al2014:1699). According to the recent study conducted in Ethiopia, 24.6% women had a high bladder fistula, which predominantly occurs following surgery, especially caesarean section or emergency hysterectomy, and 4.2% women had a ureteric fistula (Wright, Ayenachew & Karen 2016: 243).

A number of cultural practices also contribute to fistula development. Amongst the Hausa in Nigeria, there is a traditional practice known as *gishiri where* the genitalia is cut using a sharp object in order to remove a "film in a vaginal wall which is believed that it is caused by the reaction of salty and sweet foodstuff. This practice usually results in obstetric fistula. The *gishiri* fistula typically presents as a longitudinal cut through the bladder neck or urethra, or a similar finding posteriorly through the rectum (Kandala, Nwakeze & Kandala 2013: 787). Another practice, which also predisposes to obstetric fistula, is female genital mutilation (Buttia 2015: 8). Female genital mutilation may cause direct trauma to the urinary tract during the procedure. Secondly, extensive tissue loss from the vulva following infibulation (type III genital cutting) may be followed by marked fibrosis and a reduction in the vaginal length. The vaginal opening may also be too small, causing a delayed second stage scar. Under such circumstances, an extended midline episiotomy may be performed, leading to rectovaginal fistula (Frajzyngier, Ruminjo & Barone 2012:249). A cross-sectional study in Kenya found that where female genital cutting is practiced, there are other factors leading to obstetric fistula, such as early marriage and poor empowerment of women in general (Kimani, Ogutu & Anthony 2014: 278**).**

2.6.3. The impact of obstetric fistula

A number of features of obstetric fistula may increase the likelihood of developing depression and anxiety disorders. These features range from fistula risk factors to labour and delivery circumstances to post-delivery experiences (Bangser et al 201:92). Notwithstanding the direct effects of fistula development, underlying demographic characteristics of those with fistula may put them at risk for depression and anxiety (Cowgill et al 2015:6; Roka et al 2013:5; Roush et al 2012:88**).**

Obstetric fistula has great physical and psychosocial impact on the lives of women. They are extremely affected by high rates of physical and psychosocial morbidity, including mental health dysfunctions, post-traumatic stress disorder, loss of body control, shattered sex life, loss of self-worth, divorce, low quality of life, loss of babies during labour, loss of fertility, damage to the delicate hormone centres in the brain, social isolation and rejection, breached social network and marginalisation from the society (Alio et al 2011:371; Byamugisha et al 2015:1-2; Mselle et al 2011:8-11; Mohameda et al 2016:402; Siddle et al 2013:1215; Wilson et al 2015:610). According to Alder et al (2013:2) report, women and adolescents with fistula are often abandoned by their partners and families, ostracised by their communities, relegated to separate living spaces, and subjected to profound stigma and discrimination.

During obstructed labour and subsequent delivery, many women face significant psychological stressors. Evidence has shown that negative child-birth experience is a predictor of mental disorder symptoms such as depression and anxiety symptoms (Bangser al 2011:95). These women, apart from surviving the ordeal of obstructed labour, face the physical and psychosocial challenges of living with obstetric fistula (Ahmed & Tunçalp 2015:243). Studies in low income countries, including Ethiopia, report that women with fistula have significantly higher symptoms of depression, somatization, post-traumatic stress disorder (PTSD), anxiety, feelings of shame and loneliness and lower social support than other group of women (Alio et al 2011:375; Megabiaw et al 2013:3; Wilson et al 2015:610-12). According to a study conducted in Kenya by Weston et al (2011:32), 73% of women with obstetric fistula develop high rates of depression with 25% meeting the criteria for severe depression. These depressive feelings may affect individual performance of daily activities; worsen interpersonal relationships, and even lead to self-neglect and suicidal thoughts.

The physical consequences lead to severe social and cultural stigmatisation for various reasons by the community (Kimani et al 2014:286; Mselle et al 2011:10). Women with obstetric fistula are suffering from stigmatisation, social worthlessness, and isolation (Mohameda et al 2016:402). It is likely that biological, psychological, and social factors interact to trigger self-stigma because they will frequently struggle with the symptoms of mental health. The social effects of incontinence are different for each woman due to different factors, but common social outcomes include divorce/separation, abandonment,

stigma, and social isolation. Sufferers of obstetric fistula are often subject to severe social stigma due to their smell, perceptions of uncleanliness, and a mistaken assumption of venereal disease and in some cases infertility. Many marriages do not survive due to inability to cope with ongoing physical and emotional health issues. Bangser et al (2011:95) estimate that 25% of women experienced divorce/separation due to obstetric fistula. The pain of being unclean and sexually undesirable affects women psychologically.

The negative social consequences of obstetric fistula, such as lack of social support, stigma, and feelings of shame very likely contribute to mental disorders with some studies indicating their correlation with poor mental health and in some cases with suicide (Alio et al 2011:372; Rahm et al 2013:269). Depression was inversely correlated with social support. This was recorded by Dennis et al (2016:433) mentioning that individuals with higher levels of social support reported lower levels of depression. Other study findings indicated that women who undergo a severe event are less likely to develop depression if they have social support after developing an obstetric fistula (Dennis, Wilson, Mosha, Masengo, Sikkema, Terroso & Watt 2016:437). According to Weston et al (2011:31), depression symptoms are significantly associated with unemployment, lack of social support following fistula and living with fistula. Women with obstetric fistula may lose their jobs or will not be able to carry out economic tasks they used to do. That inability to work might push the women further into poverty, which might affect their psychosocial performance.

Despite physical problems related to incontinence and vaginal pains, the results reflect a high prevalence of perceived bad psychological health. This difference may be due to infection from leaking urine or to other health effects of obstructed labour that may co-occur with fistula, such as damage to nerves or joints (Wilson et al 2015:613). It is also possible that long-term stress and psychological dysfunction have increased the physical health complaints of women with fistula.

2.6.4. Surgical repair of obstetric fistula

The diagnosis of obstetric fistula is done clinically through a pelvic exam verified by a dye test or cystoscopy (Mohr, Brandner, Mueller, Dreher & Kuhn 2014:1). The treatment of obstetric fistula is mainly surgical through transvaginal or transabdominal techniques in order to close the hole in the bladder and/or bowel. Obstetric fistula repair surgery has been demonstrated to positively impact a woman's life through improvements in her physical and psychological condition, and in her interpersonal relationships (Dennis et al 2016:430). There is preliminary evidence suggesting that women with obstetric fistula following fistula repair surgery have experienced a decrease in psychological distress. A quantitative study conducted in Tanzania by Wilson et al (2016:944) reports that psychological distress, including depression and PTSD, and social functioning of women with fistula significantly decreased from admission to post-surgery. Qualitative findings support this evidence, showing that women with fistula relate experiences of improving quality of life, and social functioning and overall level of happiness after fistula repair (Drew et al 2016:11; Maulet et al 2013:531-2). These previous findings advocate that overall, women with obstetric fistula experience improvement in depression and anxiety following fistula repair.

Although some women do not fully recover from the first surgical repair and will continue to experience symptoms, or will need additional surgery, many women benefit from surgical repair (Dennis et al 2016:430). Surgical closure rates are reported to be as high as 90% but vary from one repair hospital to another (Delamou, Diallo, Beavogui, Delvaux, Millimono, Kourouma et al 2015:814). Rates also vary according to different characteristics, including the denominator used, repair technique, the expertise of the surgeon, fistula characteristics and post-operative nursing care (Arrowsmith, Barone & Ruminjo 2013:1; Delamou, Delvaux, Beavogui, Toure, Abdoulaye, Kolié et al 2016:141). In spite of the total positive effect of surgery on psychological distress, there is also evidence that some women continue to experience distress after repair (Kayondo et al 2011:8; Wilson et al 2016:943). While becoming continent after repair represents arebirth for women suffering from fistula, failure of fistula closure can lead to further depression and isolation (Landrya, Vera, Ruminjo, Asiimw,Thiernoh& Bello 2013:940).

In the aforementioned study of women with fistula in Tanzania, there was a significant difference in post-surgery psychological distress and social functioning among women whose repairs failed. Specifically, psychological distress was worse for women whose fistula did not close after surgery (Wilson et al 2016:943). Those women whose surgeries resulted in incomplete fistula closure or stress incontinence report persistent negative mood following fistula repair (Pope, Bangser & Harris 2011:7). In addition, repeat surgery for a fistula that has not been closed represents an additional social and economic burden for the women and fistula care programmes as well as the reduced likelihood of successful closure with subsequent repair attempts (Maulet et al 2013:524).

2.7.   LIMITATIONS OF EXISTING LITERATURE

Obstetric fistula associated with mental health problems has become an important hidden public health problem (Kalembo & Zgambo 2012:3). Obstetric surgical repair is the common therapeutic intervention available to women with obstetrical fistula in Ethiopia: It poses a challenge for health care professionals who often fail to diagnose the associated mental health problems. The continued focus on physical intervention means that women will continue to suffer the salient burden of the associated mental health which can compromise the recovery problem (Dennis et al 2016:431; Nielsen, Lindberg, Nygaard, Aytenfisu, Johnston, Sørensen & Duffy 2009:1259; Kayondo et al 2011:8).

Despite this burden to health systems in most of the developing Sub Saharan Africa countries, including Ethiopia, there are limited comprehensive literature on the effects of surgical repairs of obstetric fistula on the severity of depression and anxiety and they are seeking care behavior. Most of the studies cited in the reviewed literature quantifying the magnitude of depression symptom and mental health dysfunction of women with obstetric fistula. While surgery most often cures the physical pain of obstetric fistula (understanding and addressing mental health symptoms in this population can improve quality of life and social functioning and overall level of happiness after fistula repair (Drew et al 2016:11; Maulet et al 2013:531-2).

As noted previously, cited studies have found depression symptoms and psychological dysfunction in women with obstetric fistula. However, many of these studies have important methodological and study design limitations, which necessitate further investigation of the effect of surgical repair on the severity of depression and anxiety symptoms. Such limitations reduce the validity of findings. The field of obstetric fistula integrating mental health is relatively new, and as such many studies do not consider follow-up with a comparison group (Bangser et al 2011:95; Maulet et al 2013:524; Megabiaw et al 2013:3; Weston et al 2011:33). These types of study designs limit the extent to which researchers can conclude that fistula is associated with depression and anxiety symptoms. Most of the data are cross-sectional and as such cannot be used to make conclusions about the trajectory of mental health after developing a fistula or after repair surgery.

A methodological limitation of previous fistula research is that most of the studies were analysed using traditional methods of analysis without accounting for correlation effect among multiple episodes. Traditional methods of analysis ignore the potential measurement error and do not account for the correlation between the explanatory variables. Therefore, traditional analysis can be incorrect and possibly entails misleading substantive. Given the complex nature of mental health of women with obstetric fistula, statistical methodologies that account for these complexities have substantial contributions to understanding the condition clearly. However, a study using the multilevel modelling technique defines separate parameters within the domain of the model parameters to account for the inter-individual/cluster dependence and estimates these parameters simultaneously with other model parameters (Twisk 2003:152-203).

In the organization of literature investigating psychological symptoms in women with obstetric fistula, there have been studies to date that have included a comparison group. However, neither of the studies included a comparison group comprised of women, which represents a major methodological drawback. Rather, the studies compared women with obstetric fistula to gynaecology outpatient (Wilson et al 2015:612). Given that individuals with newly diagnosed illness of obstetric fistula report higher level of psychological distress compared to gynaecological outpatient, it is unclear whether evaluations of psychological dysfunction are

attributable to fistula specific experience. Due to this relationship between physical pain (illness) and psychological dysfunction, it is reasonable to surmise that for women with obstetric fistula, some distress could be accounted for poor social support and feelings of shame. Women with obstetric fistula are often subject to severe social stigma due to their smell, perceptions of uncleanliness, a mistaken assumption of venereal disease and in some cases infertility, isolation and abandonment by their families and husbands (Bangser et al 2011:95; Mselle et al 2011:2; Alio et al 2011:372). For this type of control would likely present with general health-related distress, they could constitute a more appropriate comparison group. Thus, the same group before and after treatment could serve as the most appropriate control group.

No study to date has investigated the severity of anxiety and depression before and after surgical treatment in women with obstetric fistula in Ethiopia. As stated previously, the few studies that have been conducted investigating psychological distress symptoms, specifically depression in women with obstetric fistula, suggest that they do suffer from increased psychological distress (depression). While no studies have specifically focused on anxiety symptoms of women with fistula in Ethiopia, the severity of the physical and emotional trauma experienced by these women makes anxiety a reasonable result (Bangser et al 2011:95; Wilson et al 2016:944). Anxiety symptoms play a part in the psychological wellbeing of women with fistula, given demographic and cultural risk factors, the high prevalence of stillbirth, and negative labour experience. Since anxiety symptoms have not yet been qualitatively and or quantitatively assessed in women with obstetric fistula, assessing the effect of obstetric fistula on mental health distress before or after treatment has the potential to significantly contribute to the scientific literature on mental health distress of women with obstetric fistula.

Overall, further study into the changes of mental health (depression and anxiety) symptom after fistula repair and measuring the correlated effect leaking could be substantially strengthened to develop a model for managing the severity of depression and anxiety in women with obstetric fistula in Ethiopia.

From the available literature covering both theory and empirical studies, there is evidence that obstetric fistula enhances depression and anxiety. However, there is no information about the trajectory of mental health after developing fistula or after repair surgery. Examining these differences is important in determining the severity of depression and anxiety between pre and post-surgical repairs and develops an integrated mental health treatment model for women with obstetric fistula problem in Ethiopia support health care providers and for other groups.

2.8.   CONCLUSION

This chapter covered the literature review. Aspects such as the epidemiology of obstetric fistula in the global, African, and Ethiopian context, the factors associated with obstetric fistula, the impact of obstetric fistula (physical, psychological and social) and surgical repair of obstetric fistula were highlighted. The chapter concludes by providing limitations of existing literature. The next chapter focuses on the methodology and specific design employed to conduct this research study. Ethical issues are also addressed in the next chapter.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. INTRODUCTION

The previous chapter presented relevant literature reviewed regarding obstetric fistula, the effect of surgical repair on the severity of depression and anxiety. Finally, it addressed the interrelationships between multiple cause and effect of depression and anxiety using the theoretical framework of the study. This chapter describes and explains the research methodology used to address the research objectives and research questions/hypotheses. The research methodology is understood as a science of studying how research is done scientifically. It is inclusive of the research design and data collection methods (Burns, Gove & Gray 2013:707; Rajasekar, Philominathan & Chinnathambi 2013:5). This study was done in two phases, namely empirical and model development phase; this chapter provides detailed information regarding the methodology for each phase separately.

3.2. PHASE ONE: EMPIRICAL PHASE

In this section, detailed information on the research paradigm, approach, design and methods of the research is provided. The chapter also provides a description of the study setting, sampling and sampling method, data collection method, data management and analysis, measures taken to ensure the validity and reliability and ethical issues related to the study.

3.2.1. Research paradigm

Research paradigm is a basic and general organizing framework for theory and research. Kuhn (2011:1) and Polit and Beck (2012:604) define a research paradigm as a framework that contains acceptable views, or beliefs about a subject or a pattern of thinking of a person. The paradigm contains principles relevant to the field of the study, models and approaches to scientific research to determine the points of departure and methods to obtain valid and reliable data for seeking answers to a research question (Creswell 2014:6; Neuman

2011:94). A research paradigm provides structure and direction of how the researcher was undertaken and describes details of the severity of depression and anxiety among women with obstetric fistula before and after surgical repair. It also explains how the research should be performed and how the results were interpreted. In this study, a positivism paradigm was utilised. "Positivism" is the application of natural science research principles of the humanities so as to verify or confirm the strength of the cause and effect relationship (Polit & Beck 2012:607). The research approach of positivism is quantitative design, and the purpose of research is to predict results, test a theory, or find the strength of relationships between variables or a cause and effect relationship (Chilisa & Kawulich 2012:9).

Therefore, this study used this particular paradigm to enable the researcher to gain a clear understanding of the mental health outcome of women with obstetric fistula. This clear understanding about the cause and effect of surgical repair of obstetric fistula on mental health outcomes enabled the researcher to measure the severity of depression and anxiety, refine the change after their repair, and develop an integrated mental health treatment model for women with obstetric fistula to address their mental health needs. This study emphasizes the positivism of an observation and often associated with quantitative research. As the aim of quantitative studies is to compare attributes of different variables, unique factors in individual cases and information about context are ignored (University of South California [USC] 2013:1). Quantitative research begins with ideas, theories or concepts that are defined as they are used in the study to point to the variables of interest (Chilisa & Kawulich 2012:9). Positivists view reality as being objective and knowable; value free and based on precise research objective and verifiable measurement, used quantitative research design including longitudinal or causal-comparative research (Chilisa & Kawulich 2012: 17).

Thus, this study emphasises the positivism of an observation, which is often associated with quantitative research and addressed the following positivism characteristics:

- There was a tight control on the context being measured as described under and the researcher's beliefs and biases to avoid interference with the phenomena under study.
- The researcher developed appropriate data gathering instrument which could produce the absolute truth for a given inquiry, follows the deductive process and critically

focuses on the research objectives, described in section 3.2.4.4 and chapter 4, result section.

- The techniques of gathering data for this study was questionnaires, describe in section 3.2.4.4

- This study has used fixed and pre-specified designs, describe in section 3.2.3,

- This study analysed the data using quantitative or numeric information, described in chapter 4, result section.

- This study analysed the cause and effect of obstetric fistula surgical repair and severity of depression and anxiety symptoms, described in chapter 4, section 4.3.2.2 and 4.3.4.

3.2.2. Research approach

In this study, the researcher used a quantitative research approach. Quantitative research is the numerical representation and manipulation of observations for the purpose of describing and explaining the particular phenomenon and questions (Burns & Grove 2011:20-24). Quantitative research is based on a systematic and objective process, and deemed to provide a sounder knowledge base to guide health care practice as composed of qualitative research (Porter, Millar & Reid 2012:31). According to Wertz (2011:79), quantitative approach is more effective for enhancing people`s understanding of human experiences and factors that may influence behaviour. The quantitative research approach follows research objectives and questions/hypothesis, a systematic process to test a variable numerically, and determine cause and effect relationships between variables and their causality (Creswell 2014:188). It contains, a single subject experiment in which the treatment is administered over time to a single or a small number of individuals to investigate cause and effect relationship (Creswell 2014:41). However, quantitative study is used to test theories, collect descriptive information, analyse relationship between variables that are analysed using statistical methods.

Moreover, quantitative research approaches have their roots in logical positivism and tend to focus on measurable aspects of human behaviour, and focus on selected concepts and moves in an orderly systematic fashion (Burns et al 2013: 54). It is for the aforementioned merits that the researcher chose a quantitative research approach to measure the change of

severity of depression and anxiety before and after surgical treatment and their causal relationship.

3.2.3. Research design

A research design is an approach or an outline for conducting the study that maximises control over factors that could interfere with the validity of the desired outcomes needed to address the research aims and objectives (Moule & Goodman 2011:168; Rubin & Babbie 2011:647). In quantitative studies, the research design tends to be highly structured and controlled, and the design also includes aspects such as frequency of data collection, types of comparisons to be made and where the study will take place (Polit & Beck 2012:78). A good research design is characterised by the amount of information it generates and its power of testing the hypotheses (Creswell 2014:41-207).

The research design is the conceptual structure for action that serves as a bridge between research questions and the implementation of the research. In this particular instance, the researcher was interested in understanding the change in the severity of depression and anxiety before and after surgical treatment and their causal relationship. In order to answer the research questions, the researcher used a quantitative prospective longitudinal study design for investigating the effect of surgical treatment on the severity of depression and anxiety among women with obstetric fistula from obstetric fistula cohort.

The prospective study design was chosen in order to ensure that the exposure and outcome information from eligible individuals was self-reported. Prospective studies are particularly useful for evaluating cause and effect relationships, outcomes of treatments over different lengths of time, and analyse change over time for a group, or for particular individuals (Van-Belle, Fisher, Heagerty et al 2004:730). This prospective characteristic of quantitative longitudinal study design was therefore a preferable design for conducting this study because of the nature of the research problem, questions, objectives of the study and the type and nature of variables.

The longitudinal study design is a quantitative research study that involves repeated observations of the same variables from the same respondent over a period of time (Edward et al 2015:537). Longitudinal studies employ continuous or repeated measures to follow particular individuals over a period of time. They are generally observational in nature, with quantitative and/or qualitative data being collected on any combination of exposures and outcomes, without any external influence being applied. It allows the researcher to detect changes in the target population over the period and determine causal relationships between surgical repair and the severity of depression and anxiety symptoms.

3.2.4. Research methods

According to Burns and Grove (2011:335) and Rees (2011:244), research methods refer to the steps, procedures, principles and strategies for collecting and analysing the data in a research investigation. Research methods cover aspects, such as study setting, population, sample and sampling method, data collection method, data management and data analysis.

3.2.4.1. *Study setting*

Study setting is defined as the physical, social and cultural site where the researcher collects the data during the study (Polit & Beck 2012: 588; Creswell & Plano-Clark 2011:172). The study was conducted in six fistula hospitals in Ethiopia, a world-class centre of excellence for treating women with obstetric fistula. Ethiopia is the second largest in geographical terms and the second most populous country in sub-Saharan Africa. The country is located in Northeast Africa between 3° and 18° North latitude and 33 and 48 east longitude with 1.1 million square kilometers of the land area, bordering Sudan, Kenya, Somalia, Djibouti and Eritrea (UNICEF 2014:1).

In Ethiopia, maternal health service access and utilisation, and maternal mortality have shown dramatic improvement in the past ten years (UNDP 2015:41-43). These data reflect very promising improvements, although maternal mortality in Ethiopia is still high (CSA 2016:22-46). Obstructed labour is one of the leading causes of maternal mortality in Ethiopia (Berhan & Berhan 2014:26). The ministry is strongly working to improve access to obstetric

care and to move a substantial portion of primary care for pregnant women into the community setting. Ethiopia has nine regional states and only six of this regional states (Amhara, Oromia, Tigray, South Nation Nationality People Regional State, Harari Region and city administrative region (Addis Ababa) have dedicated fistula hospitals. These six fistula hospitals are built only for managing women with fistula. The fistula hospitals provide surgical repair of obstetric fistula free of charge through the support of governmental legislation and NGO funding. Once admitted to the fistula ward, women generally undergo repetitive surgery within two weeks and remain in the ward up to four weeks following surgical repair.

3.2.4.2. *Research population*

The population is a large collection of individuals known to have similar characteristics or target group under investigation (Neuman 2011:241; USC 2013:17; Burns et al 2013:351). Furthermore, De Vos et al (2012:223) define population as the totality of the person, events, organization unit, or case records from which the sample is drawn. As the researcher could not reach all women who have developed fistula in Ethiopia, the researcher only focused on the target population. Target population refers to a set of individuals who meet the inclusion criteria of the study and to whom the study is going to be generalised (Polit & Beck 2012:273). The target population was all women who have developed fistula and who were admitted to fistula hospitals in Ethiopia. Though the researcher has identified target population for the study, due to cost and time implication, the researcher has decided to focus only on accessible population. Accessible population is a group of the eligible population, which is available to the researcher as the subject of this study (Burns & Grove 2011:51). It includes individuals in the population who are accessible to the researcher. For this study, the accessible population was all women who are eligible to the study and newly admitted to the six fistula hospitals from 1st January to 30st June 2017. The total accessible population was 219 respondents. This population was obtained from the hospitals' registers of newly registered women with obstetric fistula scheduled for surgical repair in six fistula hospitals within a six-month period (from 1st January to 30st June 2017).

3.2.4.3. Sample and sampling method

3.2.4.3.1. Sample

A sample is a part, or a process or a subset of a population selected by the researcher to participate in a study and ensures generalisation of the findings to the entire population (De Vos et al 2011:222; Burns et al 2013:351; Polit & Beck 2012:750). In order to test the hypothesis and achieve high levels of power, it is important to have sufficient sample size to be representative of the population (Stephen 2012:98). The sample size needed in a study depends on many aspects such as the type and number of indicators to be estimated; the sampling plan to be used and the way in which the estimation is made (Klaus, Pham & Pham 2012:43).

However, in structural equation modelling determining the appropriate sample size is a critical issue. The major approaches to evaluating sample size requirements in structural equation modelling depend on factors such as the number of measured indicators, potential latent variables, standard errors, the probability of rejecting the null hypothesis (statistical power) when it is false, and bias for individual effects of interest (individual factor loading, correlation or regressive path) (Wolf, Harrington, Clark & Miller 2013:914-5; Sideridis, Simos, Papanicolaou & Fletcher 2014:733). Wang and Wang (2012:411) recommend a sample size of 200 and above samples as adequate and preferable for structural equation modelling. Based on the above criteria, the researcher determined the appropriate sample size considering different algorithms; such as required Type I errors (α= 0. 05) and Type II errors (power β=0.2), correlation (ρ = 0.37), effect size (δ = 0.3), 10 subjects per variable, ratio of indicators of latent variable with controlling the family-wise error rate=3 (Wolf et al 2013: 919-925). To calculate the minimum sample size for structural equation modelling:

$$n = \max(n_1, n_2)$$

$$n_1 = \left[50(\frac{j}{k})^2 - 450\ (\frac{j}{k})^2 + 1100 \right]$$

$$n_2 = \left[\frac{1}{2H} (A \left(\frac{\pi}{6} - B + D\right) + H + \sqrt{(A \left(\frac{\pi}{6} - B + D\right) + H)^2 + 4AH(\frac{\pi}{6} + \sqrt{A} + 2B - C - 2D))} \right]$$

$$A = 1 - \rho^2$$

$$B = \rho \arcsin(\frac{\rho}{2})$$

$$C = \rho \arcsin(\rho)$$

$$D = \frac{A}{\sqrt{3-A}}$$

$$H = \left(\frac{\delta}{z_{1-\alpha/_2} - z_{1-\beta}}\right)^2$$

Where j is the number of observed variables, k is the number of latent variables, ρ is estimated Gini correlation for a bivariate normal random vector, δ is the anticipated effect size, α is the sidak-corrected type I error rate, β is the type II error rate, and z is a standard normal score. The calculated values of n_1 & n_2 are 200 and 187 respectively, n=max (200,187) =200.

The minimum calculated sample size was 200 respondents. However, the lesson from previous literature is that large sample size in structural equation modelling is a critical issue. The fear is that the above sample size would be lacking adequate power to detect changes. Because of this, all newly registered women with obstetric fistula with a physician-confirmed diagnosis of fistula and surgical repair; admitted into the six fistula hospitals within a six-month period (from 1[st]January 30st June 2017) were included.

3.2.4.3.2. Sampling method

Sampling is a process of selecting a number or portion of individuals, events, behaviour or other elements of a delineated target population in order to obtain information regarding phenomena in a manner that the individuals in the sample represent as nearly as possible the characteristics of the whole study population (Burns et al 2013:708). In this study, the researcher used a non-random consecutive sampling approach to select appropriate respondents. Consecutive sampling is a type of non-random sampling, where each respondent meeting inclusion criteria are recruited to participate (Etikan, Musa & Alkassim 2016:2; Mugera 2013:3). The researcher recruited 219 newly registered women with obstetric fistula; who were scheduled for surgical repair at the six fistula hospitals within a six-month period (from 1st January to 30st June 2017) using consecutive sampling techniques. All selected respondents met certain criteria over a specified time interval to be included in the study.

Inclusion and exclusion criteria for selecting respondents

Inclusion criteria refer to a characteristic that the prospective respondents must meet to be eligible for participation in the study (Burns & Grove 2011:19). The following inclusion criteria were employed for selecting the study respondents.

Inclusion criteria:
- Women with obstetric fistula who were newly registered with a physician-confirmed diagnosis of fistula at the time of data collection;
- Women who have experienced obstetric fistula for a minimum of three months prior to being interviewed;
- Women who have awaited obstetric surgical repair; and
- Women who were not seriously sick during the data collection period.

Exclusion criteria:
- Women who had previously had a fistula repair surgery, but had severe residual urinary incontinence, and women who no longer have signs and symptoms of incontinence
- Women who had fistula from non-obstetric cause (such as; congenital or from hysterectomy);
- Women with other conditions, such as urinary incontinence from other causes, pregnant women, and those with pelvic organ prolapse.

3.2.4.4. Data collection

Data collection is a precise, systematic process or application of measuring instrument in which the researcher collects relevant data from respondents to get answers to the research problem, purpose and objectives (Burns et al 2013:523).

3.2.4.4.1. Development of the instrument

The data collection instrument is a tool that is useful for collecting facts and opinions (De Vos et al 2011:186). The researcher used a structured questionnaire as data collection

instrument. The researcher, in consultation with his supervisors, developed an adapted questionnaire for data collection. The adaptation was based on the research design, research problem, purpose and objective of the study. The questionnaire was adapted from Ethiopia demographic and health survey fistula assessment instrument, a comprehensive literature review on depression and anxiety disorders, theoretical framework and validated mental health assessment tool (English version). Additional questions were also added in order to enlist certain responses peculiar to this study.

The questionnaire was originally written in English and translated into Amharic (the official working language of Ethiopia). Proper expression and conceptualization of terminologies in local contexts were ensured by using a standard approach of iterative back translation by panels of bilingual experts, whose first language was Amharic. The translated version was back-translated and modified until the back-translated version was comparable to the original English version (Annex B). A Biostatistician also checked the questionnaire for validity and reliability focusing on the extent to which a test measures what it is supposed to measure in terms of logical and empirical validity. The Biostatistician further determined the content, face, predictive, concurrent, construct and statistical validity, and rationale equivalent and test-retest reliability. The final instrument consists of six sections (Annex C):

Section 1: Ten questions on socio-demographic information regarding the respondents included, age, ethnic group, marital status, literacy, religious activity, and the shelter of residence

Section 2: Eight questions on childbearing characteristics of the respondent

Section 3: Seven questions on fistula history characteristics of the respondent

Section 4: The researcher has adopted symptoms of the severity of mental health problem questions. Most of the measurement tool utilized Likert scales for response options. A visual representation of the scaled response option was categorised. The items on the questionnaire were-

- *Patient Health Questionnaire-9(PHQ-9)*: for screening severity of depressive symptoms (Kroenke, Spitzer & Williams 2001: 609). It is a type of latent categorical variable that was calculated by assigning 4-point Likert scale scores of 0 to 3 to the response categories of "not at all" to "nearly every day". The total score for the nine

items ranges from 0 to 27, which was used to measure (screen) and diagnose depression symptoms; scores 5, 10, 15 and 20 represent cut-off points for mild, moderate, moderately severe and severe depression, respectively

- *Generalized Anxiety Disorder Questionnaire-7(GAD-7)* for measuring anxiety symptoms (Lowe, Decker, Muller, Brahler, Schellberg, Herzog & Herzberg 2008:268; Spitzer, Kroenke, Williams & Lo¨we 2006: 1094; Dadi, Dachew, Kisi, Yigzaw & Azale 2016:2). It is a type of latent categorical variable that was calculated by assigning 4-point Likert scale scores of 0 to 3 to the response of "not at all" to "nearly every day" respectively. The total score for the seven items ranges from 0 to 21, which was used to measure (screen) and diagnose depression symptoms; scores 5, 10, 15 and 20 represent cut-off points for mild, moderate, moderately severe and severe depression, respectively.

- *Post-traumatic Stress Disorder (PTSD) Checklist-Civilian Version (PCL-C)* for measuring of post-traumatic disorder symptoms (Wilson et al 2015:604). A level of distress for each symptom was assessed on a 5-point Likert scale ranging from "1= not at all" to" 5=extremely". The total score for the seventeen items ranges from 17-85. The scores 17, 28, 30, 45+ represent cut-off points for no PTSD symptom, mild/some/ PTSD symptoms, moderately high severity of PTSD symptoms and high severity of PTSD symptoms respectively.

- *Oslo-3 Social Support Scale (OSS-3)* uses three items to screen current social support status and categorised into three groups (poor, intermediate, and strong support). OSS-3 was validated to measure social support in Ethiopia and it has good convergent and predictive validity for measuring social support (Belete, Andaregie, Tareke, Birhan & Azale 2014:111; Fekadu, Hanlon, Gebre-Eyesus, Agedew, Solomon, Tefera et al 2014:4).

Section 5: Five questions on fistula cure opinions after getting treatment. This measure was only administered to respondents after fistula repair surgery. Respondents expressed their views on fistula cure after surgery (Yes/No) question. Then, respondents used a 5-point scale to self-rate their perceived severity of current leaking.

Section 6: Six questions on health behaviors and well-being of the respondent after treatment. Respondents were asked questions to measure their plans for future care and

their engagement in sexual intercourse. They were asked a Yes/No question: "*Will you return to the hospital for follow up care?*", respondents estimated time to start sexual intercourse in the future, which was used as a continuous variable and as a dichotomous Yes/No variable. About sexual activities, it is important to note that women with obstetric fistula are medically advised not to engage in sexual intercourse for at least 3 months following discharge from the ward.

All the above instruments that were used to adopt the questionnaire have no copyright issues and no permission was required to reproduce, translate, display, or distribute the questionnaire. Thus, the researcher only adopted the items with appropriate referencing.

3.2.4.4.2. Recruitment of respondents

In this study, the researcher recruited respondents who met the inclusion criteria during their admission in collaboration with fistula hospital staff. The researcher used the assistance of psychiatric and midwife nurses who were working in an outpatient department room to recruit the respondent. Before conducting an interview, the researcher introduced himself to the potential study respondents, showed them the ethical clearance obtained from the University of South Africa, Department of Health Studies, Research Ethics Committee and Fistula Hospital. Study respondents were assured that the information obtained during the course of the study would be used solely for the purposes of the study. The researcher obtained verbal consent from each individual respondent prior to each individual procedure. In addition to this, the researcher and his assistants informed the respondents that the data will be collected anonymously.

3.2.4.4.3. Data collection process

In this study, the researcher made efforts to control the application of the study design, for protecting the integrity of the study. The researcher selected twelve data collectors (one psychiatrist and one midwife nurse from each fistula hospital) who were regularly working at

the fistula hospital. All selected data collectors were trained on the content of the questionnaire, issues of confidentiality, ethical conduct of human subject's research and data collection techniques for three consecutive days. After confirming data collectors' competency, the two data collectors (one psychiatrist and one midwife nurse) for each woman were assigned the responsibility to interview the respondents who meet the inclusion criteria during admission and discharge. Though the researcher trained the data collectors on how to use the questionnaire, the initial interviews were performed under his guidance and supervision. The researcher kept in touch with all research data collectors by asking questions on how they were following the established procedures and provided guidance where necessary.

The questionnaire was administered two times (first time during the admission and a second time during discharge). Qualified psychiatric nurses collected details of the socio-demographic, social history and childbearing characteristics of the respondent's, and administered the pre-surgery PHQ_9, GAD_7, and PCL_C questionnaire through the interview. Respondents were contacted within two days of admission to the fistula ward and informed that they will be contacted for a follow-up interview after getting treatment. During discharge, PHQ_9, GAD_7, and PCL_C Likert scale questionnaire was administered again and fistula cure perceptions (opinions) and health behaviors wellbeing of respondents were included, but this time by a midwife nurse who was blinded to the responses on the previously administered questionnaire in order to eliminate the data collectors effect or bias and in order to free respondents from possible fear of judgment.

The researcher for completeness evaluated all collected data daily in order to implement early correctional measures for the following day's activities. Data collection began on January 1st, 2017 and was completed by June 30th, 2017. All interviews were undertaken in Amharic (national working language of Ethiopia). The researcher maintained overall responsibility for the study to ensure that all procedures were followed in accordance with the approved study protocol.

3.2.4.5. *Data management*

Guided by the principle of conducting research, the researcher instituted stringent data management measures to ensure that the entire research process upholds the accurate privacy and confidentiality of the respondents. In order to ensure confidentiality of the respondents, signed informed consent and completed questionnaires were kept in a locked cabinet where no one other than the researcher can access. No personal identifiers such as name, address, and hospital identification numbers were documented on the questionnaires. This was done to ensure that data are not identifiable with the particular individual respondent. All data collectors returned the completed questionnaire in sealed envelopes addressed directly to the researcher thereby limited access by parties not privy to the study. All persons who had a role in data collection, data entry, and analysis processes were trained in research ethics with emphasis on preserving respondents' confidentiality and anonymity.

The researcher assessed the quality, accuracy, and completeness of the collected data using range plausibility and cross-validation checks to confirm that all is logical. Data cleaning was done by screening each questionnaire by the researcher and two of his assistants looking for completeness of the data. Two persons who had experience in using the Epidemiological-data software (EPIDATA) version 3.32, public access software made available from the United States Centres for Disease Control and Prevention (USCDC) application were hired as data entry clerks. The Biostatistician and researcher directly supervised the data entry process, which took place within the researcher's office. The Biostatistician developed an EPIDATA template for data entry and ascertaining the accuracy and consistency of the entered data with subsequent cleaning to maximize its quality of the data set by double data entry, audit trails, verification checks, and appropriate data cleaning procedures. Data that differed during double entry were crosschecked against the questionnaire concerned. Data entry lasted two weeks and took place in a room exclusively used by the engaged data entry clerks so as to limit access to the respondents' information by other parties. The questionnaires, which were selected to be included in the analysis, were then coded from 001 to 219 for the sake of referring when an error occurs.

3.2.4.5.1. Monotone and sample adequacy

Monotone response analysis was done to measure the response pattern of the respondent's network to answer the instrument. This type of response has little or no value for an analysis. Monotone responses are responses that have no/zero variance (Sideridis et al 2014:5). The minimum values of the study variance were 0.267 and confirmed that there was no monotone response. Kaiser-Mayer-Olkin (KMO) > 0.7 and Bartlett's tests for sphericity (P< 0.05) were considered for sampling adequacy for factor analysis (Sideridis et al 2014:40). The sample size of the study was appropriate to proceed with further analysis (Bartlett's test of sphericity (p<0.001) & KMO=0.881).

3.2.4.5.2. Missing values and outliers

The preferred method of dealing with missing data is expected maximization (EM) technique for producing variances, covariance's and means in an initial step, and repeating the whole process until changes in the parameters are so small, that the final solution is said to have converged (Sideridis et al 2014:11). Accordingly, in this study, missing values and outliers were cross-checked. Results indicated that there are no missing values in Likert scale measurement, but other socio-demographic and obstetric fistula history-related variables have less than the threshold (10%). This was not problematic to run the further analysis. In this case, the p-value is not significant (p > 0.05) indicating that the pattern of missing values in the data set is missing completely at random. The missing value upper limit was 20%. Anything above the 20% ceiling can potentially lead to a bias of the final result (Karanja, Zaveri & Ahmed 2013:745). Outliers were checked for each individual variable using boxplot and Mahalanobis distance in SPSS. Results showed that all the independent variables have no potential outliners. Outliers do not really exist in Likert-scales (answering 1 or 5 does really represented outliers' behavior but may indicate unengaged respondents. Unengaged respondents were checked and validated using zero variance, standard division (SD=0.5) and also compare 5% trimmed mean and mean values (Karanja et al 2013:748). The result of an outlier (unengaged respondent) in Likert scale variables revealed that, there is no zero variance, all variables SD above 0.5 (the minimum SD is 0.53) and there is no difference between these values of 5% trim mean and mean values. In addition, multivariate outliers were checked using Mahalanobis distance. Results indicated that there are no multivariate

outliers because the cumulative probabilities of Mahalanobis distance value from the chi-square distribution was greater than the p- values (the minimum value of p=0.061).

3.2.4.5.3. Addressing biases

Bias contaminates data, masking the true value of an observed correlation between variables. Causes of bias vary according to the nature of each study, the field of the study and the methodology the study uses (Doty & Glick 1998:376). Nonetheless, these causes of common method bias can be examined and addressed accordingly.

Common method bias is a measurement error. The statistical controls against the common method bias were Harman's single factor test (less than 50% cut-off point) (Podsakoff, MacKenzie & Podsakoff 2012:545). The common method bias was checked using systematic variance to address inflating or deflating a given relationship among variables to allow the researcher better control for their influence on the data. Both procedural and statistical measures are normally used for controlling the bias effect. The common method bias of this study was identified using the following procedural measure:

- Obtaining measurements of the predictor and criterion variables from different sources;
- Using of temporal, proximal, psychological or methodological separation of measurement;
- Protecting respondent anonymity and reducing evaluation apprehension;
- Using counter balance question order and improving scale items;
- Using statistical controls against the common method bias were Harman's single factor test was less than the 50% cut-off point (Podsakoff et al 2012:545). Accordingly, Harman's single factors test result had 23.6% variance explained by a single factor show that the common method bias is not a major concern of this study (less than 50% cut-off point).

3.2.4.6. Data analysis and statistics generated

Data analysis is systematic organization and/ or a process of reducing a large group of information that the researcher gathered so as to synthesise or generate meaning out of it (Polit & Beck 2012:725; Burns et al 2013:46; Bryman 2012:13). After data entry, the researcher and his assistant Biostatistician exported the data into Statistical Package for Social Science plus Analysis of Moment Structures (SPSS-AMOS) software version 20 for analysis. Data analysis was done in two phases: descriptive and inferential analysis and structural equation model analysis.

3.2.4.6.1. Descriptive and inferential analysis

The first phase of the analysis was describing the severity of depression and anxiety, before and after treatment to answer the first four research questions/objectives in section 1.5 in chapter 1 using descriptive and inferential analysis.

Descriptive Analysis: This was used to calculate descriptive statistics, generate frequency table, and graph/charts that show the comparison between groups.

Inferential analysis: Two-tailed significance test was used to set at $p<0.05$. A cross-tab was performed to evaluate differences in categorical variables. In addition, Mann-Whitney_ U test and Kruskal Wallis test were used to compare the social support score of women with obstetric fistula. Spearman's correlation analysis was also used to assess the correlation effect among continuous variables. Paired t-test and Holm-Bonferroni step-down procedure for controlling multiple comparisons in statistical analysis were used. The Holm- Bonferroni procedure reduces the probability of type I error, does not require test independence, and shows improved versatility and power compared to other multiple comparison procedures (Sanat, Yiyong & Weng 2016: 237). A set of exploratory analysis was applied for comparing the outcomes after fistula surgical repair between women who perceived themselves as cured vs not cured. To identify distinct groups of women with similar patterns of change in the severity of depression and anxiety symptoms over time, a group-based trajectory analysis

was applied based on assessment scores from their admission to discharge after surgical repair. Group-based trajectory modelling is a person-centered analysis which is designed to estimate growth curves for each individual and then classified individuals with similar growth curves into different patterns of trajectory groups (Nagin & Odgers 2010:111-13).

3.2.4.6.2. Structural equation model analysis

Analysis of structural equation modeling was done to measure the closeness of the parameters of the population covariance matrix and sample covariance, check the model fit, and estimate parameter. Standard error and individual significance tests on parameters were also performed. This section builds on testing whether a theoretical model based on theory or empirical data is supported by sample data. Structural Equation Modelling (SEM) is more appropriate for measuring reciprocal causal effects of fistula on the severity of depression and anxiety. Some variables are allowed to serve as risk factors as well as outcome variables in the system of equations that should be solved simultaneously. Latent variables are involved in modelling processes by allowing two or more measured indicators for the theoretical hypothesis (Wang & Wang2012:207). Structural equation modeling is useful in investigating more complex modelling; providing information about the interrelation among independent variable in a model and how this affects the dependent variable. Structural equation modeling the process described by Carvalho and Chima (2014:7) and Kline (2011:91-2):

- ***Model specification:*** The researcher identified the concept, women with obstetric fistula following surgical repair, model specification involved determining every relationship and parameter in the model for the interest of the researcher.
- ***Model identification***: After specifying the model, it is critical to check if the model was identified. In this study, the researcher resolved the identification process assessed, if the prior factor loading of each item on its respective factors were identified or could be estimated; estimated the designation of the parameter using under-identified, just-identified and over identified. The researcher utilised confirmatory factorial analysis to assist model identification.

- **Model estimation** of the population parameters in structural equation model. The researcher described and constructed the structure based on the descriptive result and other inferential test and developed a factorial analysis, concept representation of relationship to form the initial model estimation.

- *Model testing:* Once the parameter estimates were obtained for a specified structural equation model, the researcher determined how well the data fit the model. The researcher applied the following standards to develop model-fit indices such as: for a single model: chi-square, degree of freedom (DF), Goodness of Fit Index (GFI), Root Mean Square Error of Approximation (RMSEA), Normated Fit Index (NFI) for a nested model: Comparative Fit Index(CFI), Akaike Information Criterion (AIC); for cross-validation indices: Cross-Validation Indices (CVI), Extract Cross-Validation Indices (ECVI) and for parameter estimates, t-values and standard errors. The researcher described the result using a table of estimates, standard errors, statistical significance.

- **Model modification**: The model was not a strong model. The researcher modified the model and subsequently evaluated the new modified model. The purpose is better fitting in some sense and yield parameter having practical significance and substantive meaning.

3.2.5. Validity and reliability

The researcher considered both validity and reliability when selecting a research instrument, as there is no point using an instrument that is not valid. However, reliable it may be, by the same token, if an instrument is valid, but the measurements are not consistent, it is of no use (Brink 2012:1126). Creswell (2014:206-7) had suggested that the research design and instruments must reflect the concepts of the theory being tested to ensure that the conclusions drawn from a study are valid and reliable to advance the development of theory and evidence-based practice. The following sections discuss the reliability and validity of the study.

3.2.5.1. Validity

Burns and Grove (2011:334) and Polit and Beck (2012:236) state that validity is the approximate truth of an inference. It is always a matter of degree to which questionnaire measures, not an absolute; therefore, validity is a property of an inference; measures the actual concepts and constructs it claims to measure. Validity covers the aspects of external validity, content and constructs validity.

3.2.5.1.1. External validity

External validity is the extent to which inferences about observed relationships in a study will hold over variations in persons, setting, time or measures of the outcome (Creswell & Plano-Clark 2011:211; Polit & Beck 2012:180 &336). In this study, the researcher used the following points to address external validity:

- Used a consecutive sampling technique for selecting the study respondents and selection bias was prevented,
- Low response rates were avoided by the researcher or data collectors personally distributing the research tool,
- The adequate sample size was determined and used for data collection,
- Strong inclusion and exclusion criteria were used to select study respondents, and
- The Hawthorne effect and social desirability were avoided by ensuring the respondent's anonymity, privacy, and confidentiality of information collected so that they truthfully completed the questionnaire without fearing that they might be identified and victimised because of their responses.

3.2.5.1.2. Content validity

Content validity is the degree to which the items represent the dimensions of the construct being measured (Sideridis et al 2014:30). The content validity is a subjective evaluation of items, which can be accomplished through literature and domain expert review. In this study, the researcher employed the following points to ensure content validity:

- A relevant literature review was conducted before the development of the instrument. This review helped to ensure that all the necessary variables were included in the instrument;

- A validated questionnaire was adopted from the standardized questionnaires;

- The questionnaire was applied after translating into local language to suit the language ability of respondents;

- The researcher solicited the review of experts in the field of the study. The instrument was evaluated by two senior researchers to ensure the consistency of the instrument and that the tool contains all attributes of the phenomena to be measured. For this study, the evaluators (ratter) used both Item Validity Index (I-CVI>=0.78) and Scale Validity Index (S-CVI>=0.9) of the data collection instrument (Polit & Beck 2012:360). The ratter values of this study instrument were above the threshold (I-CVI=0.85, S-CVI=0.99).

3.2.5.1.3. *Construct validity*

Construct validity is an abstraction or concept that is deliberately invented or constructed by researchers for scientific purposes (Burns & Grove 2011:335). Construct validity can be assessed by convergent validity: AVE > 0.5, square root of AVE > variance between constructs and Discriminant validity: MSV < AVE and ASV < AVE (Roni 2014:30). In this study, the researcher used statistical evidence to ensure the convergent validity. The Average Variance Extracted (AVE) high cross-loadings (AVE=0.7) and no items with either low loading (<0.65), indicating good convergent validity. The cross-loadings should differ by more than 0.2 and the correlations between factors should not exceed 0.7. For the satisfaction of discriminant validity, the square root of the Average Variance Extracted (AVE) from the construct should be greater than the variance shared between the construct and other constructs in the model. In this study, the low cross loading of the items of all latent constructs used in the model also indicated reasonable discriminant validity.

3.2.5.2.   Reliability

Reliability refers to the extent to which independent administration of the same questionnaire over time consistently and accurately yields the same results under the comparable conditions (Burns & Grove 2011:332; Polit & Beck 2012:231-6). According to Polit and Beck (2012:331), in a quantitative study, an instrument is said to be reliable if it is accurate and consistent in the way it measures the target attribute. In support of this, Ellen, Susan and Thomas (2013:468) define reliability, as the extent to which an instrument will give the same result on different occasions. If there is less variation produced when an instrument is used in repeated measurements, it has higher reliability. It means it is stable, consistent or dependable (Polit & Beck 2012:331). In this study, the researcher used different strategies, including using adequate sample size, standard questionnaire, trained data collectors, and strict supervision during data collection. The researcher described different types of reliability tests among which are test-retest reliability and instrument reliability.

3.2.5.2.1. Test-retest reliability

Aaronson, Alonso, Burnam, Lohr, Patrick, Perrin and Stein (2002:195) define test-retest reliability as "a measure of the reproducibility of the scale, that is, the ability to provide consistent scores over time in a stable population" and measure the respondent stability. The satisfactory to good inter-observer (Inter-rater) reliability reflects test-retest correlation coefficient ranging from 0.7 to 0.8 (Stephen 2012:204). In this study, the researcher evaluated by administering the same instruments to a sample of respondents twice over a period of time and compared the result using Cohen's Kappa (k) correlation. Kappa is measuring the proportion of anxiety and depression symptom agreement, where 1 is perfect, 0 is exactly what would be expected by chance, 0.01-0.2 is slight, 0.21-0.4 is fair, 0.41-0.6 is moderate, 0.61-0.8 is substantial and 0.81-0.99 almost perfect agreement between their association. Negative values indicate agreement less than chance, i.e., potential systematic disagreement between the observers (Anthony & Joanne 2005:362). It turns out that, using the commonly cited scale; a Kappa of 0.21 is in the "fair" agreement range between anxiety

and depression symptoms. The inter-rater reliability of this study instrument was 0.79, which is found in the acceptable score.

3.2.5.2.2. Reliability of data collection instrument

The commonest way of checking the reliability of an instrument is calculating its Cronbach's alpha. The Cronbach's alpha coefficient is a statistical estimate of the reliability of data consistency of the scores from multiple questions with each other (Creswell & Plano-Clark 2011:211). The researcher computed the homogeneity of the response using interclass correlation coefficient (ICC) of the study respondents (Burns & Grove 2011:333). A Cronbach's alpha of 0.7 or more is generally regarded as acceptable (De Vos et al 2011:177). To ensure the reliability of this study, the researcher followed the following steps::

- Use of multiple indicators (items) of a variable (concept) such as using two or more questions in a questionnaire to measure each aspect of a variable
- Clearly operationalizing all constructs, developing an unambiguous clear theoretical definition for each construct and then making sure that each measure indicates only one specific concept
- The Cronbach's alpha values of the scales of the instrument are greater than 0.7, there was no significant difference between main and standardized Cronbach's Alpha as indicated in *Table 3.1*; the inter-item correlation is good. This indicates that the instrument has internal consistency – reliability.

Table 3.1: Reliability of the instrument based on the results of Cronbach alphas

Variables	Number of Items	Cronbach's Alpha (main)	Cronbach's Alpha based on Standardized Items
Depression (PHQ-9)	9	0.815	0.814
Anxiety (GAD-7)	7	0.83	0.830
PTSD (PCL-C)	17	0.889	0.887
Social support (OSLO_3	3	0.75	0.76

3.2.6. Ethical considerations

Ethics is associated with the moral responsibility of the researcher towards the respondent's legal value and professional obligation to be ethical for the research respondents (Polit & Beck 2014:381; Neuman 2011:143). Creswell (2014:95) emphasised the need for ethical issues of a research in all its processes: proposal, sampling, data collection, and analysis, reporting, sharing, and storing the data. Grove et al (2013:162) and Polit & Beck (2012:152) identify some human rights that require protection in research, including the right to justice, the right to provide informed consent, the right to protection from discomfort and risk, the right to anonymity and confidentiality, right to withdraw and right to beneficence. These ethical principles are briefed under the following sub-headings.

3.2.6.1.   *The right to justice*

Justice refers to the right to fair distribution of the benefits and burdens of the respondent in a study (Burn & Grove 2011:107; NEAC 2012:9). The principle of justice focuses on issues of fairness and equity. The principle of justice also imposes duties to neither neglect nor discriminate against individuals or groups who may benefit from research (Burns et al 2013:173; Polit & Beck 2012:155; NEAC 2012:9). It ensures that people who decline to participate in the study are treated in an un-prejudicial manner (Polit &Beck 2012:155). In this research, the researcher selected the study respondents based on study requirements and research problems. The researcher followed the inclusion and exclusion criteria set out in this research based on the reasons directly related to the research problem and purpose of the study.

3.2.6.2.   *The right to provide informed consent*

Informed consent is the prospective subject's agreement to participate in a study or subject, which is reached after the assimilation of essential information and content from the investigator to the prospective subject (University Putra Malaysia [UPM] 2013:9). The researcher provided key information about the research to potential respondents in order to obtain informed consent. In this study, the consent form was comprehensive and provided

the following information: (a) introduction to the consent process, explaining the consent form and compliance with institutional policy and country laws; (b) reminder that participation is voluntary; (c) nature and purpose of the study; (d) explanation of study procedures; (e) potential discomforts and risks, as well as plans to protect respondent from these risks; (f) potential benefits; (g) alternatives to participation in the study; (h) confidentiality, including how data would be used and how it will be kept privately; (i) refusal/withdrawal, including right to withdraw consent and leave the study at any time; and (j) rights and complaints. After each major section, the research data collectors would pause and check for understanding by asking the respondent to repeat, in their own words, what "the right to refuse" means. They would be given the opportunity to ask questions about the study and their participation. Potential respondents were informed that the information they provided through the consent and interview is confidential (i.e., not shared with anyone outside of the research team) and voluntary (i.e., they are not obligated to answer any questions). Potential study respondents were also informed that the interview will take about 45 minutes. Potential respondents did not receive any incentives to participate in this study. Informed verbal consent of the respondents was sought and recorded in writing. The objectives of the study were discussed with each respondent. The cell phone numbers of the researcher and the supervisor were given to the respondent in case they have queries related to the study. All this information was also given to each respondent in the form of information leaflet.

3.2.6.3. *The right to protection from risk and discomfort*

The researcher must protect respondents from any kind of harm, including physical, emotional, economic and social aspects (De Vos et al 2011:115; Burns et al 2013:174; Polit & Beck 2012:152-6). In this study, the researcher used the following point to protect the respondents from risk and discomfort:

- The primary risks of respondents were related to breach of confidentiality. To minimize this risk, the researcher provided intensive training to data collectors on maintaining confidentiality. To ensure confidentiality of stored data, the researcher assigned a unique study ID for each respondent and all forms were kept in locked cabinets.

- The potential risk of participating in this study was personal discomfort or interview fatigue when talking about sensitive topics. To minimize the risk of interview fatigue, the researcher informed the respondents that; they can take a break or stop at any time. The research data collectors were intensively trained and informed respondents beforehand about the nature of the questions and assured their privacy.

3.2.6.4. The right to anonymity and confidentiality

Confidentiality and anonymity are the basic principles to protect individual privacy. This means that individual identities of subjects' cannot be linked to the information they provide and would not be publicly divulged (Burns et al 2013: 688; NEAC 2012:21; Neuman 2011:155). Anonymity is the most secure means of protecting confidentiality and ensuring that information cannot be linked to the individual's responses (Burns et al 2013:172; Polit & Beck 2012:162). For this study, the researcher collected the data through anonymous questionnaires. The respondents were not required to write their names anywhere on the questionnaire. No identity of any respondent was linked to the questionnaire filled or a research report.

In order to ensure the privacy and confidentiality of the respondents, the researcher obtained informed consent and administrations of the questionnaire were carried out in discrete rooms prearranged with the management of the hospitals. Research data collectors ensured that respondent filled the questionnaire at their respective hospitals because it was deemed that carrying the questionnaire to their homes or other places would compromise the respondent confidentiality. No personal identifiers of the respondents and the study setting (hospital) were documented on the questionnaire. This was done to ensure that data are not identifiable with particular individual respondents and study setting (hospitals). All data collectors returned the completed questionnaire in a sealed envelope addressed directly to the researcher thereby limiting access by parties not privy to the study. All persons who had a role to play in the data collection and analysis processes were trained in research ethics with emphasis on preserving respondents confidentially and anonymously.

3.2.6.5. The right to refuse or withdraw

Potential respondents were told that they had full right to refuse to participate or terminate their participation at any time. They could also choose not to respond to some or all questions. The researcher stressed that participation is entirely voluntary. It was further explained to the respondents that if they refuse to participate, it would not affect their treatment or health care that they get from the health facility in any way. Respondents were also told that they had the full right to withdraw from responding to the question any time they wished to, without losing any of their rights as clients in the health institutions.

3.2.6.6. The right to beneficence

Beneficence is the principle of motives to participate in the study focus on minimising risk and maximising the benefit to the respondents or other individuals in the future (Burns & Grove 2011:107; NEAC 2012:9). During the course of the study interviews, respondents can gain information about themselves, and their preconceived ideas about mental illness. There was no direct financial gain to respondents from this study or any prospects for any incentives. The findings of the study will advance scientific knowledge about the severity of depression and anxiety among women with obstetric fistula and enhance understanding of the individual care plan including mental health counseling. Additionally, understanding the effect of fistula repair surgery on the severity of depression and anxiety and its risk factor among women with obstetric fistula will be relevant to clinicians, women, and their families, and policymakers to improve the lives of women and the care provided in the treatment centers.

3.2.6.7. Institution/Site

Creswell and Plano Clark (2011:175-6) indicate that researchers must obtain permission from institutions in which the data collection is undertaken. Institutions related to this study in one or other ways were treated as autonomous agents. Complying with this principle, the researcher first obtained ethical clearance from the University of South Africa, Department of Health Studies, Research Ethics Committee and then from the target fistula hospitals prior to the execution of the study (Annex E). The anonymity of the institutions was maintained in this

study and the term 'target hospital' were used to refer to the institutions. The researcher adhered to the inclusion criteria set out in the research proposal.

3.2.6.8. *The scientific integrity of the research*

Research in all fields is a significant feature of all societies and represents major commitments of researchers. Therefore, it is important to conduct a research with integrity and in accordance with high ethical standards (Polit & Beck 2012:745). In this study, the researcher considered the entire facts and acted professionally, by employing an ethical and scientific manner throughout the study. The researcher refrained from any sort of plagiarism, fabrication/falsification; maintained attribution and citation, and copyright and intellectual property (UNISA 2015:25). The result will be published in accredited journals as part of the researcher's ethical obligation to the scientific community.

3.3. PHASE TWO: MODEL DEVELOPMENT

The second phase of the study involved developing an evidence-based model for addressing the mental health needs of women with obstetric fistula. This section builds on the findings of the first empirical phase and answers the fifth objective of the study. The model was developed based on cognitive behavioural therapy (CBT) (Beck 2011:5), the theory of stress and coping (Lazarus & Folkman 1984:11), system theory (Ravitz et al 2013:355), mental health conceptual framework and promotion designs (WHO 2005b:48; Kinser & Lyon 2014:667; Baingana et al 2005:11) and also reviewed literature. The model development also integrated elements of the system theory: situation, stakeholder, input, process, and the outcome to formulate an integrated mental health treatment model. All these were organised following theory development designs and methods described by Chinn and Kramer (1991:74), Walker and Avant (1995:39), and Schumacker and Lomax (2010:55-64) making use of concept analysis, initial model description and construction of relationship statements and evaluating the model.

3.3.1. Concept analysis

Walker and Avant (2011:160) define concept analysis as a mechanism for identifying a set of characteristics that are essential to give meaning to a particular concept. Following an in-depth review of literature and findings from the phase one analysis, the researcher identifies the concept, women with obstetric fistula before and after fistula repair surgery in terms of their social support and behavioral outcomes. The literature reviewed in chapter 2 and the study findings in chapter 4 identify the main concepts of obstetric fistula and their relation to a mental health disorder. The research finding highlights that women with obstetric fistula are significantly associated with depression, anxiety and PTSD, and also poor social support. Other similar studies have shown that women with obstetric fistula have high rates of psychological distress like depression, anxiety and also PTSD (Weston et al 2011:32; Wilson et al 2015:612) and low quality of life (Pope et al 2011: 8)

The researcher, therefore, concluded that there is value in surgical repair treatment in terms of enhancing their mental health outcomes. The study also found that providing psychotherapy services requires addressing the mental health needs of women with obstetric fistula. Through deductive reasoning, the researcher identified cognitive behavioral therapy service as the main concept and viewed from a system perspective. A system was then defined as a whole, with interrelated parts characterised by elements such as: having obstetric fistula programme context, stakeholder, inputs, processes, and outcome. These components of the systems theory formed the basis for model development (see chapter 5, section 5.4 on the structure of the model).

3.3.2. Model description and construction of relationship statements

The researcher described and constructed the structure based on the descriptive result and other inferential tests and developed a factorial analysis, and concept representation of relationship to form the model. The researcher used the following five questions to describe the components of the model for addressing the mental health needs of women with obstetric fistula.

- **What is the purpose of the model?**

This question addresses, why the researcher developed the model and reflects on the context, and situations to which the model can be applied. The integrate mental health treatment model for women with obstetric fistula that can be delivered concurrently with surgical treatment, thereby adding value to clinical services to manage psychological problems and taking advantage of the "window of opportunity" when women are in the hospital to address the mental health needs of women with obstetric fistula. The detail description is provided in chapter 5, section 5.3.

- **What is the nature of relationships of concepts in the model**?

This question seeks clarification on how concepts were linked to one another. The manners in which the concepts are linked to each other, as well as the relationships between them is described in chapter 5, section 5.4. The relationships are explained in the context of the study to make the model meaningful and practical.

- **What is the structure of the model**?

This addresses the overall form of the concept interrelationships. From relating the concepts of the model, the overall organization and composition of the model are described in chapter 5, section 5.5.

3.3.3. Model evaluation and refinements

The model was critically evaluated with the help of a panel of experts. The panel included experts in mental health and Obstetrics and Gynecology involved in the care of obstetric fistula. The following questions proposed by Chinn and Kramer (2011:128-130) were used:

- **How clear is the model**?

The clarity of the model reflects how understandable the model is and how consistently the ideas are conceptualised. The clarity of the model for revitalizing the effect of surgical repair for mental health outcome is described in chapter 5, section 5.7.1.1.

- **How simple is the model?**

The model is analysed in relation to its descriptive ability as well as its ability to explain or predict phenomena. It is evaluated according to the difficulty versus the straightforwardness of the concepts and relationships. This evaluation is presented in chapter 5, section 5.7.1.2.

- **How accessible is the model?**

The model was evaluated on how it is accessible as well as the extent to which empiric indicators for the concepts can be identified and how attainable the projected outcomes of the model are after it has been operationalised. The accessibility of the model for revitalizing the effect of surgical repair for mental health outcome is described in chapter 5, section 5.7.1.3.

- **How important is the model**?

This pertains to the usefulness of the model. This is detailed in chapter 5, section 5.7.1.4.

3.4.   CONCLUSION

This chapter describes the methodology of the two phases of the study, namely empirical phase and model development phase. The study design, sample and sampling method, data collection, data management, and analysis, measures to ensure validity and reliability of the empirical phase were described in full. The process for model development was also highlighted. The next chapter will present data analysis, interpretation, presentation and description of the findings of the study.

CHAPTER 4

ANALYSIS, PRESENTATION, INTERPRETATION, AND DISCUSSION OF RESEARCH FINDINGS

4.1. INTRODUCTION

The previous chapter (Chapter 3) highlighted the research methodology used in the study. In this chapter, findings from the study are analysed, presented and described based on the research objectives. The chapter also includes both descriptive and inferential statistical data analysis. The results are grouped based on the descriptive characteristic of the sample population and the research objectives. In addition, this chapter also describes the findings and interpretations of reliability assessment, Confirmatory Factor Analysis (CFA) for item retention and deletion to measure the relationship between observed and latent variable. Furthermore, an interpretive report on the meaning of the data in relation to the literature reviewed is provided. Aspects covered include: the prevalence and severity of depression and anxiety among women awaiting surgical repairs of obstetric fistula in Ethiopia; the severity of depression and anxiety among women who undergo surgical repairs of obstetric fistula in Ethiopia; the variations in the severity of depression and anxiety between pre and post-surgical repairs; and changes in the severity of depression and anxiety attributed to obstetric fistula repair surgery.

4.2. RESEARCH RESULTS

Results will be presented in different sections. The sections include socio-demographic, gynecologic and obstetric history of the study respondents; the prevalence and severity of depression ,anxiety, and secondary PTSD of women with obstetric fistula who are awaiting surgical repairs; prevalence and severity of depression and anxiety, and secondary PTSD of women with obstetric fistula who have undergone surgical repair; changes and variation in the severity of depression and anxiety outcome between pre and post-surgical repairs; and descriptive information on women with obstetric fistula sexual behavior and plans for follow-up care.

4.2.1. Socio-demographic, gynaecologic and obstetric history of the study respondents

4.2.1.1. Socio-demographic characteristics of the sample

Description of socio-demographic characteristics of the respondents is necessary for quantitative research as it enables the readers to understand the sources of data, and also assist in the interpretation of the findings (Bryman, Bell, Hirschsohn, DOS Santos, Du Toit, Masenge, Van, Aardt & Wagne 2014:45). Selected background characteristics of the study respondents and their descriptive characteristics at baseline are presented in Table 4.1. On average, respondents were 28.8 years of age (SD=7.7). Approximately 36% of the respondents were in the 26-30 years' age bracket, while 17% of respondents were under 21 years (*Table 4.1*).

Fistula Hospital in Ethiopia covered and supported every corner of the country and thus the target respondents were from all over the country. The majority of the respondents were rural residents 86% (188), while 14% (31) were urban residents. Of all respondents, Christians constituted 34% (75) followed by Muslims 32% (69) and Protestant 31% (68). Among ethnic groups Oromo accounted for 51% (112), followed by Amhara 23% (51). The majority 74% (162) of women with obstetric fistula had not attended any level of education (*unable to read and write*), while 26% (57) of the respondents were at least able to read and write. Almost all respondents were ever married, 93% (203), of which 20% (44) of them are currently divorced/widowed, while 13% (28) of them are not living with their sexual partners/husband (*Table 4.1).*

Table 4.1: Socio-demographic characteristics of the study respondents (n=219)

Characteristic	Number	Percent (%)
Current Age		
<25+	77	35.2
26-30	79	36.1
>31+	63	28.8
Residence		
Urban	31	14.1
Rural	188	85.8
Educational status		
Unable to read and write	162	74
Able to read and write	57	26
Religion		
Orthodox Christians	75	34.2
Muslim	69	32
Protestant	68	31
Others	7	3
Ever married		
Yes	203	92.7
No	16	7.3
Current marital status		
Married	159	72.6
Divorced/Widowed	44	20.1
Single	16	7.3

4.2.1.2. Gynaecologic and Obstetric history of women with obstetric fistula

All women with obstetric fistula who were divorced and not living together with their partners attributed the divorce to the fistula onset. Most respondents were currently living with their sexual partner/husband 60% (131) and the mean number of children was 2.8 (SD=2.6; range: 0-10). The mean age of respondents at their first marriage and first delivery was 16 years (SD=3.1) and 19 years (SD=3.6) respectively. Over 90% (197) of the respondents had their first child when they were younger than the age of 25 years old, 13% (28) had their first child when younger than 15 years old, and while 57% (125) of them had their first child when they were between 16-20 years old. Only 7% (15) of the respondents had their first delivery when they were 26-34 years old. It can be concluded from this study that most of the affected women give birth to their first child between the age of 12 and 20 years (*Table 4.2*).

In line with previous research findings, the study highlighted that known demographic characteristics linked to obstetric fistula, include low educational attainment (Roka et al 2013:5; Alio et al 2011: 376). Gender inequality and oppression of women are known to persist in regions where obstetric fistula occurs. This is accompanied by forced adolescent and teen marriages and low education levels for girls (Roush et al 2012:88). This finding, which is supported by other similar studies, indicated that obstetric fistula is more prevalent among the sexually active and teenage population as more than half of the women give birth before the age of 20 years (Tebeu et al 2012:387). This became evident in this study, as 86% of women with fistula who participated in the study were teenagers.

Women with fistula reported that the average duration of time between the occurrence of the problem and report to the hospital was 2.3 years and the median duration was 0.75 years (SD= 3.5; ranging between 0.17-20 years). Only 38.3% (83) of the women had lived with obstetric fistula for more than one year, whereas the rest had lived with obstetric fistula for a year or less than 61.2 %(134) (*Table 4.2)*. During this extended period, many women reported experiencing high anxiety levels and depression. There is evidence that depression markers are likely to increase with chronicity of illness (greater than 3 months) (Weston et al 2011:33).

Most of the respondents, 72% (154) reported that they had a labour duration of 24 or more hours. Fifteen percent (32) of the women had labour duration of fewer than 8 hours and 37% (81) had duration of 9-24 hours. These findings concur with those of Allen et al (2011:469) mentioning that more than 90% of fistula cases occur because of prolonged and unrelieved obstructed labor. Another study evidence reported that obstetric fistula is most often the result of obstructed labour, which is associated with long labour duration (Tebeu et al 2012:392). Women who develop fistula usually experience multiple days of painful labour, commonly resulting in the death of their baby and other physical complications such as infection and infertility (Cowgill et al 2015:6; Roka et al 2013:3). During obstructed labour and subsequent delivery, many women face significant psychological stress, which can lead to depression and anxiety.

Fifty-eight percent (128) of the respondents had attended the antenatal clinic at least once during their last pregnancy. Thirty-nine percent (81) of the respondents had delivered through caesarean section and 44% (93) of them had delivered vaginally. Seventy-two percent (152) of respondents delivered their babies in a health facility (*Table 4.2*). Many of sub-Saharan African women deliver at home; among the women with obstetric fistula, 57.6% of women delivered at home. Similar evidence reported that, where labour ended in a home delivery more likely to developed obstetric fistula cases (Tebeu et al 2012:392). Obstetric care for obstructed labour through caesarean section is essential in preventing the obstructed labour complex, including fistula. It is estimated that 13.2 percent of genitourinary fistula results from provider error during hysterectomy and gynecological procedure leading to fistula (Raassen et al 2014:1703). A similar study conducted in Ethiopia found that 24.6% women had a high bladder fistula, which predominantly occurs following surgery, especially caesarean section or emergency hysterectomy (Wright et al 2016: 243).

Seventy-two percent (140) of the respondents had experienced stillbirth delivery outcome, of which 26% (54) of them experienced it more than one time (*Table 4.2)*. Another similar study confirmed that majority of (90%) of women with obstetric fistula experienced stillbirth or neonatal death at the time of delivery (Bangser et al 2011:93). Different pieces of evidence suggest that the process of developing fistula during obstructed labour increases the woman's risk of depression and anxiety. Stillbirth is associated with depression symptoms and increased risk of anxiety following childbirth (Bangser et al 2011:95).

Table 4.2: Gynaecologic and obstetric history of women with obstetric fistula (n=219)

Characteristic		Number	Percent (%)
Age at 1st marriage (year)			
	<18	108	49.3
	18+	111	50.7
Average age at 1st marriage		16.4 years (SD=3.02)	
Age at first delivery (Year)			
	<18	67	30.6
	18+	152	69.4
Average age at 1st delivery		19.25 years (SD=3.6)	
Antenatal attendance			
	0	86	40
	1-3	63	29.4
	4+	65	30.4
Number of live births			
	1-2	85	48.3
	3-5	59	33.5
	>5	32	18.2
Number of Stillbirth experiences			
	1	114	74.0
	2+	40	26.0
Disease duration (year)			
	<1+ year	134	61.2
	1-5 year	46	21.2
	>5 year	37	17.1
The average duration of the disease		2.3 years (SD=3.5), median =0.75	
Labour duration (Time spend during their last delivery (hours)			
	<24	59	27.7
	24+	154	72.3
Mode of delivery (last delivery)			
Normal vaginal delivery		93	44.3
CS delivery		81	38.6
Other modes of delivery		36	17.1
Place of delivery (last delivery)			
Home		58	27.6
Hospital		127	60.5
Health center		20	9.5
Health post		5	1.9
Delivery outcome (last birth)			
Stillbirth		140	72.2
Live birth		54	27.8

4.2.2. The prevalence and severity of depression, anxiety and secondary PTSD among women with obstetric fistula awaiting surgical repairs

The purpose of this study is to determine the effects of surgical obstetric fistula repairs on the severity of depression and anxiety associated with obstetric fistula and to develop an integrated mental health treatment model for women with obstetric fistula in Ethiopia. Women with fistula had significantly more potentially traumatic events and endured significantly higher depression, anxiety, and PTSD symptoms. Women with fistula also reported significantly less social support (*Table 4.5*). To fully examine psychological problems in women with fistula, the study included standardized measures of depression, anxiety and PTSD symptoms that have been previously used for research in low-income countries. Statistical analysis showed that, above and beyond the effects of demographic variables and trauma exposure, women with fistula had significantly higher depression and anxiety symptoms. Women with obstetric fistula have the common experience of feeling depression and anxiety, including a traumatic birth experience, have breached their social network and are marginalised from the society (Alio et al 2011:371; Dennis et al 2016:433; Mohameda et al 2016:402; Mselle et al 2011:8-11; Wilson et al 2015:610).

For measuring the severity of depression symptom, a total of 219 of the women who responded to the questionnaire scored 27 or more in the PHQ-9 scale, indicating that more than 9 in 10 women (91.3%) had depression symptoms, of which 33.3% (73) scored in the mild depression range, whereas 11% (25) were classified as experiencing severe depression. For determining the prevalence of general anxiety, respondents scored 21 or more in the GAD-7 scale, notifying that more than 7 in 10 women (79%) had anxiety symptoms, of which 32 % (71) had mild anxiety and 20 % (44) had severe anxiety. Almost all women, 97.7% (214) with obstetric fistula had symptoms of post-traumatic stress disorder (*Table 4.3*). Past quantitative studies have found that women with obstetric fistula have high rates of general mental health impairment and depression (Pope et al 2011:7; Weston et al 2011:33). Evidence in low-income countries reported that women with obstetric fistula have significantly higher symptoms of depression and post-traumatic stress disorder (PTSD) and anxiety (Alio et al 2011:375; Megabiaw et al 2013:3; Wilson et al 2015:610). In this study, a high rate of depression (91.3%) was identified among women with obstetric fistula. The

prevalence of depression among women with obstetric fistula was lower than the 100% reported by Megabiw et al (2013:3) in Ethiopia.

However, this is higher than a study from Kenya, which reported 72.9% depression symptoms among women with fistula using the PHQ-9 (Weston et al 2011:32). Self-reported history of depression or suicidal ideation was present in 34.7% (76) and 18.3% (40) women, respectively. Those who answered affirmatively to any of the questions on the PHQ-9 were asked to rate the level to which their symptoms made it difficult for them to engage in their activities of daily living (specifically, doing their work, taking care of things at home, and getting along with family and friends). Almost all respondents reported varying levels of difficulty with the above. It can be concluded from this study that; depression is common among women with fistula. The growing body of literature about fistula suggests a significant increase in psychological distress following the development of an obstetric fistula (Wilson et al 2015:24). There are a number of possible mediators of this increase. It is likely that a combination of decreased daily activity negatively impacts the mental health of women after developing an obstetric fistula.

Table 4.3: Prevalence and severity of psychological symptoms (depression, anxiety, and PTSD) among women with obstetric fistula (n=219)

Psychosocial variable	Depression	Anxiety	PTSD
over all prevalence	200 (91.3)	174 (79.5	214(97.7)
Level of severity			
No symptom/ Minimal	19(8.7)	45(20.5)	5 (2.3)
Mild	73(33.3)	71(32.4)	43(19.6)
Moderate	53(24.2)	59(26.9)	
Moderately severe	49(22.4)		79(36.1)
Severe	25(11.4)	44(20.1)	92 (42.0)

4.2.2.1.Co-morbidity of depression and anxiety trajectories

In this study, the proportion of women in the joint trajectory of anxiety and depression is presented in Table 4.4. The highest joint probability involved women with mild levels of both depressive and anxiety symptoms (15.1%), followed by women with moderate symptoms of

both (9.6%), third were 8.7% of women with moderately severe levels of depressive and high anxiety symptoms, and fourth included women with both high depressive and anxiety symptoms (6.8%). The second part of the Table shows, women's probabilities of membership in each anxiety group based on their depression trajectory group. Women with low symptoms on the severity of depression were more likely (68.4%) to be in the low symptom on the severity class of anxiety, while those with mild levels of depression were almost half certain (45.2%) to have mild levels of anxiety. Those women with high severity of depression symptoms were more likely to have high levels of anxiety (60%) symptoms.

Similar findings of woman's probability of being in a certain depression trajectory group given their anxiety group membership are shown in the third part of the Table. Together, the results of the transition probabilities indicated that women tended to follow the same symptom severity of both depressive and anxiety symptoms. Those with high severity of anxiety symptoms were more likely to have either moderately severe (43.2%) or high levels of depression symptom (34%). Cross-classification results also confirmed that depressive symptom and anxiety symptom trajectories were highly associated (Chi-Square=112. Def=12, p=0.000) (Table 4.4).

Based on the guidelines from Altman (1999), and adapted from Landis and Korch (1977), assess the symmetric measure of the chance association between anxiety and depression symptom using the Cohen's Kappa (K) coefficient. Kappa is measuring the proportion of anxiety and depression symptoms agreement, where 1 is perfect, 0 is exactly what would be expected by chance, 0.01-0.2 is slight, 0.21-0.4 is fair, 0.41-0.6 is moderate, 0.61-0.8 is substantial and 0.81-0.99 almost perfect agreement between their association. A negative Kappa value would indicate agreement less than chance, i.e., potential systematic disagreement between the observers (Anthony & Joanne 2005:362). Accordingly, in this study, a Kappa of 0.21 indicates a "fair" agreement range between anxiety and depression symptom. Furthermore, since P=0.000, the Kappa (K) coefficient is statistically significant (Table 4.4). Using these categories, anxiety symptoms significantly affected the prevalence of depression symptoms, and it was noted that depression was more likely to be observed in

women who had been living with anxiety symptom (p<0.01). The correlation of depression with anxiety sub-scale was a significant relation (r=0.697, p<0.01) (*Table 4.6*).

The joint analysis of depressive and anxiety symptoms demonstrated a moderate association between these two symptom types. Four patterns of co-morbid depressive and anxiety symptoms developed, suggesting that depression and anxiety tend to cluster together and persist over time. The pattern of co-occurrence further the finding that women with high depressive symptoms being more likely to also have high symptoms of anxiety than being in the mild or low symptom clusters. Indeed, prior research showed a concurrent association or prospective link between depression and anxiety (Yang, Shen, Ping, Wang & Chien 2011:160; Kuo et al 2014:3).

Table 4.4: Co-morbidity transitional probabilities (%) of classification in the anxiety and depressive symptom trajectories (n = 219)

Depressive symptoms	Anxiety symptoms				
	Minimal	Mild	Moderate	Severe	
The probability of joint trajectory of group membership					*Chi-Square= 112.*
Minimal	5.9	2.3	0.5	0.0	*df. =12,*
Mild	11.9	**15.1**	5	1.4	*p= 0.000*
Moderate	2.3	9.1	**9.6**	3.2	
Moderately severe	0.5	5.5	7.8	**8.7**	
Sever	0	0.5	4.1	**6.8**	
The probability of anxiety symptoms based on depressive symptoms					*Kappa (K) coefficient*
Minimal	**68.4**	26.3	5.3	0.0	*=0.21,*
Mild	35.6	**45.2**	15.1	4.1	*P=0.000*
Moderate	9.4	37.7	**39.6**	13.2	
Moderately severe	2.0	24.5	34.7	**38.8**	
20 (severe)	0.0	4.0	36.0	**60.0**	
Probability of depressive symptoms based on anxiety symptoms					
Minimal	28.9	7	1.7	0	
Mild	**57.8**	**46.5**	18.6	6.8	
Moderate	11.1	28.2	**35.6**	15.9	
Moderately severe	2.2	16.9	28.8	**43.2**	
Severe	0.0	1.4	15.3	**34.1**	

4.2.2.2. Bivariate associations of depression, anxiety and PTSD sub-scale with pre-specified risk factors

The associations of psychological disorder sub-scale with selected gynaecologic and obstetric history of women are summarized in table*4.5* using these associates (p<0.05). In addition to verifying known demographic correlates, the current study also revealed an additional significant association with obstetric fistula lifetime distressing events. The results of this study significantly expanded upon prior research in psychosocial outcomes related to obstetric fistula. It is noteworthy that women with obstetric fistula report greater symptoms of depression, PTSD, and anxiety, even after controlling for underlying risk factors for psychopathology. Symptoms of depression were more prevalent among rural than urban (188 vs 31), and those who have had stillbirth outcome than those who did not (140 vs 54). The researcher noted that anxiety was more likely to be observed in women who had lived with obstetric fistula for more than 1 year than those with less than a year (p=0.004), and among those who experienced stillbirth outcome than live birth (p=0.049).

Evidence has shown that negative childbirth experience is a predictor of mental disorder symptoms like depression, PTSD, and anxiety. It is suggested that stillbirth is associated with depression symptoms following childbirth (Bangser et al 2011:95). In this study, delivery outcome following fistula was not significantly associated with depression (P=0.57), which may have occurred due to low sample size in one of the groups, 72% (140) women had experienced a stillborn infant. There is evidence that depression markers are likely to increase with chronicity of illness (longer than 3 months) (Weston et al 2011:32). In the present study, depression and PTSD symptoms were more prevalent among women with an obstetric fistula of less than 1-year duration than above 1 year' duration (120 vs 80, 101 vs 70) respectively, although the difference was not significant (p=0.242, p=0.224). Again, this may have occurred due to the low sample size in one of the groups.

Women with fistula also reported that significantly less social support affected the prevalence of depression, PTSD and anxiety symptoms (P=0.024, P=0.008, P=0.001) respectively. It was also noted that depression and anxiety had a strong correlation with PTSD (r=0.64, r=0.68) respectively. The mean OSS-3 score was 10.30(SD=2.65) and ranged from 3 to 14.

The distribution of the depression and anxiety sub-scale according to their Social Support Scale (OSS-3) grouping is shown in Table 4.5. The Table shows, the mean depression score of cases to non-cases as 10.65 to 1.0, respectively and the mean anxiety symptom score of cases to non-cases as 9.22 to 1.0, respectively. The mean depression and anxiety score among cases decrease progressively with increasing social support. The mean difference was statistically significant (t-test = 61.01; p=0.000). The correlation of OSS-3 with depression, anxiety, and PTSD sub-scale was significant and of inverse relation (r=-0.328, -0.284 &-0.256) respectively (*Table 4.6*).

Table 4.5: Association between gynaecologic and obstetric history of women and psychological disorder [a,b,c,d] sub-scale, (n=219)

Characteristic		Depression	P value	Anxiety (GA)	P value	PTSD	P-value
Disease duration	<1+ year	120 (60)	0.242	98 (56.3)	**0.004**	101 (59.1)	0.224
	>1 year	80 (40)		76 (43.7)		70(40.9)	
Delivery outcome (last birth)	Stillbirth	140 (72.2)	0.578	118 (75.6)	**0.049**	110(73.3)	0.706
	Livebirth	54 (27.8)		38 (24.4)		40(26.7)	
Social support	Poor	50 (25)	**0.024**	48 (27.6	**0.001**	48 (28.1)	
	Intermediate	77 (38.5)		68 (39.1		63 (36.8)	**0.008**
	Strong	73 (36.5)		58 (33.3		60(35.1)	
		*T-test = 61.01; p = <0.000)					

[a] Values are given as number (percentage) unless otherwise indicated.
[b] Women with minimal depression were grouped together with those without depression to form a "minimally or not depressed" cohort, whereas those with mild, moderate, moderately severe, or severe depression constituted the "depressed" cohort (n=219).
[c] Women with minimal anxiety were grouped together with those without anxiety to form a "minimally or not anxiety" cohort, whereas those with mild, moderate, or severe anxiety constituted the "anxiety" cohort (n=219).
[d] Women with minimal PTSD were grouped together with those without PTSD to form a "minimally or not PTSD" cohort, whereas those with mild, moderate, moderately severe, or severe PTSD constituted the "PTSD" cohort (n=219).

The fact that women with fistula reported significantly lower social support is a possible explanation for elevations in psychological distress (Dennis et al 2016:433, Wilson et al 2015:612). Women with obstetric fistula had higher depression and anxiety symptoms and lower social support. The study demonstrated a negative association between depression, anxiety, PTSD, and having little or no social support.

Previous research findings affirm that depression is inversely correlated with social support, such that individuals with higher levels of social support reported lower levels of depression (Dennis et al 2016:433). Similar evidence suggested that women with low level of social support have high depression, PTSD and anxiety symptom, and a significant proportion of women end up divorced or separated from their partners (Bangser et al 2011:95; Mselle et al 2011:6-9; Wilson et al 2015:611). Other similar evidence reported that social isolation and stigma often lead to psychological trauma, including depression, anxiety, PTSD and in some cases of suicide (Alio et al 2011:372; Rahm et al 2013:269).

Women with fistula who experience low social support may violate their interdependence schema, thus introducing a threat to their conceptual self. It is this threat to the interdependent self, which is theorized to contribute to the development and maintenance of depression and anxiety symptoms (Wilson et al 2015:49). Other evidence suggests that psychological disorders are significantly associated with marital status; widowed, divorced, or separated individuals are more likely to develop psychological disorders than others (Mossie, Kindu & Negash 2016:5; Mselle et al 2011:6-9). One explanation for the higher rate of depression in the present study could be the higher rate of divorce reported by respondents (20.5%) compared with that reported by Weston et al (2011:32) in their cohort, (11%) and lower than the 25% reported by Bangser et al (2011:95) in Tanzania and Uganda. From the total respondents, 73% were currently married, of which 13% were not living with their sexual partners/husbands due to their smell, perception of uncleanliness, and mistaken assumption of venereal disease.

In a context in which being a woman often is largely defined by motherhood, wifehood, and social connections, it is devastating to lose one's childbearing ability, marital relationship quality, and social interaction. This would suggest that the heightened psychological distress (anxiety and depression) present in the overall sample respondents with fistula may be moderated by the level of social interconnectedness during and immediately following prolonged labour, such that women with higher interconnectedness may demonstrate increased resilience. The social connection could come in the form of a faithful spouse, supportive parent, or a helpful friend. If these connections are strong and longstanding, they

may endure after fistula development. This would enable a higher level of social support activity, which could protect the women against depression and anxiety.

Table 4.6: Exploratory bivariate correlations at prior to surgical repair

		1	2	3	4	5	6
1	Post-Traumatic Stress Disorder (PTSD)	1					
2	Anxiety	**.678****					
3	Depression	.643**	**.697****				
4	Social support	**-.256****	**-.284****	**-.328****			
5	Disease duration	.020	.131*	.034	-.132*		
6	Delivery outcome	-.041	-.079	-.045	.109	-.028	1
	** P< 0.01, * P< 0.05						

4.2.3. The prevalence and severity of depression, anxiety and secondary PTSD of women with obstetric fistula who undergo surgical repair

Initially, 219 eligible respondents were recruited on admission using a consecutive sampling technique. In this section, the researcher analysed data from only 200 respondents after completing their surgical repair in order to assess the severity of depression and anxiety. Nineteen respondents chose to exercise their right to withdraw from the study at any time are therefore not included in the analysis.. The dropout rates were acceptable compared to clinical studies in general (Katja, Ylva, Matthias & Alexander 2015:161; Mary, Richard, Berthold, Kathy, Andy & Lucas 2013: 458).

The main causes of respondent dropout were refusing or not being interested to participate after completing baseline information. All follow-up measures were administered immediately prior to their discharge date (before 2 days) and the average follow-up time (hospital stays for surgical repair) at 5.64 weeks (SD=2.34). During the study period, there was no change in the composition of the study respondents in terms of their socio-demographic characteristics.

For measuring the severity of depression symptoms, the200respondents scored 27 or more in the PHQ-9 scale, indicating that more than 2 in 10 women (27%) had depressive symptoms. Out of this proportion of women with depressive symptoms 15.5% scored in the

mild depression range, whereas 1 in 10 women were classified as experiencing severe depression. In regards to the prevalence of general anxiety, respondents scored 21 or more in the GAD-7 scale, showing that more than 2 in 10 women (26%) had anxiety symptoms, of which 16 percent of them mild anxiety and 6 percent had severe anxiety. With respect to the severity of PTSD, more than 6 in 10 women (66%) had a PTSD symptom, of which 13 and 6 percent had moderately severe and severe PTSD, respectively (*Table 4.7*).

Table 4.7: Prevalence and severity of depression, anxiety and PTSD symptoms of women with obstetric fistula who had undergone surgical repairs (n=200)

The severity of psychological variables	Depression (PHQ-9)	Anxiety (GAD-7)	PTSD (PCL-C)
Psychological Symptom	54 (27)	51 (25.5)	132 (66)
No symptom/ Minimal	146(73)	149(74.5)	68 (34)
Mild	31 (15.5)	32 (16)	94(47)
Moderate	14(7)	7(3.5)	
Moderately severe	8(4)		26 (13)
Severe	1(0.5)	12(6)	12(6)

4.2.4. Variations in the severity of depression and anxiety between pre and post-surgical obstetric fistula repairs

Obstetric fistula repair surgery has been demonstrated to positively impact a woman's life through improvements in her physical and psychological condition (Dennis et al 2016:430). Compared to baseline and control for multiple comparisons, all measures of psychological disorders showed improvement at follow-up (*Figure 4.1 and Table 4.8*). On admission, 91 percent of women screened positive on the PHQ-9 questionnaire with a mean score of 12.3. On discharge, the same questionnaire was administered to all women. This time only 27% of women screened positive and the overall mean score was only 3.64.

The difference in prevalence of screen-positive women was statistically significant (Kruskal Wallis test, P=0.000) as was the difference in mean score (Mann–Whitney U test, P < 0.05) (*Table 4.8*). For anxiety screening, 79% of women screened positive on the GAD-7 questionnaire with a mean score of 9.9 during admission. The same questionnaire was

administered on discharge where only 25% of women screened positive and the overall mean score was only 3.4. The difference in prevalence of screen-positive women was statistically significant (t-test, P= 0.000) as was the difference in mean score (Paired test and Mann–Whitney U test, P < 0.001) (*Table 4.8*).

There is preliminary evidence suggesting that women with obstetric fistula following fistula repair surgery have experienced a decrease in psychological distress. In this study, women reported decreased anxiety and depression symptoms. The difference was statistically significant before and after surgical repair. A quantitative study conducted in Tanzania by Wilson et al (2016:944) reports that psychological distress, including depression and anxiety of women with fistula, significantly decreased from admission to post-surgery. These study findings indicate that overall, women with obstetric fistula experience improvement in depression and anxiety following fistula repair. Follow-up after surgical repair revealed that over time, from admission to 5.64 weeks after surgery, women with fistula report a decrease in depression and anxiety symptoms.

Results from the follow-up study verify previous literature that has suggested an overall improvement in the mental health outcome and quality of life of women following obstetric fistula repair (Drew et al 2016:11; Yeakey, Chipeta, Rijken, Taulo & Tsui 2011:157; Maulet et al 2013:531-2). The current study adds to this literature by specifying and quantifying depression and anxiety symptoms that change following surgical repair. The sharp decline reported in these symptoms suggests that women generally experience improvement in their mental health following surgical repair. The reduction in anxiety and depression symptoms at follow-up was somewhat remarkable, given the level at which symptoms were reported at baseline. This is not a typical course of anxiety and depression unless traumatic stress is conceptualized as chronic and ongoing for women with obstetric fistula rather than restricted to a single event (the traumatic childbirth).

Table 4.8: Psychological symptoms (depression and anxiety) between, baselines to post-discharge follow-up

Variable	Baseline M (SD)	Follow-up M (SD)	Paired test (2 tailed)		Kruskal Wallis test		Mann-Whitney Test	
			T	P	X^2	P	z	p
Depression Symptoms	12.29 (5.9)	3.64 (4.6)	15.94	< .001	178.1	0.000	-13.3	0.000
Anxiety Symptoms	9.90 (5.2)	3.35 (4.7)	13.29	< .001	145.5	0.000	-12.1	0.000
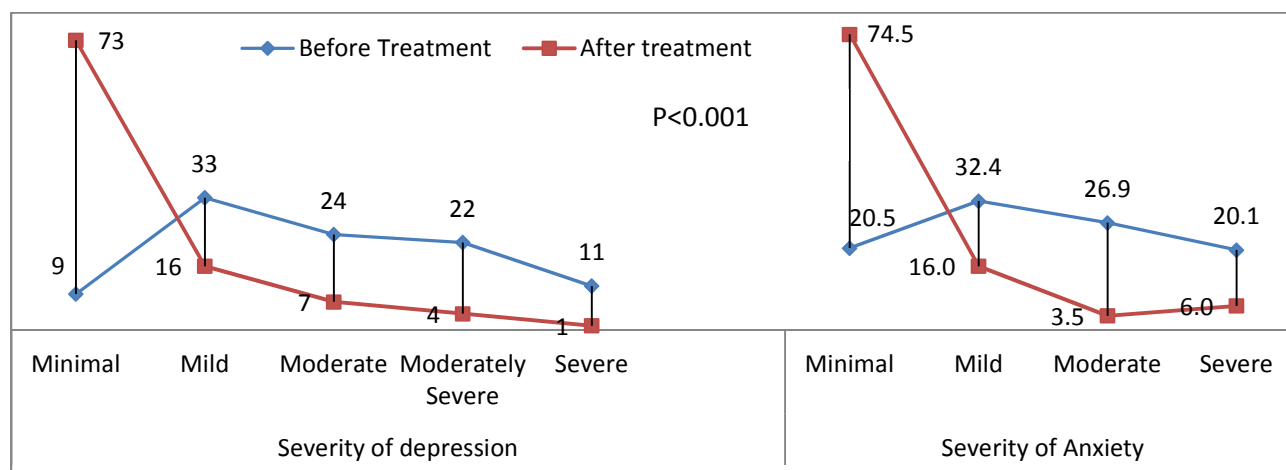
Figure 4.1: Variation of depression and anxiety symptoms between, baselines to post-discharge

The post-operative score was highly dependent on the success of the treatment. Although some women do not fully recover from the first surgical repair of their fistula and will continue to experience symptoms or will need additional surgery, many women do benefit from surgical repair (Dennis et al 2016:430). Following surgery, 18 of the 200 repairs were considered to have failed (9%). Of the remaining women, 69% (137) respondents self-reported that their fistula was cured and 23 % (45) of them not cured. Of those who reported that their fistula was not cured 23% (45), 5% (10) leaked only with extraction, 13% (26) leaked only while walking, but were dry while setting, 4.5% (9) leaked while walking and occasionally while sitting.

In exploratory analyses, differences between those who reported being cured versus those who are not cured were seen in depression and anxiety symptoms (*Table 4.9*). In spite of the

total positive effect of surgery on psychological distress, there is also evidence that some women continue to experience distress after repair (Kayondo et al 2011:8; Wilson et al 2016:943). At follow-up, respondents who reported continued leaking endured significantly higher depression and anxiety symptoms than those who self-identified as being cured. Significant differences were detected in depression and anxiety symptoms among women who continued to experience leaking after completing their follow up treatment and those who did not. While becoming continent after repair represents a re-birth for women suffering from fistula, failure of fistula closure can lead to further depression and isolation (Landrya et al 2013:940). Furthermore, continued leaking could potentially be considered an ongoing traumatic event. If obstetric fistula and its consequences are an ongoing trauma exposure, then surgery would put an end to this fistula-related traumatization. Thus, a decrease in anxiety and depression symptoms following the repair surgery may indicate a natural healing process in the wake of trauma.

Table 4.9: Exploratory association between cure with psychological symptoms after post-discharge follow-up only

Variable	Self-Reported Cure Status		Group difference (t-test	P-value
	Cured M (SD)	Not Cured M (SD)		
Depressionsymptoms	1.16(2.5)	3.9 (4.3)	-4.3	0.000**
Anxiety symptoms	1.24(2.6)	3.4(4.3)	-3.3	0.002*

*p<0.01, ** p<0.001

Linear associations were detected between self-reported severity of leaking and severity of depression symptoms at follow-up (*Table 4.10*). The self-reported severity of leaking was positively associated with depression severity (r=0.15). This suggests a relationship between psychological distress and the extent of leaking after fistula surgery. The self-reported severity of depression was positively associated with anxiety severity and PTSD severity symptoms. Depression was a particularly strong correlation between anxiety and PTSD severity (*r* =0.65 and r=0.69).

The study results also support evidence from a qualitative research that suggested continuing psychosocial concerns for women with post-surgery incontinence (Pope et al

2011:7). Of our sample, 69% believed that their fistula was cured at follow-up. Women who did not perceive themselves to be cured had significantly higher depression and anxiety symptoms than those who believed they were cured, and self-reported severity of leaking was correlated with depression. Given that 23% of the current fistula follow-up sample reported continued leaking after fistula repair surgery, there is a significant association between leaking and psychological symptoms. Consequently, it is possible that a small percentage of women with obstetric fistula would not experience this decrease in symptoms after fistula repair, and would instead develop chronic anxiety and depression. For these women, empirically supported treatment for depression and anxiety may be necessary.

Table 4.10: Exploratory bivariate correlations at post-discharge follow-up

	1	2	3
Depression	.15[*]		
Anxiety	-.05	.65[**]	
PTSD	.10	.69[**]	.64[**]

$* p < .05. ** p < .001.$

4.2.5. Sexual behavior and plans for follow-up care among women with obstetric fistula

The majority of the respondents were satisfied (81%) by the treatment received in the fistula treatment centres. Eleven percent of respondents with leaking and 81% without any leaking, making up 92% of the total respondents, reported that they would reutrn to fistula treatment center for follow-up care. Sixty percent of the respondents plan to deliver at the fistula treatment center.

Follow-up assessment also provided the opportunity to examine the sexual intercourse plan of the respondents following fistula repair. While women are regularly advised not to engage in sexual intercourse within three months after fistula repair surgery, the prevalence of sexual behavior in the months immediately following fistula repair is still not fully understood. During the follow-up period, 43 respondents (31%) reported that they have a plan to start sexual intercourse after three months of waiting, 82 respondents (59%) had a plan to start sexual intercourse within three months and 10.5% (14) had plans to start before three months. This

is a considerably lower estimate than previous research, which found that 57% of women had engaged in sexual intercourse before 3 months after fistula repair (Wilson et al 2015:53). This difference may be due to factors relating to the severity/size of women' with fistulae.

4.3.   STRUCTURAL EQUATION MODEL ANALYSIS

Structural equation model is a confirmatory method providing a comprehensive means for assessing and modifying the measurement model of a latent construct. Carvalho and Chima (2014:6) define structural equation model as a statistical methodology that takes a confirmatory (i.e. hypothesis-testing) approach to analyse the relationship among latent variables, which allow testing the statistical hypotheses for the study. The overall goal of structural equation model is to test whether a theoretical model based on theory or empirical data is supported by sample data using the scientific method of hypothesis testing to advance our understanding of the relationship among constructs.

4.3.1. Confirmatory factor analysis

The part of structural equation model that connects the measured variables to factors (constructs) is called measurement model (Schumacker & Lomax 2010:184). The type of analysis that estimates this measurement model is called Confirmatory Factor Analysis (CFA) (Ullman 2006:37). Confirmatory Factor Analysis helps to test the hypothesis that the relationship between observed variables (items for the case of depression and anxiety) and latent mediator variables (PTSD); and it addresses important issues such as the validity of the structure of a scale (Diana & Shay [Sa] 2017; Ullman 2006:37).

In this study, two main points were addressed based on the objective of the study. The first main point checks the closeness of the parameters of population covariance matrix (estimated structural covariance matrix) and sample covariance (estimated unstructured covariance matrix) using chi-square test statistic and fit indexes which are discussed below. After checking the model fit, the second step was looking into the estimates, standard errors and individual significance tests (path coefficients and covariance) on the parameters that were performed. The overall objective of confirmatory factorial analysis (CFA) for this study is

to determine and validate if the set of items assigned for the two constructs of measurement scale are adequate indicators of the three underlying constructs (depression, anxiety, and PTSD). Even though, there is no agreed reporting guideline on confirmatory factorial analysis and structural equation modeling process. The study employed the following confirmatory factorial analysis/structural equation modeling reporting steps according to the recommendations of Carvalho and Chima (2014:7) and Kline (2011:91-2). Model specification

- Model identification
- Model estimation
- Testing model fit
- Model manipulation

4.3.1.1. *Model specification*

Model specification is an important first step in analyzing a confirmatory factor model (Schumacker & Lomax 2010:165). Many different relationships among a set of variables can be postulated with many different parameters being estimated. In this study, the three latent constructs of measuring psychological distress (depression, anxiety, and PTSD) contains nine items under depression scale, seven items under anxiety and seventeen item under PTSD. The confirmatory factor models for each of the latent variables that contained specified observed variables (items) were specified. The drawing conventions used in the consecutive confirmatory factorial analysis models as defined by Schumacker and Lomax (2010:165-166) and Ullman (2006:36-37) were explained as follows:

- Measured variables (observed variables) also called items for this study are represented by squares or rectangles.
- Factors, also called constructs or latent variables are represented by circles or ovals
- A line with one arrow represents a hypothesized direct relationship between two variables; this indicates the variable the arrow pointing to is affected by the other variable.
- A curved, double-headed line between two factors indicates that they have shared variance or are correlated.

- A curved, double-headed line between two measurement error variances indicates that they also have shared variance or are correlated.
- The measurement errors are represented by smaller ellipses and indicate that some portion of each observed variable is measuring something other than the hypothesized factor.

There were three latent variables, which were represented by a set of observed variables as shown in Table 4.11, which depicts variable names and items used in the analysis of confirmatory factorial analysis. The three latent variables with their corresponding items (variables) were analysed separately using confirmatory factorial analysis. Each of the three confirmatory factorial analysis models was represented using a number of measurement equations (number of free parameters) which was calculated by summing up:

- The number of factor loadings which equals the number of observed variables (items)
- The number of measurement error variances which equals the number of observed variables

Table 4.11: Variable names and items that correspond to each of the three models used in the analysis of the confirmatory factorial analysis

Variable Name	Items
Depression (Dp), a 4-point Likert scale ranging from "0=not at all" to "3=nearly every day"	
Dp1	Little interest or pleasure in doing things?
Dp2	Feeling down, depressed, or hopeless?
Dp3	Trouble falling or staying asleep, or sleeping too much?
Dp4	Feeling tired or having little energy?
Dp5	Poor appetite or overeating?
Dp6	Feeling bad about yourself — or that you are a failure or have let yourself or your family down?
Dp7	Trouble concentrating on things, such as reading the newspaper or watching television?
Dp8	Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving. Around a lot more than usual?
Dp9	Thoughts that you would be better off dead or of hurting yourself in some way?

Table 4.11: Variable names and items that correspond with each of the three models used in the analysis of the confirmatory factorial analysis

Variable	Items
General Anxiety (GA), a 4-point Likert scale ranging from "0=not at all" to "3=nearly every day"	
GA1	Feeling nervous, anxious or on edge?
GA2	Not being able to stop or control worrying?
GA3	Worrying too much about different things?
GA4	Trouble relaxing?
GA5	Being so restless that it is hard to sit still?
GA6	Becoming easily annoyed or irritable?
GA7	Feeling afraid, as if something awful might happen?
Post-traumatic stress disorder (PTSD), a 5-point Likert scale ranging from "1= not at all" to" 5=extremely"	
PTSD1	Repeated, disturbing memories, thoughts, or images of a stressful experience?
PTSD2	Repeated, disturbing dreams of a stressful experience?
PTSD3	Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?
PTSD4	Feeling very upset when something reminded you of a stressful experience?
PTSD5	Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience?
PTSD6	Avoiding thinking about or talking about a stressful experience or avoiding having feelings related to it?
PTSD7	Avoiding activities or situations because they reminded you of a ?
PTSD8	Trouble remembering important parts of a stressful experience?
PTSD9	Loss of interest in activities that you used to enjoy?
PTSD10	Feeling distant or cut off from other people?
PTSD11	Feeling emotionally numb or being unable to have loving feelings for those close to you?
PTSD12	Feeling as if your future will somehow be cut short?
PTSD13	Trouble falling or staying asleep?
PTSD14	Feeling irritable or having angry outbursts?
PTSD15	Having difficulty concentrating?
PTSD16	Being "super-alert" or watchful or on guard?
PTSD17	Feeling jumpy or easily startled?

In the confirmatory factorial analysis models, it was assumed that there were no correlations among the latent variables and zero measurement error covariance terms or correlations; hence were not considered under a number of free parameters.

In this study, the researcher confirmed the uni-dimensionality, validity, and reliability for all latent constructs involved in the study before modelling their interrelationship in a confirmatory factorial analysis. With confirmatory factorial analysis for every measurement model using individual or pooled confirmatory factorial analysis, any item that does not fit the measurement model due to low factor loading should be removed from the model (Awang 2014:68). In this study, the researcher performed individual confirmatory factorial analysis for all latent constructs involved in the model. The individual endogenous confirmatory factorial analysis results of the severity of depression and anxiety measurement showing fitness indexes and factor loading for every item together with its R^2 are presented in Figures 4.2 and 4.3.
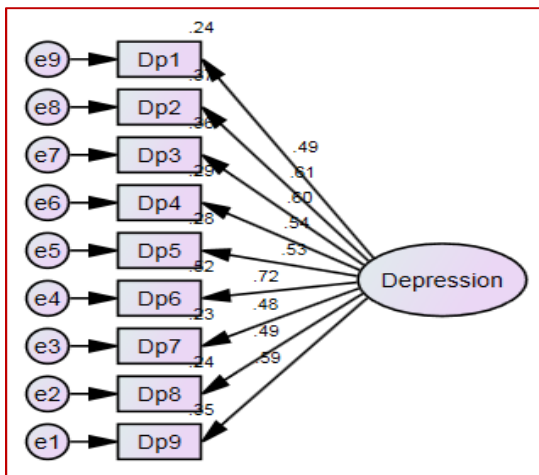
Figure 4.2: The Factor Loading for every item in the measurement model for severity of depression
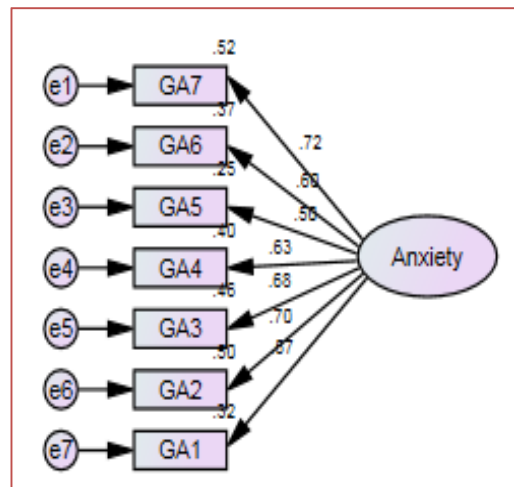
Figure 4.3: The Factor Loading for every item in the measurement model for severity of anxiety

The exogenous latent constructs of PTSD contained 19 items and the individual confirmatory factorial analysis results showing fitness indexes and factor loading for every item together with its R^2 are presented in Figure 4.4.
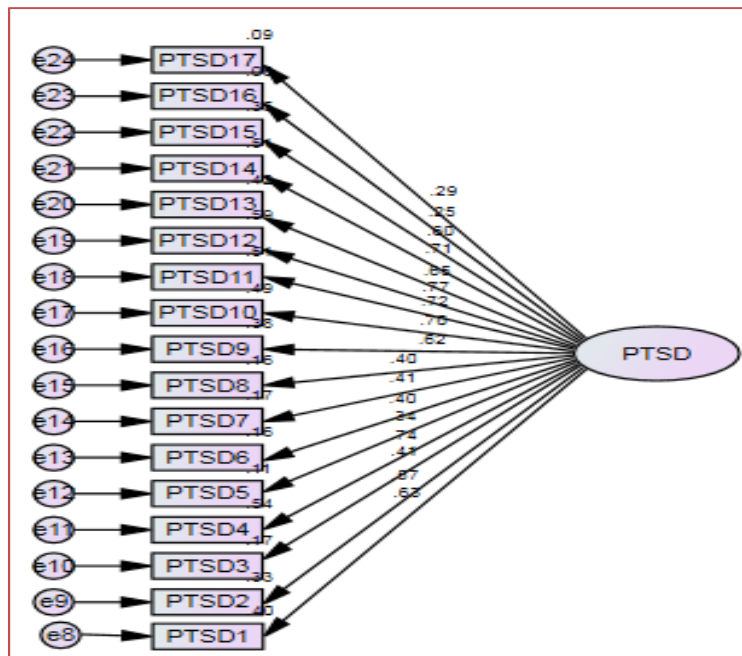
Figure 4.4: The Factor Loading for every item of the rrespective cconstruct
in the measurement model for PTSD

4.3.1.2. Model identification

After specifying the confirmatory factorial analysis models, it was critical to check if the models were identified. In this study, model identification process assessed if the factors loading of each of the items on its respective factor were identified or could be estimated. In order to check this, it was important to assess order conditions. The number of free parameters to be estimated must be less than or equal to the number of distinct values in the matrix S, then the model is called over-identified (Schumacker & Lomax 2010:167-168). Factor loading and measurement error variances that correspond to the number of observed variables or items were determined for each of the three confirmatory factorial analysis models specified in this study as indicated in Table 4.12. Moreover, it was assumed that there were no measurement error covariance terms or correlations for each of the three confirmatory factorial analysis models. The number of distinct values in the matrix S was calculated by the formula: $p(p+1)/2$ (where p is a number of observed variables in the sample variance-covariance cematrix). According to the order condition, the model is over-identified because there are more values in S than parameters to be estimated. In this study, the researcher checked on the model identification through the rank test and information matrix,

which satisfied the order and rank conditions for the equation of every endogenous variable of this study, indicating that the confirmatory factor model is indeed identified.

Table 4.12: Number of free parameters and distinct values in the matrix S for each of the three confirmatory factorial analysis model

	Number of observed variables in the models	Number of free parameters	Number of distinct values in the matrix S	DF	Status
Depression	9	18	45	27	Over identified
Anxiety	7	14	28	14	
PTSD	17	34	153	119	

4.3.1.3. Model estimation

After the identification problem has been addressed, the next step is to estimate the parameters of the specified factor model. This section considered decomposition of the correlation (or variance-covariance) matrix, parameter estimation in general, and parameter estimation of the confirmatory factor model of this study (Schumacker & Lomax 2010:156). The decomposition notion is that the original correlation (or variance-covariance) matrix can be completely reproduced if all of the relations among the observed variables are accounted for by the factors in a properly specified factor model. If the model is not properly specified, then the original correlation (or variance-covariance) matrix will not be completely reproduced (Schumacker & Lomax 2010:169).

Following model identification, it was important to estimate the parameters of the specified factor model. There are various types of estimation procedures depending on their distributional assumptions and scale dependence, such as maximum likelihood (ML), generalized least squares (GLS), and unweighted least squares (ULS), and can be reported as unstandardized estimates or standardized estimates (Schumacker & Lomax 2010:59-63). This study analysed the confirmatory factor model using Maximum Likelihood Estimates (MLE) with a standardized solution to report our statistical estimates of the free parameters

because the dataset meets the multivariate assumption (acceptable skewness and koritossis); there are no missing values; no outliers and continuous variable data.

4.3.1.4. Testing the model fit

After completing parameter estimations of the three models (depression, anxiety, and PTSD), the researcher needed to determine how well the data fitted the hypothesized model. It is the process of evaluating a structural equation model with the goodness of fit indices (Carvalho & Chima 2014:7; Mueller & Hancock 2013:490). Model fit determines the degree to which the sample variance-covariance data fit the structural equation model. There is no gold standard set of fit statistics that would help in determining which model to retain or reject. However, in this study the following commonly recommended (frequently reported in literature) model fit criteria were used to judge the statistically significant and theoretical meaning: the Goodness of Fit Index (GFI>0.9), Root Mean Square Error of Approximation (RMSEA<0.08), Chi-Square(P>0.05), Adjusted Goodness of Fit (AGFI>0.9), the Comparative Fit Index (CFI>0.9), and Chi Square/Degrees of Freedom values, which should be less than 5 (Lacobucci 2010:90-91; Hooper, Coughlan & Mullen2008:58; Hair, Black, Babin & Anderson 2010:654). In addition, using the statistical significance of individual parameters estimates the paths of the model. This is assessed using a value and t-value of 1.96 or more (at the 0.05 level of significance or less) are considered significant. The researcher also run the separate confirmatory factorial analysis model for each set of observed variables, which were hypothesised to indicate their respective latent variables (constructs) and look into whether the items are indeed good indicators of constructs (Carvalho & Chima 2014:8).

4.3.1.5. Initial test of the confirmatory factorial analysis model and model modifications

In this study, three confirmatory factorial analysis models were run using the MLE method separately for the three constructs of measurement items (depression, anxiety, and PTSD) using individual confirmatory factorial analysis uses AMOS version 22 computer software. To identify model misspecifications, the standardized residuals and the modification indices for each of the sub-scales were inspected in addition to the statistical significance of each

parameter, the magnitude and directions of the parameters. Based on standard residuals and model fit indices (MIs), the original models were modified and the model fit indices were re-screened when the criteria mentioned in section 4.3.1.4 were met.

As reflected in Table 4.13, as expected, the chi-square values were significant for all the three confirmatory factorial analysis initial models, so the specified confirmatory factor analysis is not supported by the sample variance-covariance data. The fit of the initial model is poor. The RMSEA values exceeded the cutoff point 0.08 for all the confirmatory factorial analysis models. The GFI and CFI (criterion ≥0.90) did not meet the criteria.

Table 4.13: Initial model fit test of confirmatory factorial analysis models (n=217) sub-scales

Model fit categories	Index	Depression	Anxiety	PTSD
Absolute fit	Chisq	112.030	73.545	602.865
	df	27	14	119
	P-value	0.000	0.000	0.000
	RMSEA	0.121	0.140	0.137
	GFI	0.888	0.907	0.702
Incremental fit	AGFI	0.814	0.813	0.617
	CFI	0.823	0.870	0.677
	TLI	0.764	0.805	0.631
	NFI	0.783	0.846	0.631
Parsimonious fit	**Chisq/df**	4.149	5.523	5.066

As shown in Table 4.13, certain fitness indexes for the constructs do not achieve the required level. Therefore, the model needed to be modified in order to improve chi-square values and model fit indices by deleting redundant items or low factor loading items.

In the initial confirmatory factorial analysis model, the researcher examined the factor loading, the standardized residual table demonstrated that the factor loading for item Dp7 (from constructing depression), PTSD17 (from constructing PTSD), and GA5 (from constructing anxiety) were below 0.6. Any item having a factor loading less than 0.6 should be deleted from the measurement model of a construct: however, this should not be done if the fitness indexes for that measurement model have already achieved the required level (Awang 2015:55). In confirmatory factorial analysis, the item-deletion process is made for

every construct by selecting the item having the lowest factor (item should be less than 0.6) loading in each construct to be deleted (Awang 2015:60). These three "useless items" have caused the measurement model for the constructs to be poorly fit. Therefore, one has to delete these three items step by step, and delete all low caseload items using the same procedure and run the new measurement model as shown Table 4.14.

Table 4.14: Mis-specified confirmatory factorial analysis model fitness indexes after the items were deleted (n=217) sub-scales

	Index	Depression	Anxiety	PTSD
Absolute fit	Chisq	22.75	16.752	79.489
	Df	5	5	20
	P-value	0.000	0.005	0.000
	RMSEA	0.128	0.104	0.117
	GFI	0.958	0.97	0.903
Incremental fit	AGFI	0.875	0.911	0.826
	CFI	0.929	0.961	0.926
	TLI	0.859	0.922	0.896
	NFI	0.913	0.946	0.904
Parsimonious fit	**Chisq/df**	4.556	3.35	3.974

Across this particular set of model fit indices, the conclusion is that the model fit is reasonable, although still not acceptable. Even though the factor loading of all items was 0.6 and above some model modification could still allow the researcher to achieve a better sample data (variance-covariance matrix) to confirmatory factor model fit. Determining what change (s) to make to the confirmatory factorial analysis model to achieve a better fitting model is considered in the next section.

The researcher continued to modify the measurement model since the fitness index does not meet the required level. Thus, the researcher suspected that certain items are redundant to each other in the measurement model. The items redundancy can be examined through inspecting the Modification Indexes (MI). The high value of MI (4 or above) indicates there are redundant items in the model (Modification Indexes (MI) (Bowen 2014:1). The researcher set the correlated pair as "free parameter estimate" and continued the modification process using free parameter estimate until the measurement model fitness index met the required

level. Table 4.15 indicates the MI for a pair of correlated errors, which reflect redundant items exist in the model. The MI value of 14.25 is considered high since it is greater than 4.0. The correlated measurement error here is between e18 and e19. The redundancies between these two items have caused the measurement model to have a poor fit. In dealing with redundant items in the model, the researcher has set two correlated measurement errors of redundant items as a "free parameter" and run the new measurement model. The modified confirmatory factorial analysis results showing fitness indexes and factor loading for every item together with its R^2 are presented in the following diagram and Table. The sections conclude with the set of items that were retained in the final measurement items.

Table 4.15: The Modification indices present the covariance between each pair of items

		MI	Par Change
Depression	e1<--> e7	4.674	-.126
	e1<--> e9	5.327	-.129
Anxiety	e1<--> e5	5.532	-.117
PTSD	e16<--> e21	11.992	.284
	e8<--> e11	12.859	.260
	e18<--> e19	**14.246**	**.223**
	e17<--> e18	6.471	.193
	e17<--> e19	7.751	.191
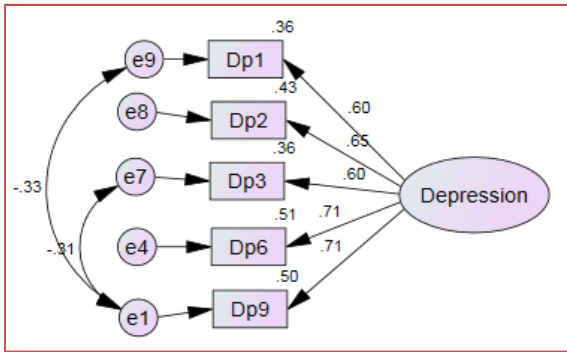
Figure 4.5: Final depression measurement model after modification index and set as "Free Estimate"
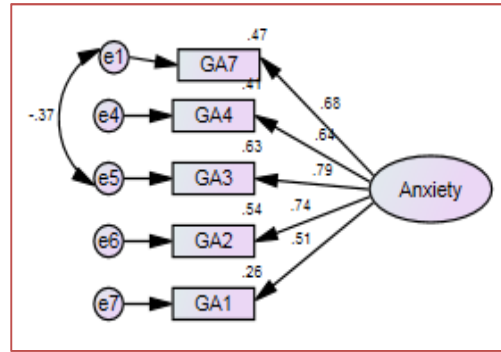
Figure 4.6: Final aanxiety measurement model after modification index and set as "Free Estimate"
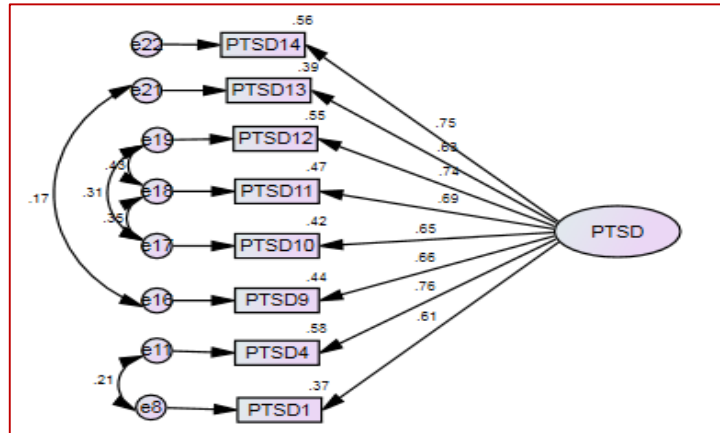
Figure 4.7: Final PTSD measurement model after modification index and set as "Free Estimate"

The modification model Figure presents the factor loading for each item in a measurement model and the factor loading for a particular item, which achieved the required expected level of fitness index. In summary, as it was depicted in Table 4.16, the model fit indices for each of the three modified sub-scale models showed that the Chi-square values of the model were non-significant. This indicated that the observed and implied variance-covariance matrices were similar meaning the data fit the proposed models. Considering practical significance and values of RMSEA, CFI, and GFI, these models were also accepted. The fitness indexes improved after the modification was done. Once the fitness index requires the expected level, the researcher computed the validity and reliability of the construct before conducting structural equation model.

Table 4.16: The fit indices for the three sub-scale modified models (n=217) sub-scales

	Index	Depression	Anxiety	PTSD
	Chisq	6.824	7.2	21.057
Absolute fit	Df	3	4	15
	P-value	0.078	0.126	0.135
	RMSEA	0.032	0.061	0.043
	GFI	0.988	0.987	0.977
Incremental fit	AGFI	0.938	0.95	0.945
	CFI	0.985	0.989	.992
	TLI	0.949	0.973	0.986
	NFI	0.974	0.977	0.975
Parsimonious fit	**Chisq/df**	2.275	1.8	1.404

4.3.1.6. *Assessing the validity and reliability of individual confirmatory factorial analysis measurement model*

As mentioned earlier, assessment of uni-dimensionality, validity, and reliability of measurement models is required prior to modelling the structural model. In this study, the uni-dimensionality requirement was achieved through the item-deletion process for low factor loading items until the fitness indexes achieved the required level and run the new model. All processes have been demonstrated. The researcher also checked the validity (convergent and construct validity) through the following processes. Convergent validity was achieved when all items in the three modified sub-scale models (depression, anxiety, and PTSD measurement model) were statistically significant.

The individual measurement model requirement was presented in Table 4.17. Construct validity was achieved when the fitness indexes for a construct achieved the required level. The fitness indexes and the level of the requirement are presented in Table 4.16 above. The discriminant validity was achieved when all redundant items are constrained as "free parameter". Referring to the modified new Figure, one can conclude that the discriminant validity for all three constructs was achieved.

Table 4.17: Maximum Likelihood Estimates for the modified individual measurement model

			Estimate	Standard Error	Critical Ratio	P_value
DP6	<---	Depression	1.081	.142	7.597	***
DP3	<---	Depression	.893	.141	6.351	***
DP2	<---	Depression	.915	.132	6.939	***
DP1	<---	Depression	.869	.138	6.303	***
DP9	<---	Depression	1.000			
GA4	<---	Anxiety	1.359	.209	6.516	***
GA3	<---	Anxiety	1.657	.244	6.798	***
GA2	<---	Anxiety	1.458	.208	7.011	***
GA7	<---	Anxiety	1.566	.249	6.285	***
GA1	<---	Anxiety	1.000			
PTSD9	<---	PTSD	1.059	.141	7.497	***
PTSD10	<---	PTSD	1.243	.170	7.315	***
PTSD11	<---	PTSD	1.220	.160	7.642	***
PTSD14	<---	PTSD	1.249	.153	8.172	***
PTSD12	<---	PTSD	1.266	.157	8.066	***
PTSD4	<---	PTSD	1.258	.133	9.439	***
PTSD13	<---	PTSD	1.057	.146	7.220	***
PTSD1	<---	PTSD	1.000			

*** Significant and less than 0.001

The probability of getting a critical ratio as large as 7.597 in absolute value is less than 0.001. In other words, the regression weight for depression in the prediction of DP6 is significantly different from zero at the 0.001 level (two-tailed). While the probability of getting a critical ratio as large as 6.516 in absolute value is less than 0.001. In other words, the regression weight for anxiety in the prediction of GA4 is significantly different from zero at the 0.001 level (two-tailed).

The five items representing the constructs of depression and anxiety disorder scale, and eight items of the PTSD measurement model were analysed for reliability. The Cronbach's alpha coefficient was performed to assess the internal consistency of the sub-scales (constructs). Alpha coefficient value of 0.70 or above was considered as evidence of adequate reliability (internal consistency) for the sub-scale (DeVos et al 2011:177). As indicated in Table 4.18, the internal consistency (Cronbach's alpha) for depression, anxiety, and PTSD measurement model items was adequate (higher than 0.7). Based on the final three models, the factor loading was inspected for all the items under each modified model and is presented in Table 4.18.

Table 4.18: Factor loading and Cronbach's Alpha values for the final individual measurement confirmatory factorial analysis model items

Construct	Item	Factor Loading	Cronbach's Alpha (Above 0.7)
Depression	DP6	.711	0.76
	DP3	.597	
	DP2	.653	
	DP9	.706	
	DP1	.603	
	DP 4,5,7 &8		This item was deleted due to low factor loading
Anxiety	GA4	.638	
	GA3	.795	
	GA2	.738	0.79
	GA7	.685	
	GA1	.511	
	GA 1,5 &6		This item was deleted due to low factor loading
(PTSD	PTSD9	.661	
	PTSD10	.646	
	PTSD11	.687	
	PTSD14	.748	0.89
	PTSD12	.742	
	PTSD1	.608	
	PTSD4	.765	
	PTSD13	.628	
	PTSD2,3,5,6,8, 15,16 &17		This item was deleted due to low factor loading

4.3.1.7. The assessment of normality for the data

After the fitness indexes have been achieved, the researcher examined the normality assessment before proceeding to modelling the structural model. The normality assessment can be made by assessing the measure of skewness or kurtosis for every item (Anwar & Low 2016:10846). Using the final measurement model, the researcher assessed the distribution of every variable in the dataset. Table 4.19 presents the normality assessment for every item involved in the measurement model. As shown in the following Table 4.19, the absolute value of skewness 1.0 or lower indicates the data is normally distributed (Gravetter & Wallnau 2014: 237). However, structural equation model using the Maximum Likelihood Estimator (MLE) is robust to kurtosis violations of multivariate normality (greater than 1.0 in absolute value) (Gravetter & Wallnau 2014:239). Meaning, the researcher could proceed with further analysis since the estimator used is MLE.

Table 4.19: The assessment of normality distribution of items in the respective construct

Variable	min	max	skew	Critical Ratio	kurtosis	Critical Ratio
DP1	.000	3.000	-.035	-.211	-1.392	-4.186
DP2	.000	3.000	-.118	-.707	-1.314	-3.952
DP3	.000	3.000	.105	.629	-1.331	-4.002
DP6	.000	3.000	-.016	-.094	-1.401	-4.213
DP9	.000	3.000	.449	2.699	-.969	-2.914
GA1	.000	3.000	.684	4.116	-.591	-1.776
GA2	.000	3.000	.360	2.162	-.848	-2.550
GA3	.000	3.000	.085	.513	-1.162	-3.494
GA4	.000	3.000	.070	.423	-1.267	-3.808
GA7	.000	3.000	.100	.602	-1.384	-4.162
PTSD13	1.000	5.000	-.139	-.838	-1.273	-3.827
PTSD14	1.000	5.000	.009	.053	-1.271	-3.822
PTSD12	1.000	5.000	-.248	-1.490	-1.227	-3.690
PTSD11	1.000	5.000	.032	.191	-1.371	-4.123
PTSD10	1.000	5.000	-.086	-.516	-1.522	-4.577
PTSD9	1.000	5.000	-.223	-1.344	-1.211	-3.641
PTSD4	1.000	5.000	-.040	-.238	-1.227	-3.691
PTSD1	1.000	5.000	.105	.630	-1.257	-3.780

4.3.2. Performing the structural equation model

The current section was concerned with analysis, interpretation, and presentation of the analysis of findings of confirmatory factorial analysis to further refine the items through assessing whether the measurement model of the structural equation modeling does confirm the fact that the proposed two sub-scales in the item fit a sample data. Eighteen items representing the three constructs were retained separately through confirmatory factorial analysis method. The final confirmatory factorial analysis models indicated that the chi-square values were not significant for the confirmatory factorial analysis modified models and showed that the proposed models fit the data. After addressing the issues of uni-dimensionality, validity, and reliability of the latent constructs involved in the study, the next step was to model these constructs into the structural model for analysis using structural equation model to test cause and effect relationship between the variables. The researcher therefore repeated the same reporting process as above for the confirmatory factorial analysis.

4.3.2.1. *Model specification*

Model specification is the first step in structural equation model (also confirmatory factorial analysis). In the previous section, the measurement scale was refined and improved from 7 anxiety items to 5, from 9 depression items to 5 and from 17 PTSD items to 8 items-scales by using confirmatory analysis. After addressing the issues of uni-dimensionality, validity, and reliability of the latent constructs involved in the study, the next step is to model these constructs into the structural model for analysis using structural equation modelling. This section intended to further test cause and effect relationship between the variables. In this study, the researcher used the arrow to link the construct to determine the direction of hypotheses. The researcher could model and analyse the multiple relationships among the construct simultaneously using structural equation modelling. The confirmatory factorial analysis procedures for the measurement model of latent constructs have been explained in the previous section, there was, however, no need to assess confirmatory factorial analysis for the observed variables. The structural model specification in Figure 4.8 was executed

after inserting data for the respective items including control variables and selecting the required analysis to perform the procedure.

Goodness-of-fit indices	
ChiSq	582.213
df	258
p value	0.000
GFI	.822
AGFI	.775
RMSEA	.076
CFI	.830
TLI	.802
NFI	.736
ChiSq/df	2.257
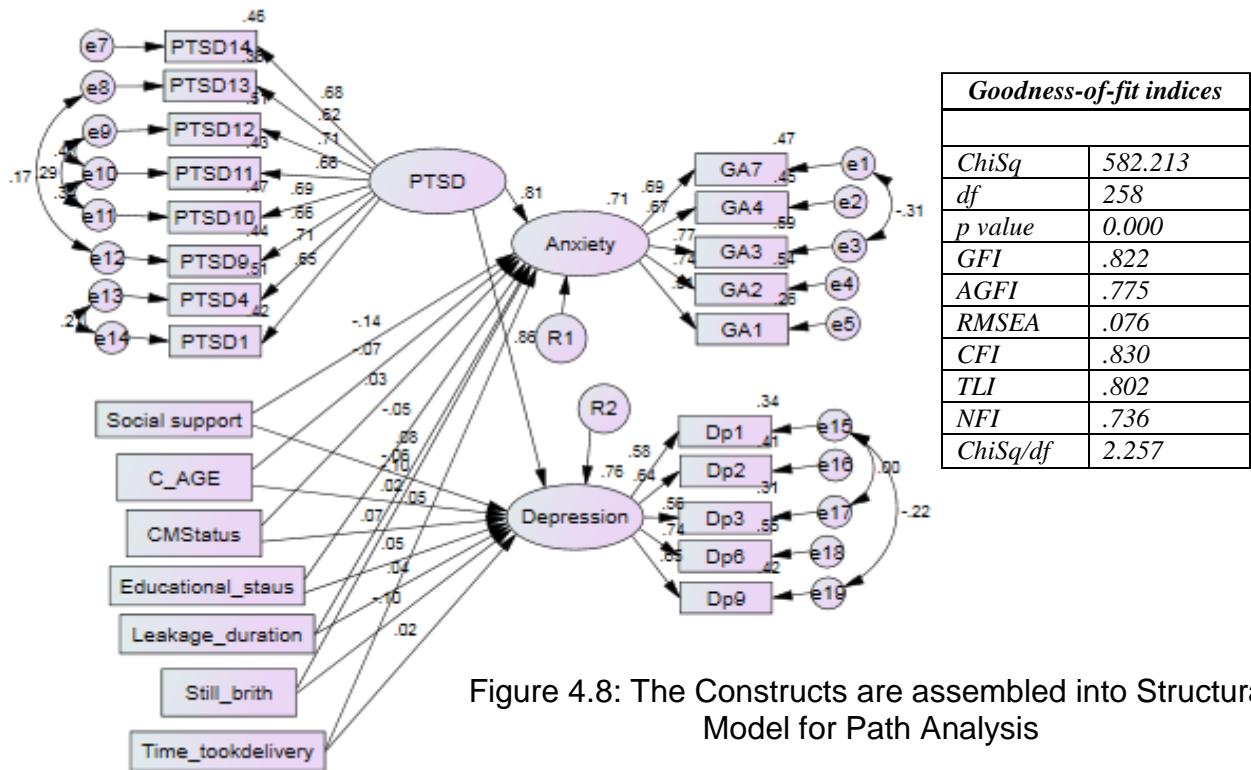
Figure 4.8: The Constructs are assembled into Structural Model for Path Analysis

4.3.2.2. Model identification

Once a structural equation model has been specified, the next step is to determine whether the model is identified. The researcher solved the identification problem prior to the estimated parameter. Factor loading and measurement error variances that correspond to the number of observed variables or items were determined by the structural model specified in this study as indicated in Table 4.20. Moreover, there was no measurement error covariance term or correlations for the model. The number of distinct values in the matrix S was calculated by the formula: p (p+1) /2 (where p is the number of observed variables in the sample variance-covariance matrix).

According to the order condition, the model is over-identified because there are more values in S than parameters to be estimated—that is, our degrees of freedom are positive not zero

(just-identified) or negative (under-identified). The researcher checked the identification through the rank test and information matrix. This satisfied the order and rank conditions for the equation of every endogenous variable of this study. This indicated that the hypothesized structural equation model for predicting the severity of anxiety and depression has been identified.

Table 4.20: Number of free parameters and distinct values in the matrix S for each of structural equation modeling

	Number of observed variables in the models	Number of free parameters	Number of distinct values in the matrix S	Degree of Freedom
Depression	5	10	15	5
Anxiety	5	10	15	5
Post-traumatic stress disorder	8	16	28	14

4.3.2.3. *Model estimation*

Once the identification problem had been resolved, the next step was to estimate the parameters in the hypothesized structural equation model. The maximum likelihood estimates for the initial model are presented in Table 4.21. All of the parameter estimates are significantly different from zero ($p<0.05$), except the structural coefficient of the control variable (age, marital status, educational status, leakage duration, time taken during delivery, stillbirth) which predicted the severity of anxiety and depression. Because this structure coefficient is of substantive theoretical interest, the researcher did not remove it from the model.

Table 4.21: Maximum Likelihood Estimates for initial model

			Estimate	Standard Error	Critical Ratio	P_value
Depression	<---	PTSD	.817	.101	8.103	***
Depression	<---	Social Support	-.067	.059	-1.127	.260
Depression	<---	Current Age	.002	.007	.296	.767
Depression	<---	Marital Status	.132	.104	1.264	.206
Depression	<---	Edu_ Status	.084	.113	.745	.456
Depression	<---	Leakage duration	.010	.016	.635	.525
Depression	<---	Stillbirth	-.192	.107	-1.801	.072
Depression	<---	Time took delivery	.001	.002	.405	.685
Anxiety	<---	Leakage duration	.017	.013	1.294	.196
Anxiety	<---	PTSD	.670	.084	7.972	***
Anxiety	<---	Social Support	-.134	.051	-2.647	.008[*]
Anxiety	<---	Edu_ Status	-.078	.094	-.829	.407
Anxiety	<---	Marital Status	.041	.087	.478	.633
Anxiety	<---	Current Age	-.006	.006	-1.044	.296
Anxiety	<---	Stillbirth	-.157	.089	-1.752	.080
Anxiety	<---	Time took delivery	.001	.001	.977	.329
GA4	<---	Anxiety	.986	.106	9.254	***
GA3	<---	Anxiety	1.102	.106	10.408	***
GA1	<---	Anxiety	.690	.097	7.095	***
GA7	<---	Anxiety	1.081	.119	9.112	***
GA2	<---	Anxiety	1.000			
PTSD9	<---	PTSD	.999	.120	8.343	***
PTSD10	<---	PTSD	1.239	.145	8.566	***
PTSD11	<---	PTSD	1.099	.134	8.221	***
PTSD14	<---	PTSD	1.066	.128	8.350	***
PTSD12	<---	PTSD	1.139	.131	8.713	***
PTSD4	<---	PTSD	1.098	.111	9.874	***
PTSD13	<---	PTSD	.979	.125	7.833	***
PTSD1	<---	PTSD	1.000			
DP2	<---	Depression	.796	.092	8.686	***
DP3	<---	Depression	.738	.098	7.500	***
DP1	<---	Depression	.740	.099	7.445	***
DP9	<---	Depression	.811	.091	8.902	***
DP6	<---	Depression	1.000			

*** Significant and less than 0.001, *Significant and less than 0.05

4.3.2.4. Model testing

Model testing is the next crucial step in interpreting our results for the hypothesized structural equation model. When the model-fit indices are acceptable, the hypothesized model has been supported by the sample variance-covariance data. When the model-fit indices are not acceptable, the researcher will have to attempt to modify the model by adding or deleting paths to achieve a better model to data fit (Schumacker & Lomax 2010:203). In this study, the initial model includes several model-fit indices (control variable) as shown in Figure 4.8. For the initial model, the ChiSq statistic, a measure of the badness of fit, was equal to 582.25, 258 degrees of freedom, and ChiSq value was statistically significant (p <0.001), this model-fit index indicates that the initial model is unacceptable. The root-mean-square error of approximation (RMSEA) is equal to 0.076, which is an acceptable range of model fit (criterion RMSEA <0.08). The goodness-of-fit index (GFI) is 0.822 and adjusted goodness-of-fit index (AGFI) is 0.832 for the initial model, which is below the acceptable range of model fit (criterion GFI > 0.90, AGFI >0.90). The parsimonious fit index ChiSq/degrees of freedom is 2.257 for the initial model, which is an acceptable range of model fit (Chi-square/ df < 5.0) (Figure 4.8). From this particular set of model-fit indices, the researcher concluded that the hypothesized structural equation model is reasonable but still needed to modify the structural model to achieve a more acceptable fit. The model modification is discussed in the next section.

4.3.2.5. Model modification

The final step in structural equation modelling is to consider a model modification to achieve a better model to data fit. In this study, after constructing a structural model, the fitness indexes did not achieve the required level. The parameter significances (t-value) as generated using AMOS 22 were greater than 1.96 for all the eighteen items (observed variables) except the structural coefficient of the control variable (age, marital status, educational status, leakage duration, the time taken during delivery, stillbirth) in the initial model (*Table 4.22*). The t-statistics did not suggest the elimination of any existing observed parameters from the initial path model because every parameter was statistically different

from zero (t-value >1.96). But, also the structure coefficient of the control variable is of substantive theoretical interest.

With regard to the possible inclusion of new parameters, the largest modification index was for the paths of residual error of the two endogenous variables such as anxiety (R1) and depression (R2) (modification index [MI] =39.393) and exogenous variable such as, PTSD11 to PTSD12 (MI=14.246), PTSD 1 to 4 (MI=12.86). The correlated measurement between these two items has caused the structural model to have a poor fit. The model was modified by including free parameter paths between R1 &R2, PTSD 11&12, PTSD 1 &4, GA 7 &3. However, the model fit indices have not been improved substantially and another round of model modification was performed to improve the model. Further addition of free parameter paths between PTSD 1 & 14, PTSD 10 &11, Dp 1&2, Dp1& 9 and Dp3 &9 improved some of the model fit indices even though the chi-square values remained significant.

Thus, the researcher realised that certain items were redundant of each other in the structural model and eliminated one parameter (PTSD13) from the initial path model, as PTSD13 was redundant with other exogenous and endogenous observed variables. The model fit indices for the final modified model were substantially improved from the initial model as indicated in section 4.3.1.4. The chi-square value was non-significant with regards to indicating whether the observed and implied variance-covariance matrices were similar, indicating that the implied theoretical model could significantly be reproduced by the sample data. Considering practical significance and values of RMSEA was <0.05, values of Goodness of fit index (GFI) and CFI were above 0.90 and the value of *ChiSq/df* was <5, our selected model-fit indices now all indicate an acceptable level of fit. Thus, the researcher considers the modified model to be the final structural equation model for the prediction of severity of anxiety and depression. The model structure with standardized regression weights for the modified and final model is presented in Figure 4.9. The Maximum Likelihood Estimates and selected model-fit indices for the modified model, where the measurement error covariance is now included, are shown in the Table 4.22. The Table presents the causal effects of all exogenous constructs on their corresponding endogenous constructs in the model.

Table 4.22: Maximum Likelihood Estimates for the modified model

			Estimate	Standard Error	Critical Ratio	P_value
Depression	<---	PTSD	.718	.091	7.910	***
Depression	<---	Social Support	-.075	.067	-1.118	.264
Depression	<---	Current Age	.002	.008	.251	.802
Depression	<---	Marital Status	.117	.117	1.004	.315
Depression	<---	Edu_ Status	.129	.126	1.022	.307
Depression	<---	Leakage duration	.005	.018	.298	.765
Depression	<---	Stillbirth	-.161	.119	-1.351	.177
Depression	<---	Time took delivery	.001	.002	.330	.741
Anxiety	<---	Time took delivery	.001	.002	.906	.365
Anxiety	<---	Social Support	-.140	.055	-2.564	.010*
Anxiety	<---	Current Age	-.005	.007	-.693	.488
Anxiety	<---	Stillbirth	-.141	.097	-1.463	.143
Anxiety	<---	Leakage duration	.014	.014	.960	.337
Anxiety	<---	Edu_ Status	-.077	.102	-.755	.450
Anxiety	<---	Marital Status	.032	.094	.339	.735
Anxiety	<---	PTSD	.566	.076	7.467	***
GA14	<---	Anxiety	.955	.104	9.154	***
GA17	<---	Anxiety	1.110	.116	9.578	***
GA13	<---	Anxiety	1.091	.104	10.536	***
GA11	<---	Anxiety	.708	.096	7.359	***
GA12	<---	Anxiety	1.000			
PTSD9	<---	PTSD	.960	.114	8.399	***
PTSD10	<---	PTSD	1.184	.142	8.366	***
PTSD11	<---	PTSD	1.099	.131	8.392	***
PTSD14	<---	PTSD	1.098	.133	8.235	***
PTSD12	<---	PTSD	1.119	.128	8.717	***
PTSD4	<---	PTSD	1.099	.109	10.068	***
PTSD1	<---	PTSD	1.000			
DP2	<---	Depression	.718	.083	8.619	***
DP1	<---	Depression	.666	.089	7.508	***
DP9	<---	Depression	.809	.084	9.652	***
DP3	<---	Depression		.091	7.826	***
DP16	<---	Depression				

*** Significant and less than 0.001, *Significant and less than 0.05

All of the parameters are statistically significantly different from zero (p <0.001), except for the path between control variables (age, marital status, educational status, leakage duration, duration of labour, stillbirth and psychological disorder like depression and anxiety). However, once again, for substantive theoretical reasons, the researcher chose to leave this relationship specified in the model. Women with obstetric fistula social support parameter was statistically significantly associated with severity of anxiety, but not significantly associated with depression (p<0.05).

Goodness-of-fit indices	
ChiSq	271.261
df	221
p value	0.012
GFI	.908
AGFI	.90
RMSEA	.032
CFI	.971
TLI	.964
NFI	.936
ChiSq/df	1.227
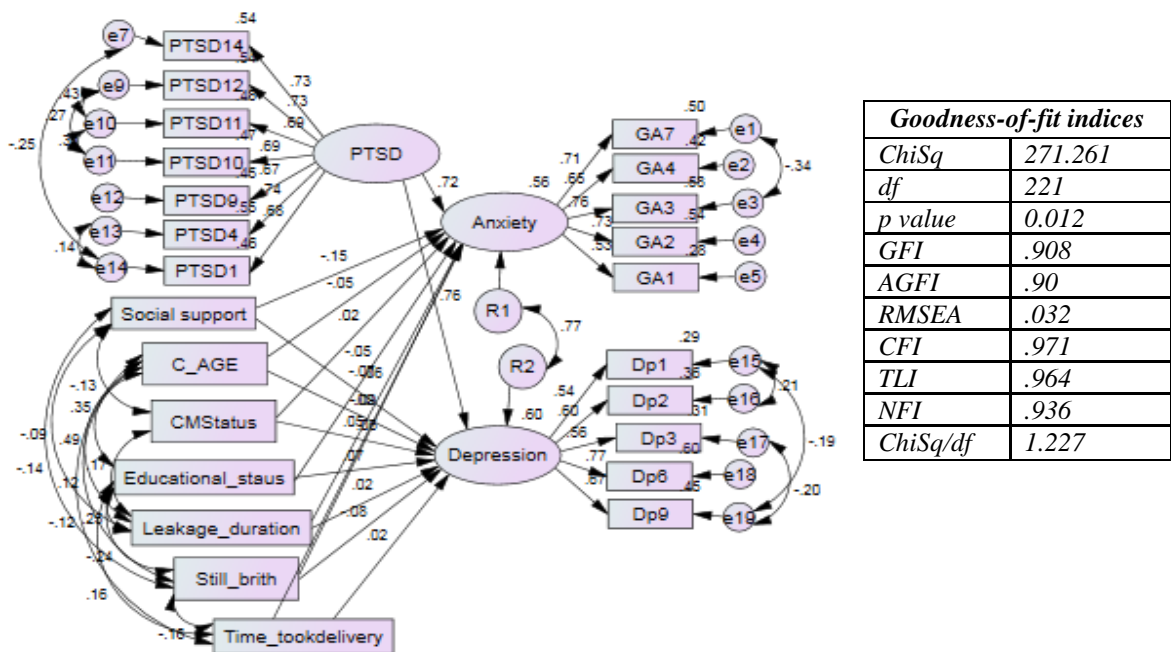
Figure 4.9: The Modification Standardized regression weights (All Units are in Standard Deviation)

As shown in the Table 4.22, the standardized beta estimate for the effect of post-traumatic stress disorder (PTSD) on the severity of anxiety was 66%. Therefore, when PTSD goes up by 1 standard deviation, the severity of anxiety goes up by 0.66 standard deviations. The standardized beta estimate for depression was 63%, thus when PTSD goes up by 1 standard deviation; the severity of depression goes up by 0.623 standard deviations. The Figure also indicates the contribution of PTSD construct in estimating the endogenous construct severity of anxiety was 48%, while the coefficient of determination of PTSD contributing to the

severity of depression was 40%. It is estimated that the error variance of depression was approximately 60%of the variance of depression itself.

Table 4.23: Standardised and unstandardised regression weight estimation of hypothesis testing for the causal effect of an exogenous variable on endogenous constructs in the model

			Standardized	P value
Anxiety	<---	PTSD	.660	0.000
Depression	<---	PTSD	.626	0.000
Anxiety	<---	Social support	-.139	.007
Depression	<---	Social support	-0.073	.180

4.4.   CONCLUSION

Overall, this chapter has given a detailed description of the prevalence and severity of depression and anxiety among women with obstetric fistula before and after surgical repair. The chapter also describes the change and variation in the severity and prevalence of depression and anxiety. This chapter concludes that women with obstetric fistula are psychologically affected by the development of an obstetric fistula. The findings also indicated that women with obstetric fistula reported significantly lower social support. This deficit significantly affects the level of depression and anxiety symptoms.

The researcher hypothesized a structural equation model to predict the severity of anxiety and depression through following the recommended structural equation modeling process. The initial model did not achieve acceptable model fit indices, but the researcher conducted model modification and obtained acceptable model-fit indices. Therefore, this was determined to be the best model for data fit. The next chapter will highlight the recommendations to address the gaps identified in the study. It will also discuss an ideal recommended model for addressing the mental health needs of women with obstetric fistula to be used in a fistula health care setting.

CHAPTER 5

INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

5.1. INTRODUCTION

Chapter four provides a detailed description of the research findings, and discusses and compare the findings with the literature. The major highlights of the research findings are: the women with obstetric fistula experience challenges associated with psychological distress (depression, anxiety, and PTSD) and such distress are exacerbated by the poor social support. In this chapter, the findings of the study are used to develop an integrated mental health treatment model for women with obstetric fistula. The model was developed using theory development, designs and methods according to Chinn and Kramer (2011:237) and Walker and Avant (2011:195). The model development was also informed by systems and theoretical processes that the researcher considered as ideal for addressing the aforementioned gaps and challenges. The model is intended to serve as a resource for health workers to address the mental health needs of women with obstetric fistula. It is also expected to enable health workers to provide comprehensive care and necessary support for enhancing mental health outcomes of women with obstetric fistula. In this chapter, an overview of the model is discussed; including the description, purpose and the structure of the model. The measures applied to ensure validity and reliability of the model, assumption, and implications of the model are provided.

5.2. DESCRIPTION OF AN INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

Based on the identified gaps in the study and existing literature, the researcher developed an integrated mental health treatment model for women with obstetric fistula to address their mental health needs. Although the need to address mental health issues of women with obstetric fistula has been recognised by Maulet et al (2013:531) and Pope et al 2011:8); and is part of the WHO's guiding principles of fistula management (WHO 2006:25), to date there

has been no published integrated treatment service in Ethiopia to improve psychological healing among women with obstetric fistula.

An integrated mental health treatment model for women with obstetric fistula was developed based on several study findings, which affirm the value of obstetric fistula surgical repair in enhancing positive mental health outcomes of the women. Similar findings suggest that obstetric fistula surgical repair contributes to the reduction of psychological distress. The model was developed based on cognitive behavioural therapy (CBT) (Beck 2011:5), the theory of stress and coping (Lazarus & Folkman 1984:11), system theory (Ravitz et al 2013:355), and mental health conceptual framework and promotion designs (WHO 2005b:48; Kinser & Lyon 2014:667; Baingana et al 2005:11).

In rigorous trials, cognitive behavioural therapy (CBT) has been demonstrated to have impacts on mental health, quality of life, and shame (Watt, Wilson, Sikkema, Velloza, Mosha, Masenga et al 2015:14; Van't Hof, Cuijpers, Waheed & Stein 2011:2005; Tshabalala & Visser 2011:25). The theory of stress and coping suggests that improvement in coping skills leads to an increase in a positive emotional state, reductions in mental health dysfunction and improvement in self-care (Lazarus & Folkman 1984:157). Leddy and Pepper (1998:168) state that the systems theory is one concerned with changes due to interaction in a situation and not functions, bringing about the completeness of the system.

An Integrated mental health treatment model for women with obstetric fistula has the potential to improve the psychological distress symptoms and coping behaviour of the women with obstetric fistula, and in turn to improve social well-being and functioning to promote successful reintegration to the community post-surgery (Watt et al 2015:14; Dennis et al 2016:436). Replication of the treatment model on a wider scale enables women with obstetric fistula to access comprehensive and sustainable support. Women with obstetric fistula typically stay in the hospital for one or two months from admission to discharge. The researcher assumes that this period would provide a great opportunity to address the psychological symptoms accumulated from living with this socially marginalizing condition and to develop coping skills to facilitate reintegration to the family and society after obstetric

fistula repair. The ultimate goal of this integrated mental health treatment model is improved physical and psychosocial outcome for women with obstetric fistula.

5.3. PURPOSE OF AN INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

In explaining the purpose of the model, it is important to clarify how the model could be applied. This highlights the circumstances and specifications under which it is applied, as well as who executes it (Chinn & Kramer 2011:106). The main purpose of the model is to integrate mental health treatment for women with obstetric fistula that can be delivered concurrently with surgical treatment. These will promote the integration of clinical services to address the mental health needs of women with obstetric fistula while they are still in the hospital.

5.4. THE STRUCTURAL ELEMENTS OF AN INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

A description of each element of an integrated mental health treatment model for women with obstetric fistula will be outlined as adapted from Beck (2011:5) cognitive behavioural therapy and Ravitz et al (2013:355) systems theoretical processes which are context, stakeholders, input, process and outcome, followed by a description of the interrelationship of the elements to make up a whole.

5.4.1. The context of an integrated mental health treatment model for women with obstetric fistula

A context is a term or label that describes a phenomenon or group of phenomena (Meleis 2007:11). Strauss and Corbin (1990:101) and Bruce and Klopper (2010:3) state that context is characterised by a 'specific set of properties pertaining to a phenomenon and a particular set of circumstances', within which an action takes place.

The context of integrated mental health treatment model for women with obstetric fistula has the following levels, namely the national/strategic level and the institutional level (health

facility where they obtain obstetric fistula care). The context of this model is represented by rectangular shapes as shown in Figure 5.1. The bigger rectangle is the Ethiopian health care system strategic plans 2016-2020 (Health Sector Transformation Plan (HSTP) and National Plan of Action to Eliminate Obstetric Fistula by 2020).

National level

National Health Care System Strategic plans 2016-2020

Institutional level
Obstetric fistula treatment center
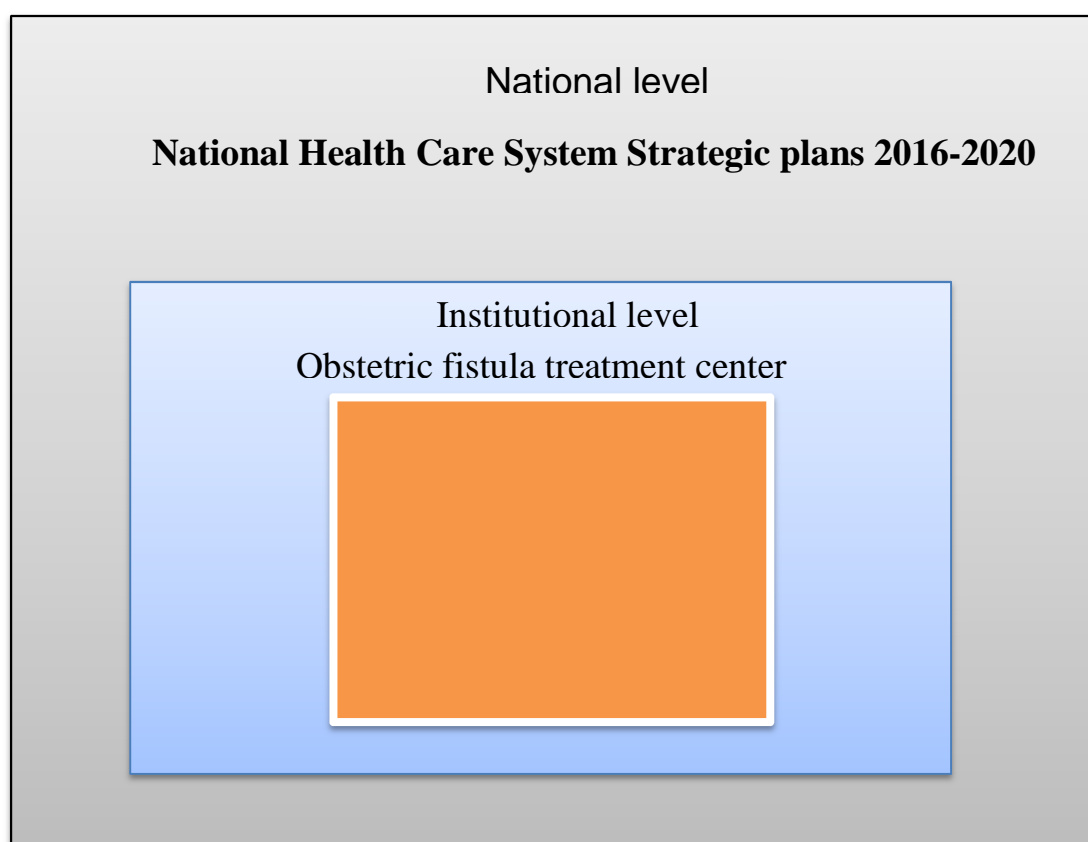
Figure 5.1: The context of an integrated mental health treatment model for women with obstetric fistula

5.4.1.1. *National level: Ethiopia health care system context*

The government of Ethiopia through the Federal Ministry of Health, which are determined in the context of the Ethiopian health care system, has a body responsible for obstetric fistula and mental health issues, which are determined in the context of the Ethiopian health care system.

This context guided and affected by the following national level factors:

- National Health Care System Strategic Plans 2016-2020
- National Health Sector Transformation Plan 2016-2020
- National Plan of Action to Eliminate Obstetric Fistula by 2020

The Government is already undertaking a range of strategies to increase skilled birth attendance and improve access to emergency obstetric care as will be detailed later, which are expected to reduce the incidence of obstetric fistula (FMOH 2016a:5). The obstetric fistula elimination strategic plan is thus aligned with and complement strategies aimed at improving maternal health as outlined in the Health Sector Transformation Plan. Therefore, the strategic plan sets out strategies and activities aimed at supporting the women with obstetric fistula rehabilitation and reintegration in the context of the 'continuum of care' approach through the stages of Identification, Referral, Diagnosis, Treatment, Rehabilitation, and Reintegration. The strategic plan outlines the national context within which the obstetric fistula program operates.

5.4.1.2.   Institutional level: fistula hospital

The study setting consists of six fistula hospitals in Ethiopia. The main central fistula hospital located in Addis Ababa is a world-class center of excellence for treating a women with obstetric fistula and training obstetricians to specialize in fistula surgery. In order to make fistula repair treatment more available in remote areas, regional fistula hospitals have established and intensively work to identify and treat suspected cases. Through the support of government legislation and NGO funding, the hospitals provide surgical repair of obstetric fistula free of charge and have dedicated fistula wards. The main aim of the hospitals is to enhance accessibility of quality obstetric fistula surgical repair and contribute to eradicating obstetric fistula from Ethiopia by providing trained midwives in the rural regions of the country (Hamlin 2015:2). The hospital's services include identification of suspected cases, screening, transportation and surgical repair of women with obstetric fistula throughout the country (Bangser & Abonesh 2010:8). To enhance obstetric fistula care, health care workers provide life-skills training to selected women with obstetric fistula before and after initiating them on surgical repair. The trainers encourage them to become an ambassador to identify suspected

cases so as to benefit other women with obstetric fistula as well as to facilitate prevention and stigma reduction.

Women with obstetric fistula suffer multifaceted health problems, including psychological consequences. Therefore, the hospital strategy alone may not end the challenges that women with fistula face. Not much attention has paid to pre-or post-surgical psychological health, despite the critical need to also address the psychological morbidity of women with obstetric fistula.

5.4.2. Stakeholders

In this model, the stakeholders are composed of agents who are involved in strengthening health and community systems for enhancing the effectiveness of an integrated mental health treatment model and the beneficiaries are those who benefit from the implementation of the model.

5.4.2.1. *Agents*

For decades, Ethiopia fistula hospital had established a working relationship with organisations such as Pathfinder International, United Nation Population Fund, Women, and Health Alliance International to provide surgical fistula repair and rehabilitation. This network of stakeholders assists with conducting a nation-wide campaign to identify and refer women. The campaigns are conducted through the use of community ambassadors, trained health workers, radio advertisements and mobile phone technology to arrange or transfer funds for women transportation (Pathfinder International (PI) 2014:2; Bangser & Abonesh 2010:2). For the success of this model, non-governmental stakeholders should be fully involved in mental health issues of women with obstetric fistula so that they can support the training of health actors to identify and diagnose cases; restructuring the flow and integrating obstetric fistula care within the existing clinical continuum of care. Most women in need of obstetric fistula treatment require financial and other support for transportation to each of the treatment centers in the country. Stakeholders provide financial support for transport, new clothes, and sanitary materials for women with obstetric fistula.

Community structures such as community health extension workers, the health development army, local women's associations, social welfare and traditional councils, traditional healers, organization of churches, youth council, peer educators, school governing bodies and other organizations and committees in the community should be included in preventing fistula and creating awareness. These structures can also serve to de-stigmatize fistula, reducing barriers to accessing preventive and treatment services, foster a more enabling environment for case identification and care-seeking while providing a livelihood support and acceptance to fistula survivors. The extent of involvement of the above agent will differ depending on the extent of their contributions as agents in the integration of mental health issues.

5.4.2.2.   Beneficiaries

Ethiopia has undertaken efforts to identify women with obstetric fistula and immediately refer them for free surgical repair. Some of the main beneficiaries from this model include policy-makers, obstetric fistula program implementers (governmental and non-governmental organization), health care providers, public health professionals, mental health professionals, fistula hospitals, women with obstetric fistula, and their families, and also future researchers.
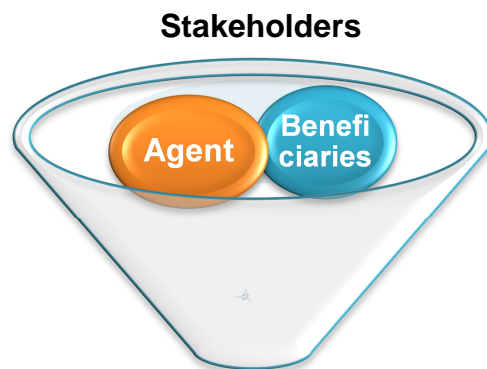
Figure 5.2: The structure of the agents and the recipients in the context of an integrated mental health treatment model for women with obstetric fistula.

5.4.3. Inputs of integrated mental health treatment model for women with obstetric fistula

Input can take a variety of forms. Meyer and O' Brien-Pallas (2010:2831-2833) define input as a resource required to carry out a procedure/process. In the context of an integrated mental health treatment model for women with obstetric fistula, the inputs required to implement the model are financial, physical, human and material resources.

5.4.3.1. *Financial resources*

The National Health Account (NHA) showed that the total spending on health has been growing steadily (FMOH 2015:50). This is an acceptable level of increment since it is above the WHO recommendation of a minimum of 5% of GDP (Growth Development Plan) spending on health. However, the share of total public sector health expenditure against the country's total government expenditure remains low (National Bank of Ethiopia [NBE] 2011:17). The health facility budget allocation varies from facility to facility and from region to region.

The model recommends a realistic and sustainable alternative way of public health funding and can be implemented immediately and widely with the availability of adequate resources: financial as well as human. Depression and anxiety disorders can be effectively treated, in most instances with common and inexpensive medications and the proposed simple psychosocial interventions. It is possible to implement the integrated model within the fistula hospital setting with the provision of some basic training and appropriate medications. These hospitals are under-resourced, therefore there is need to properly and sustainably equip the hospitals, to enable them to carry out this integrated mental health treatment model.

The fistula treatment centers should be innovative, mobilise resources, and not rely only on conventional methods of funding. Governmental and non-governmental organizations, private companies, and professionals should be requested to adopt certain programmes to make resources available for implementing this integrated mental health treatment model

and pave the way in providing full and comprehensive services to women with obstetric fistula.

5.4.3.2. Human resources

Having adequate number of motivated and skilled workforce is essential at all levels of the health system. The health workforce density in Ethiopia has increased from 0.84 to 1.3 /1000 population between 2008 and 2013, which is indicative of an improvement in supply and availability of health workers (FMOH 2015:45). However, the number of health care providers (doctor, nurse, health officer, and midwives) is below the minimum threshold. To resolve this, the country is on track in scaling up the number of health workers trained through pre-service and in-service training (FMOH 2015:46). For successful implementation of this model, the institutions need to employ cognitive behavioral therapy experts and review the current human resource allocation policies to ensure that there is an adequate number of well-trained health care professionals dedicated to the management, care, and support of women with obstetric fistula.

Newly trained midwives and nurses have inadequate skills and experience, because of insufficient practical exposure to institutional delivery (FMOH 2016a:19). In order to adequately implement the integrated mental health treatment model, the quality of the health workforce training needs to be improved with an emphasis on competence and skills development. To enable health workers to provide better quality service there is a need for continuous in-service refresher training in specific program areas. There is also a need to strengthen monitoring, support, and supervision of newly trained health care providers to improve competencies and ensure quality maternal health service. There is limited focused education and training on obstetric fistula and mental health care built into existing training modules for mid-level health workers (FMOH 2016a:20). This gap needs to be address by identifying and adapting existing modules to develop standardised training materials. At the health center level, there is a low number of mid-level workers (nurses, midwives, and health officers) trained and skilled in diagnosing obstetric fistula as well as the mental health disorders associated with it. Hence, there is a need to improve obstetric fistula and

associated mental health disorders diagnosis and optimize referral linkages through pre-service and in-service training.

The fistula hospitals have 500 staff (Hamlin 2015:1), the model recognizes the need for program experts to improve abilities of health care workers. in providing effective counseling service to the women. This is done through training, mentoring and coaching. Mainstreaming of cognitive behavioral therapy at the facility for women with obstetric fistula will address the need for mental health treatment competencies among all therapists and assure the integrated mental health treatment of women with obstetric fistula in a sustainable manner. Furthermore, the treatment curriculum should address the dynamic and important aspects of the integrated mental health treatment intervention program, in particular, the use of the treatment process; and incorporate the discharge-planning concept of pre and in-service training of the therapist.

5.4.3.3. Physical infrastructure resource

Physical infrastructure refers to the buildings and hospital consultation rooms. These physical facilities play an important role as one of the required inputs. In keeping with international best practices, the existing infrastructure does not have the kind of privacy that the proposed model requires because these structures are old and outmoded. In order to provide an environment that is client friendlyand provides privacy and confidentiality, the recommended model calls for modification or adjustments to the current health infrastructure to promote amongst other things client safety, privacy, and quality of care.

5.4.3.4. Material resource

The European Commission, Joint Research Centre (2015:1) defines materials as documents that provide background information or quick facts on any given topic or procedure. In this context, materials are reliable quality assurance tools in a fistula treatment setting. Examples include obstetric fistula treatment and identification guidelines, and Standard Operations Procedure Manuals. These should be available as reference materials for service providers as they implement fistula care. Besides being made available, the model proposes that such

guidelines incorporate aspects of quality assurance standards in integrated mental health care. The model also calls for training and mentorship on quality assurance standards for therapists offering cognitive behavioral therapy services. The integrated mental health treatment model initial curriculum development will built upon the techniques of cognitive behavioral therapy (CBT) and the current and previous research activities on psychological distress among women with obstetric fistula. Experts in clinical psychology and obstetrics and gynaecology with the collaboration of a research team will be developing the initial treatment curriculum, therapist-training manuals ,and coaching materials.

.
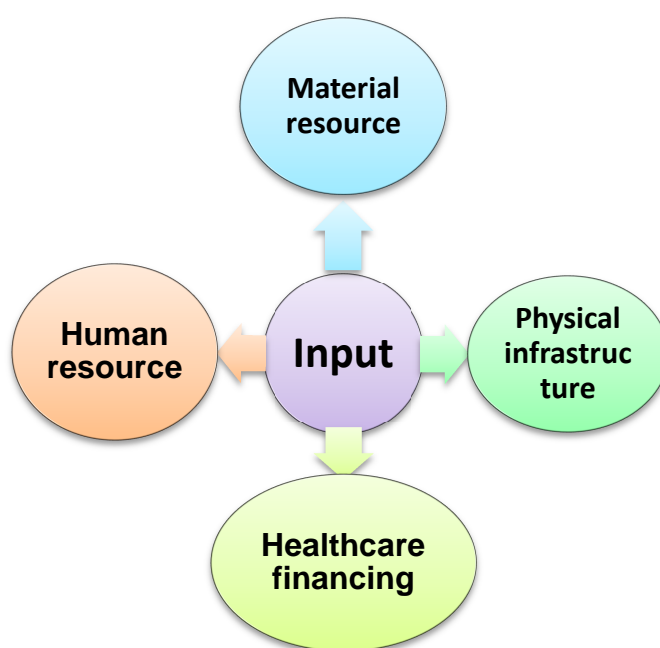
Figure 5.3: The inputs required for the integrated mental health treatment model for women with obstetric fistula.

5.4.4. Implementation processes for an integrated mental health treatment model for women with obstetric fistula

The World Health Organization (2012:108), defines 'process' as the manner in which resources are transferred into usable service. The process represents the action part or a procedure in the context of model development (Stevens1994:340). The discussion below gives a framework for the factors impacting on the proposed process for the integrated

mental health treatment model for women with obstetric fistula. These processes are meant to address the challenges experienced by women with obstetric fistula and enhance the utilisation of integrated mental health treatment services. The process of an integrated mental health treatment model for women with obstetric fistula is composed of six phases: (a) advocacy and supportive environment, (b) identification and referral networking, (c) psychical, psychological, and psychosocial treatment and care, (d) quality assurance activities, (e) rehabilitation and reintegration and (f) scientific evidence, which are the conceptual framework of this study. The processes are diagrammatically presented in Figure 5.4. The model asserts that the implementation of the processes will enhance utilisation of integrated mental health treatment services

Figure: 5.4. The process for an integrated mental health treatment model for women with obstetric fistula

5.4.4.1. *Advocacy and supportive environment*

Women with obstetric fistula suffer multifaceted health problems, including psychological consequences. Evidence from past studies and the current research demonstrates that many of them are divorced, suffer depression and anxiety, and are stigmatized or marginalised by their families and communities. Recognizing the intense suffering of these women, the

government of Ethiopia through the Federal Ministry of Health has committed to intensifying efforts to prevent new cases of obstetric fistula (FMOH 2016a: 3). Lack of knowledge and awareness of maternal health services is one of the determinant factors for the poor utilization of maternal health services in Ethiopia (FMOH 2016b:13). Therefore, there is the need for the creation of a political, legal and social environment that leads to an improvement in the status of women and girls. This in turn supports the prevention of obstetric fistula (Nigeria Federal Ministry of Health [NFMOH] 2012:38). To do this, it is imperative that programmes engage global leadership, share information, and materials, and integrate and engage social media in social mobilisation. Social mobilisation is essential to challenge cultural and social pressures that lead to engagement in practices that increase the risks of developing an obstetric fistula..

There is a need to develop culturally appropriate advocacy strategies based on the integrated model that would be used for community sensitisation meetings. The model advocates for the development of different tailored information leaflets and posters addressing the needs of the local communities and targeting women of reproductive age, adolescents and youth (both girls and boys), pregnant women, religious leaders and clan leaders. Standardising communication materials intensifies behavioral change activities in support of the elimination of obstetric fistula with a particular focus on the causes and impacts of obstetric fistula, the availability of payment free treatment and the need for identification and referral of affected women for treatment. Another critical advocacy strategy for the proposed model would be to have community sensitization meetings through stakeholders such as fistula foundations, non-governmental organizations working in the area of maternal health, specifically obstetric fistula, so as to communicate issues related to user fees, the importance of male partner involvement and referral procedures. To create a supportive environment, a public relations desk needs to establish for providing relevant information and directions to women and other community members.

5.4.4.2. Identification and referral network

Identification and referral of obstetric fistula are considered to be the major bottleneck to reach and treat more women with obstetric fistula (Pathfinder International [PI] 2014:3). Fistula treatment centers are thought to be under-utilised because of the poor identification and referral of obstetric fistula cases. Integrating obstetric fistula identification and referral activities into existing communications, mechanisms through community-level health services will solve the challenges related to poor identification and referral of cases. There is a need, therefore, to intensify identification and referral activities at the community level and to strengthen the referral network (linkage) among communities, health extension workers, health centers and the fistula treatment centers. Established referral network tools and tracking of referred women to see if they actually get to the intended referral facility is an important segment of the overall fistula elimination efforts. The population would need to be informed about the fact that fistula treatment services are exempted from the user fee. Most of the health extension workers do not have the technical capacity nor the time to identify suspected cases. Fistula screening has recently been incorporated in the standardised integrated refresher training to health extension workers. It is important that all health extension workers receive this refresher training at the level of quality that it is intended for. To achieve this, the model should include training of health extension workers on fistula case identification, and simultaneously train community and religious leaders, local women's associations, and fistula survivors to engage in active case identification. It is also imperative that numbers of the community level network of the Women Development Army members are sensitised and include fistula identification and referral into their everyday activities.

5.4.4.3. Provision of physical, psychological and psychosocial treatment and care

Evidence demonstrates that more than 50,000 women with obstetric fistula have been treated to date with 95% closures or success rate (Hamlin 2015:1). While surgical repair can address the physical symptoms of a fistula (Nielsen et al 2009:1258), surgical repair alone may not end the challenges that women with fistula face. Women with obstetric fistula are not provided with cognitive behavioral therapy. Based on the study findings, women with

obstetric fistula have a high prevalence of mental health disorders. In order to change the status-quo, the model deemed six pillar cognitive behavioral therapy sessions integrated with clinical services, each representing the cited source of integrated treatment. With these treatments mainstreamed in obstetric fistula clinical services, cognitive behavioural therapies (CBT) among women with obstetric fistula assist in addressing sustainable and comprehensive mental health treatment. The content of the therapy session was adopted based on theories of cognitive behavioral therapy (Beck 2011:59), coping models (Lazarus & Folkman 1984:185-6), mental health structural model (WHO 2005b:48) and mental health intervention model (Watt et al 2105:8). The first two therapy sessions are intended to be delivered before the surgery, and the remaining four therapy sessions are intended to take place after surgery.

The therapy session combined the components of cognitive behavioural therapy, including relaxation training, identifying thoughts and emotions, cognitive restructuring/reforming, and identifying stressors and effective coping strategies (Beck 2011:145; Watt et al 2015:6-7). Study findings argue that when the six therapy sessions are presented or implemented in combination, they are expected to result in the desired outcomes. The model is premised on delivering different therapeutic techniques, such as medical education, role-play, homework and validation to reinforce concepts and facilitate the greatest and broadest impact of obstetric fistula mental health outcomes (see detailed CBT content in Annex A).

5.4.4.4. Quality assurance

The developed integrated mental health treatment model of obstetric fistula can be delivered concurrently with surgical treatment by adding value to the clinical service and providing a "window of opportunity" when women are in the hospital. This integrated treatment service improves the quality of health care service. The provision of quality care is dependent on the set standards. The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (2013:7) describes a standard as a written description that reflects the desired level of performance and is usually associated with a measure of excellence. Accordingly, these standards are used in the organisation of maternity care to evaluate the actual performance during clinical decision-making. Therefore, for the purpose of policy

implications, this study advocates the development and definition of quality assurance standards.

The standard of technical competence indicates that therapist should be properly trained, and have the regular in-service training to enhance technical competence. Informed consent and choice standards state that services need to be patient-focused, ensuring good communication, and provide clear and sufficient information to facilitate appropriate decision making about women. The women need to be informed about the obstetric fistula related services, risks, and benefits; as they need to make critical decisions for surgical repair and their follow-up after discharge.

Continuum of care is another important standard that is advocated for by the model. Within the context of the study, the focus would be to make sure that the women attend all the proposed therapy sessions. Another important aspect is to review their goal within a given date and appointments appropriately. Provision of integrated services, therefore, needs to be supervised and feedback given on performance according to set standards. Therefore, there should be a regular clinical audit of the service provision in terms of quality, access, process, and outcomes from the women's point of view. The results of the audit would need to be acted upon to ensure appropriate improvements in service provision through monitoring and evaluation activities.

5.4.4.5. Rehabilitation and reintegration

Rehabilitation provides an opportunity to live again, renews hope and lays the foundation of a new dawn thus dispelling the mental health issues associated with the condition (NFMOH 2012:39). There are a few agents engaged in rehabilitation and reintegration support services. Rehabilitation services need to be expanded and sustained in order to meet the needs of increased referrals. The model is based on addressing stigma and discrimination. Women returning to their communities would receive the support of community-based organizations that can offer mental health and other support, including social relationship, skill acquisition, literacy education, income generating/ business development, and microenterprise loans or grants. The organisations should assist in ensuring attaining of

physical competency among women with obstetric fistula, which will enable them to live a productive life. The organisations need to ensure proper management and support of women following fistula repair to enable them to face uncertainty in the future.

5.4.4.6. *Research for an integrated mental health treatment model for women with obstetric fistula*

Research is a critical process for the integrated mental health treatment model for women with obstetric fistula. It forms the basis of offering relevant integrated treatment and assessing effectiveness and efficacy of the model to address the mental health needs of women with obstetric fistula. Research is necessary for obtaining evidence-based data for optimising model implementation approaches. Successful implementation of the model will require ongoing robust monitoring and evaluation to inform and adjust the model. It is also critical that routine information systems are strengthened to generate robust data on the effectiveness of the model in the medium and long-term. Meanwhile, other means for evaluating progress at the outcome level will need to be established. However, there may be a need to undertake a randomised controlled trial that will evaluate the efficacy of this model to address the mental health needs of this population. To achieve this, a research and data management committee needs to be set up with membership across stakeholders to provide the platform to coordinate research and data management activity.

5.4.5. Outcomes of an integrated mental health treatment model for women with obstetric fistula

According to Ravitz et al (2013:354-355), the outcome is defined as a tangible product or result after providing a service. The purpose of this model is providing an integrated mental health treatment service to address the mental health needs of women with obstetric fistula in Ethiopia. The findings from this study indicated that the developed model could improve the overall well-being and functioning of these women with obstetric fistula. Holistic care for women with obstetric fistula should include integrated mental health treatment that complements the surgical repair outcome so that women receive comprehensive treatment. This outcome has three interrelated dimensions: (a) improved social well-being, (b) improved

physical, psychological, and psychosocial outcomes, and (c) improved ability to reintegrate back into their communities. If there is improved physical and psychosocial outcome for women with obstetric fistula, more resources can be redirected towards the general social well-being of women with obstetric fistula. The Figure below gives a visual illustration of the outcomes of the recommended model for integrated mental health treatment for women with obstetric fistula in the Ethiopian context.
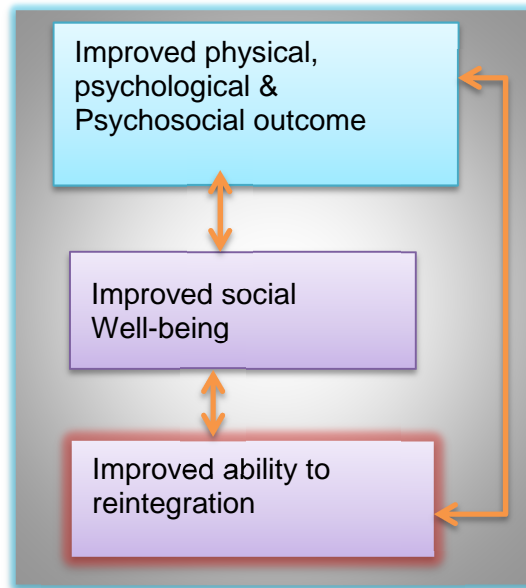
Figure 5.5: The expected outcomes of integrated mental health treatment model for women with obstetric fistula

5.5.   STRUCTURAL DESCRIPTION OF THE MODEL

The structure of the model is composed of context, stakeholders (agents and recipients), process, and outcomes. All these elements are necessary for the model to function. There is a systemic relationship amongst all the elements of the model. The use of connecting arrows between different levels and elements of the model shows the interrelatedness of these factors. The structural pattern of the model assists in understanding relationships between the concepts, their preferred sequence of occurrence and how they interact (Chinn & Kramer 2011:112). The model is premised both on the findings of the study and the researcher's deductive reasoning which has led to the identification of the process required the model to

be effective. The integrated mental health treatment model of women with obstetric fistula is based on literature and experience implementing.

The relationship between all the elements is dynamic with ever-changing context and stakeholders which highlights the need for regular monitoring and adjustment of the processes.. The process can also influence the context and the stakeholders. The applications of the process influence the outcome of the model which in turn has an effect on the context and the stakeholders. Proper and effective functioning of all these segments of the structure is important for the ultimate achievement of the desired outcome. Figure 5.6 is a schematic presentation of integrated mental health treatment model for women with obstetric fistula in Ethiopia showing the relationship between the elements of the model.
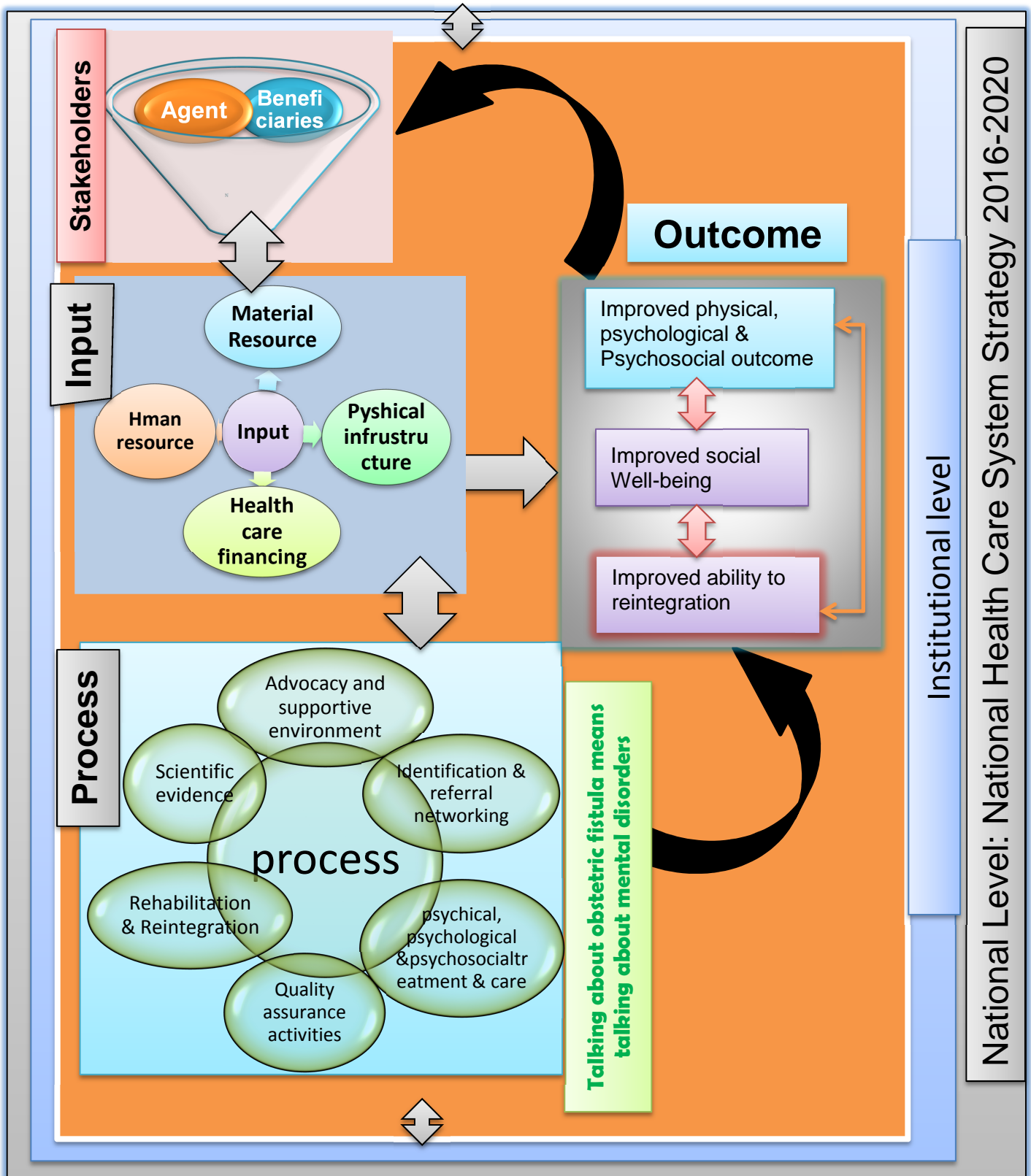
Figure 5.6: An integrated mental health treatment model structure

5.6. DESCRIPTIVE SUMMARY OF AN INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

The model is composed of the following six elements: *the context* (consisting of national and facility level), the *stakeholders* (consisting of the agents and beneficiaries), *the process* (composed of advocacy and supportive environment, identification and referral networking, psychical, psychological and psychosocial treatment and care, quality assurance activities, rehabilitation and reintegration and research), and finally the *outcome* (improved psychical, psychological and psychological outcome, improved social well-being and ability to reintegrate for women with obstetric fistula) as depicted diagrammatically in Figure 5.6. These elements have a direct impact upon each other, for example, the context determines the type of the stakeholders, which in turn determine the process, which then determines the outcome. These inputs should be made available and accessible for the integrated mental health treatment model for women with obstetric fistula care system to be functional. The process utilises and transforms these inputs to produce proper case identification and referral linkage. Accurate and quality physical and psychological treatment assures the quality of service and also ensures proper reintegration and rehabilitation services to achieve the desired integrated service outcome. Proper and effective functioning of all these segments of the system is important for the ultimate achievement of the desired product. However, it should be noted that, any change in one element of the model leads to changes in the remaining elements.

5.7. EVALUATION OF AN INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

The model was evaluated using Chinn and Kramer's (2011:237) criteria plus the modified version of the Delphi technique. Model evaluation helps in clarifying how well a model relates to theory, research or practice. According to Yousuf (2007:1-6), Hasson and Keeney (2011:1696) and Rowe and Wright (2011:1487-1490) the Delphi technique is a group process employed to collect the opinion of experts on a particular subject. To establish reliability and validity, the study was supervised by an expert in quantitative research as well as in model development.

The proposed model has been scrutinised by professionals, experts, familiar with the model of mental health treatment and support, in addition to guidance from academic supervisor. The expert reviewers were selected based on the diversity of their skills and professional training. Three experts were involved (one gynaecology and obstetrics expert, a professional psychiatric nursing expert and one expert in model generation). To add rigour to the model development, the model was also evaluated using Chinn and Kramer (2011:237)'s criteria for evaluation, which included clarity, simplicity, accessibility and the importance of the model. In that regard, the model was shared and reviewed by gynaecology and obstetrics professionals with obstetric fistula surgical expertise for consensual validation. All revisions and suggestions have been incorporated to refine the model. Chinn and Kramer (2011:134-137) provide a framework for evaluating models.

5.7.1. Clarity of the model

Chinn and Kramer (2011:127) recommend that evaluating the model should consider two major factors: (i) semantic clarity and consistency and (ii) structural clarity and consistency. Clarity refers to how understandable the model and its description are to readers or potential users; how well the model can be understood and how consistent it is in terms of terminology and structure. Consistency refers to conformity with standard processes or procedures for the sake of logic, accuracy, or fairness.

To achieve semantic clarity and consistency, the researcher has endeavored to construct definitions of concepts in a logical or sequential manner from the identification of the main concept to its attributes, throughout theoretical definitions and in the structuring of the model. Clarity was lacking in the initial model proposed by the researcher; however, after a series of revisions through expert review, the model has now become more lucid and clear. No unimportant concepts have been introduced which would create unnecessary complexity and it has been declared to be clear and straightforward.

5.7.2. Simplicity of the model

According to Chinn and Kramer (2011:124), simplicity refers to the lack of complexity of the structural components and relationships between concepts. In this model, the essential and related attributes are derived from the main concept thus are closely related and experts felt some parts needed clarification. Initial feedback pointed to some ambiguity, that rendered it difficult to follow and it needed some clarification. In order to keep the model simple, it has been illustrated using a simple structure that can be easily understood. The researcher revisited and refined these, and the model was declared by experts simple to use as all the elements were well explained and can be easily understood and deemed user-friendly.

5.7.3. Accessibility of the model

Accessibility addresses the extent to which empiric indicators for the concepts can be identified and how attainable the projected outcomes of the model are after it has been operationalised (Chinn & Kramer 2011:129-136). These two factors are dependent on the scope and specificity of the model. The accessibility of the model has been ensured by the provision of clear definitions of concepts, built on the essential criteria. The evaluators of the model felt that the empirical grounding of this model was clear. The model can be accessible to different types of empirical testing, making it easy for a skilled, experienced program expert to design integrated intervention programs in different situations. Electronic and hard-copies of the model will be made available to all stakeholders on request.

5.7.4. Importance of the model

The model described above is the researcher has recommended integrated mental health treatment model for women with obstetric fistula to address the mental health needs of women with obstetric fistula through integrated treatment service. Integrating mental health treatment model with obstetric fistula surgical repair is expected to improve the overall well-being and functioning of these women. The model is, therefore, an important tool that will enhance comprehensive care and support of women with obstetric fistula and ultimately their

mental health outcomes. It is also important to stakeholders involved in obstetric fistula elimination programs.

5.8.   ASSUMPTION OF AN INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

Chinn and Kramer (2011:115) define assumptions as the basic principles that serve as the foundation of the model. This refers to other conditions necessary; beyond to the suggested interventions by the model to yield the expected outcomes. Assumptions can also be associated with relationship statements that give reference to the values underlying the model. In order to perceive the significance of the model, it is essential to make the assumptions clear. The model assumes that if treatment services are viewed as a system and are well resourced, this will improve the quality and enhance utilisation of these services as well as address the mental health needs of women with obstetric fistula.

Assumptions
- The cognitive behavioral theory was used as a point of departure for developing the model. Health care systems were seen as an open system that is open and is influenced by different social and environmental factors. The functioning of these systems is dependent on the prevailing environment for obstetric fistula surgical treatment services to effectively take place. Obstetric fistula surgical repair services need to be viewed from a cognitive behavioral theory perspective so as to provide an enabling and effective environment, taking advantage of the integrated "window of opportunity" when women are in the hospital. Integrated services were viewed as an integral treatment system of the main obstetric fistula surgical repair service.
- The overall health care system can enhance or deter provision and utilisation of integrated treatment services due to structural or service related challenges. Provision of integrated mental health treatment service is one such model of care within health care services that improve obstetric fistula treatment outcomes.

- Therapist plays a pivotal role in implementing any integrated mental health treatment model for women with obstetric fistula that can be delivered concurrently with surgical treatment, so they need empowerment, which this model can bring about.
- Developing standards of care and implementing quality assurance activities, in a fistula hospital will enhance surgical repair outcomes.

5.9. IMPLICATIONS OF AN INTEGRATED MENTAL HEALTH TREATMENT MODEL FOR WOMEN WITH OBSTETRIC FISTULA

- Integrated practical treatment model calls for a new opportunity for health service providers and policy makers in terms addressing the mental health needs of the women with obstetric fistula.
- Another implication of this model is that both pre-service and in-service health service provider training curricular need to include aspects of quality assurance in order for health workers to have an appreciation for and apply concepts of quality assurance that are fundamental to this model.

5.10. CONCLUSION

Overall, this Chapter has given a detailed description of the model for integrating mental health treatment of women with obstetric fistula surgical repair to address the mental health needs of women with obstetric fistula. The description has covered the process of implementing the model and related concepts. It also covers the purpose, context, stakeholder, inputs, outcomes, and assumptions of the model. The structural description of the model is also addressed in this chapter. The latter sections of the chapter provide implication of the model and its evaluation using the four criteria set by Chinn and Kramer (2011:122-137). The next chapter (Chapter 6) will focus on the conclusions, limitations of the study and recommendations on how the surgical repair should affect the psychological outcomes of women with obstetric fistula.

CHAPTER 6

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1. INTRODUCTION

The previous chapter presented an integrated mental health treatment model for women with obstetric fistula. This chapter presents a conclusion drawn from the findings of the study in relation to the research objectives and questions. The main aim of this study was to determine the effects of surgical obstetric fistula repairs on the severity of depression and anxiety symptoms among women with obstetric fistula in Ethiopia. The study objectives were to i) Describe the prevalence and severity of depression and anxiety among women awaiting surgical repairs of obstetric fistula in Ethiopia; ii) Describe the severity of depression and anxiety among women who undergo surgical repairs for obstetric fistula in Ethiopia; iii) Determine the variations in the severity of depression and anxiety pre and post-surgical repair; iv) Determine changes in the severity of depression and anxiety attributed to obstetric fistula repair surgery and V) Develop an integrated mental health treatment model for women with obstetric fistula in Ethiopia.

The chapter also highlights contribution and limitations of the study. The last section of the chapter presented recommendations and concluding remarks for improving mental health outcomes of women with obstetric fistula in Ethiopia, as well as in sub-Saharan Africa.

6.2. CONCLUSIONS

Based on the study findings, women with obstetric fistula have significantly higher psychological distress such as depression and anxiety following the development of an obstetric fistula. The possible determinants of this high level of psychological distress are most likely a combination of social isolation (stigmatisation) and decreased daily activities, which negatively impact on the mental health of women after developing an obstetric fistula. Follow-up data revealed that over time, women with fistula experience a decrease in depression and anxiety symptoms from the time of fistula ward admission for fistula repair to the time of discharge. The following section presents the conclusion of the study based on the objectives.

Objective 1: To describe the prevalence and severity of depression and anxiety among women awaiting surgical repairs of obstetric fistula in Ethiopia

This objective was met as the results of the study have revealed that women with obstetric fistula face a myriad of psychological problems**.** This study concludes that women with obstetric fistula have significantly higher depression (91%) and anxiety symptoms (78%), even after controlling of the underlying risk factors for psychopathology. The research finding also indicated that women with obstetric fistula reported significantly lower social support. This support deficit has significantly affected the scale of depression and anxiety symptoms. The patterns of co-morbid depressive and anxiety symptoms suggest that depression and anxiety tend to cluster together and persist over time. The findings of this study confirmed that the trajectories of depressive and anxiety symptoms were highly associated. Women with low depression symptoms were more likely to experience low anxiety symptoms.

Objective 2: To describe the severity of depression and anxiety among women who undergo surgical repairs for obstetric fistula in Ethiopia

This objective was met as results of the study have revealed the different psychological problems of varying severity faced by women with obstetric fistula. The results of the study have described the prevalence of depression and anxiety after completing their surgical repair. Initially, 219 eligible respondents were recruited upon their admission, but only 200 respondents completed their follow up and responded to the questionnaires on discharge following surgical repair of obstetric fistula. The overall prevalence of depression symptoms was 27%, of which 1% of the women were experiencing severe depression, 16% were experiencing mild depression, and the remaining majority (73%) had no or minimal depression symptoms. The prevalence of anxiety symptoms was 26% (2 in 10 women had anxiety symptoms). Regarding the severity of anxiety, among those who showed symptoms of anxiety, 16% had mild anxiety, 75% had no or minimal anxiety symptom and 6% of them had severe anxiety symptoms.

Objective 3: To determine the variations in the severity of depression and anxiety between pre and post-surgical repairs

This objective was met as the results of the study have assessed differences in severity of psychological disorders (depression and anxiety symptoms) in respondents from admission to discharge without changing the composition of the study respondent's interims of socio-demographic characteristics. In a follow-up assessment after surgical repair, results revealed that over time, women with fistula report a variation in depression and anxiety symptoms from the time of admission in a fistula ward to 5.64 weeks following surgical repair. This study noted that women with obstetric fistula following fistula repair surgery experienced a decrease in psychological distress. The measures of psychological disorders, including psychosocial functioning, showed improvements at follow-up compared to the baseline findings. On admission, 91% of women were positive for depression symptoms with a mean score of 12.3. On discharge, the same questionnaire was administered and only 27% of women were positive for depression symptoms with mean scores of 3.64. The prevalence of women who screened positive for depression symptoms between admission and post-repair were statistically significant (Mann–Whitney U test, $P < 0.05$). For anxiety screening, 78% of women screened positive with a mean score of 9.9 during admission. On discharge, the same questionnaire was administered and only 25% of women screened positive and the overall mean score was 3.4. The difference in prevalence of women who screened positive for anxiety symptoms was statistically significant (t-test, $P=0.000$) as was the difference in mean score (Paired test and Mann–Whitney U test, $P < 0.001$).

Objective 4: To determine changes in the severity of depression and anxiety attributed to obstetric fistula repair surgery

As a follow up to objectives 1 and 2, the study revealed that over time women with obstetric fistula report a decrease in severity of depression and anxiety symptoms from their admission to discharge after completing their surgical repair. Results from the follow-up study verify previous literatures that have suggested an overall improvement in the mental health of women following obstetric fistula repair. The study added to this literature by specifying and quantifying depression and anxiety symptoms that change following surgical repair. The

sharp decline reported in these symptoms suggests that mental health of the women generally improves following surgical repair.

The reduction in symptom of anxiety and depression at follow-up was remarkable, given the level at which symptoms were reported at baseline (objective1). This is not a typical trajectory for depression and anxiety unless traumatic stress is conceptualized as chronic and ongoing for obstetric women rather than restricted to a single event (the traumatic childbirth). Thus, decrease in depression and anxiety symptoms following the repair surgery may indicate a natural healing process in the wake of trauma. In our sample, 69% (137) believed that the fistula was cured at follow-up. "Cure" was a concept that respondents appeared to define as the complete absence of leaking. Women who did not perceive themselves to be cured had significantly higher depression and anxiety symptoms than those who believed that they were cured. The self-reported severity of leaking was correlated with depression and anxiety. Indeed, it is not able that perceived cure was associated with decreased severity of depression and anxiety symptoms. This suggests a relationship between psychological distress and the extent of leaking after fistula surgery.

Objective 5: Develop an integrated mental health treatment model for women with obstetric fistula in Ethiopia.

This objective was met by developing and describing an integrated mental health treatment model for women with obstetric fistula to address their mental health needs. The model was developed based on the findings of phase one analysis. The researcher used cognitive behavioral therapy and system theory to underpin the development of the model. The importance of this theory is the interconnectedness and interdependency of different parts of the system. For rigour and measures of trustworthiness, the author utilised the principles of Chinn and Kramer (2011:237) and a modified version of the Delphi technique for expert and peer review (Hasson & Keeney 2011:696). The integrated mental health treatment model is composed of the following elements: context, stakeholder, input, process, and outcome. At the national level, the contextual environmental setting is the Ethiopian health care system strategic plan (Health Sector Transformation Plan 2016-2020 and National Plan of Action for

Elimination of Obstetric Fistula by 2020). At the institutional level, it refers to the study setting –the different fistula hospitals in Ethiopia.

Inputs*:* these are the resources required to carry out a process/procedure. For this model, they are financial, physical facilities, human and material resources.

Processes: advocacy and supportive environment, identification and referral networking, psychical, psychological, and psychosocial treatment & care, quality assurance activities, rehabilitation & reintegration, and scientific evidence.

Outcome: the findings show that the developed model could improve the overall well-being and functioning of women with obstetric fistula and also improve their physical and psychosocial outcomes, and facilitate their ability to reintegrate into their communities. In conclusion, it can be noted that the conducted research was able to address each of the five objectives.

6.3. SUMMARY OF STRUCTURAL EQUATION MODELLING

The purpose of the structural equation model was to test the hypothesis that measurement model of the structural equation do not confirm the fact that the proposed three sub-scales in the psychological distress do not fit a sample data. Thirty–four items representing the three constructs (depression=9, anxiety=7, and PTSD=17) that were retained through confirmatory factorial analysis were analysed using the simultaneous structural equation modelling method. The structural equation model for this study was analysed using MLS with a standardised solution to report the statistical estimates of the free parameters. Testing of the initial simultaneous structural equation modelling together indicated that the chi-square values were significant indicating that the proposed models were different from the estimated ones. Moreover, the RMSEA values exceeded the cutoff point of less than 0.08, GFI (criterion≥0. 90) were not met, and the model still indicated bad fit. To improve the model fit, structural equation model modifications were performed based on standard residuals and the modification indices in addition to the statistical significance of each parameter. Considering practical significance and that the value of RMSEA was <0.05, values of GFI and CFI were above 0.90 and the value of *ChiSq/df* was <5. Our selected model-fit indices now all indicate an acceptable level of fit. Thus, the researcher considers the modified model to be the final structural equation model for the prediction severity of anxiety and depression.

6.4. CONTRIBUTIONS OF THE STUDY

Creswell (2014:249) defines contribution as the relevance of the research or the importance of the study results for different audiences that may profit from reading or using the study findings and recommendations. The study will have the following contributions to the health care system, policymakers, service providers and beneficiaries and the body of knowledge. Women with obstetric fistula usually live in low-income countries where mental health services are few or non-existent. There is also evidence of high clinical burden and disability, due to lack of appropriate care provision and evidence of clinical burden and disability due to poor understanding of the condition. This study has contributed to filling the existing knowledge gap regarding the magnitude and clinical burden of mental health problems associated with obstetric fistula to give attention to the issue of this hidden public health problem. Apart from contributing to the existing corpus of knowledge, this study will provide policymakers with evidence-based data for policy formulation.

Moreover, in the context of the recent interest in scaling up mental health care and accelerating obstetric fistula elimination in low and middle-income countries, this study provides data that supports the scale-up efforts. This study also helps to understand depression and anxiety among women with obstetric fistula, the role of isolation and loss of social support on the severity of depression and anxiety, and the role and potential impact of surgical repair for addressing their mental health needs. The findings provide input to help prevent the condition with the long-term goal of eradicating mental health problems of women with obstetric fistula and improving maternal health. In addition, the integrated mental health treatment model for women with obstetric fistula that was developed, having been informed by gaps in the health facilities identified by the study and through reviewed literature, should contribute significantly to the strengthening of the Ethiopian National Plan of Action for Elimination of Obstetric Fistula by 2020. The existing national mental health strategy is old and outdated. However, there are plans by the ministry to revise this strategy. The integrated mental health treatment model proposed in this study could therefore make meaningful contributions to the modification or adjustments of the national mental health strategy to address the mental health needs of women with obstetric fistula. The approach that formed

the basis for developing the model can also be adopted and adapted for use as a best practice in any health care system.

The research finding will improve understanding of the severity of depression and anxiety pre and post-surgical repairs of obstetric fistula. This will help in identifying an individual care plan that includes mental health counseling. It will be important to know the effect of fistula repair surgery on the severity of depression and anxiety and its risk factor among women with obstetric fistula. This will be relevant to clinicians, women, and their families to improve the lives of women with obstetric fistula. It is believed that this study finding has narrowed the knowledge gap between service providers regarding the effect of surgical repair for reducing psychological distress. The differences observed in psychological symptoms depending on cure status after surgical repair indicate the importance of integrated mental health treatment model for women who experience continued leaking. The developed integrated mental health treatment model could help alleviate or improve   psychological symptoms of women with obstetric fistula. This type of treatment has the potential to significantly enhance women care during the fistula treatment process.

Finally, the analytical method is also considered a major advance for the research community and will serve as an important input for researchers. It is also an important reminder that for scientists to take their responsibility seriously and make scientific contributions to the international community.

6.5.   LIMITATIONS

The researcher acknowledges some limitations of the study. This study measures change of psychological distress only from admission process to fistula ward up to immediately prior to discharge after surgical repair. This excluded the long-term mental health outcomes of obstetric fistula, which might occur after discharge. The time of repetitive measure of depression and anxiety is short, the follow up was also limited by non-uniform time of stay between the date of admission and the date of discharge, and this might affect the exact change the mental health outcome of women with obstetric fistula. Finally, this study relied

on self-reports to measure cure and leaking severity, and did not include a clinical assessment by a fistula clinician, or use the golden standard fistula follow up assessment tools. It is, therefore, unknown whether women leaked due to incomplete fistula closure or due to stress incontinence; as these may affect the reduction of psychological distress.

6.6.   RECOMMENDATIONS

Based on the study findings, the researcher makes the following recommendations for improving the mental health needs of women with obstetric fistula in Ethiopia and about how the model can be utilised:

Obstetric fistula treatment centers

- Talking about obstetric fistula means talking about mental health disorder, in order to achieve this, treatment centre introduced the developed model to mitigate the risk of fistula as well as addressing the full reproductive life cycles of the women.
- Caring for the victims of obstetric fistula is critical, the researcher recommends that treatment centres utilise the most passionate advocacy system to eliminate obstetric fistula and for women who have gone through the experience, treatment centre should provide quality physical as well as mental health interventions.
- The model can be used to strengthen the referral and communication system.
- It is necessary to build the provider skill through training, mentoring and coaching.
- This research explores the limitation and gapes of referral linkage, in doing this treatment centre strengthen the referral linkage through collaboration.
- In order to ensure the effectiveness of the model, treatment centre should develop standard operations manual that is institution specific includes elements like technical competence, informed consent, client safety, and continuum of care.
- The result of this study demonstrates that almost all women with obstetric fistula present for surgery with significantly more psychosocial concerns. After surgery, these psychosocial problems appear to decrease overall. It should, however, be noted that women with continued leaking experience more psychological distress than those who are fully cured. Fistula clinicians should seek to address psychosocial problems in their

women through targeted integrated mental health interventions to address the mental health needs.

- It is necessary that women with obstetric fistula are empirically supported with psychological treatment.

Recommendations for further research

- This research was quantitative in nature. Further research could explore the use of quantitative and qualitative (mixed) approaches to explore mental health needs of women with obstetric fistula.

- The prevalence of psychological distress among women with obstetric fistula was very high. Future research should focus on identifying the driving and protective factors that explain resilience and absence of psychological distress.

- Given that 45% of the current fistula follow-up sample reported continued leaking after fistula repair surgery, the association between leaking and psychological symptoms warrants further investigation using clinical evaluation.

- As indicated in the limitations section, this study was limited to finding whether there were any long-term mental health outcomes. The researcher recommends that a study using a randomized controlled trial using a prospective cohort design be carried out to establish whether there are cause-and-effect relationships between surgical repair and mental health after the women are reintegrated back into their communities.

- Future research may focus on identifying and investigating which obstetric fistula factors are the main driving factors of mental health problems.

- Furthermore, this study did not account for possible intermediary factors in the developed model, there is, therefore, need to evaluate or address these possible intermediary factors

- Future researchers focus on the positive values of the model for addressing the mental health needs of women with fistula, therefore researchers may also evaluate the effectiveness and efficacy of the integrated mental health treatment model for women with obstetric fistula to address the mental health symptoms of these women.

- Finally, future research may focus on the status of mental health outcomes after reintegrating into the community.

6.7. CONCLUDING REMARKS

Study findings suggest that surgical repair and social support are associated with improved mental health outcomes. Several non-governmental organisations have adopted obstetric fistula prevention and care, and meaningful involvement of women with obstetric fistula as some of the strategies to enhance mental health outcomes. The study concludes that whilst the focus of policy and decision makers was on an expansion and scaling up of surgical treatment of women with obstetric fistula little regard has been paid to the mental health problems of these women as well as to the existing mental health service. It also emerged that there were inadequacies in the quality and quantity of counseling as well as in the discharge planning process. Whilst acknowledging the limitations of the study as being unique to these respondents in this setting, clinical practice can draw invaluable lessons from the study findings in order to address the mental health needs of women with obstetric fistula. The researcher believes that implementation of an integrated mental health treatment model for women with obstetric fistula in Ethiopia will curb most of the identified shortcomings related to prevention and management of obstetric fistula.

6.8. PERSONAL REFLECTIONS

This chapter brings to an end a long and challenging journey. While I had the pleasure of conducting some researches before and completing my master's dissertations as part of my master's program, completing this doctoral thesis has been both challenging and rewarding. The research proposal module exposed me to more concepts and complex research design processes and literally forced me to read more than 200 journal articles and 30 guidelines in order to understand my research topic and refine the study methodology. With guidance from my supervisor, Professor Mavhandu-Mudzusi, I finally overcame the challenges. Equally challenging were model development. To overcome this, I engaged the services of a Biostatistician and read several theses which involved model development. Access to the UNISA online library was a big relief to me. Furthermore, extensive reading, back and forth with my supervisor has made me a better scholar and given me more insights into the research topic than I had before. Most importantly, the study findings and the model that was developed make me proud of this academic milestone. It has been a worthwhile undertaking.

REFERENCES

Aaronson, N, Alonso, J, Burnam, A, Lohr, KN, Patrick, DL, Perrin, E & Stein, RE. 2002. *Assessing health status and quality-of-life instruments: attributes and review criteria. Qual Life Res 2002, 11(3):193–205.*

Adler, AJ, Ronsmans, C, Calvert, C & Filippi, V. 2013. *Estimating the Prevalence of Obstetric Fistula: A Systematic Review and Meta-Analysis. BMC Pregnancy Childbirth; 13:246.*

Ahmed, S & Tunçalp, Ö. 2015. *Burden Of Obstetric Fistula: From Measurement To Action. The Lancet Global Health;3:242-244.*

Alio, AP, Merrell, L, Roxburgh, K, Clayton, HB, Marty, PJ, Bomboka, L, Traore, S & Salihu, H M. 2011. *The Psychosocial Impact of Vesico-Vaginal Fistula in Niger. Arch Gynecol Obstet; 284:371-8.*

Allen, Am, Lakin, T, Shobeiri, SA & Nihira, M. 2011. *Transmural Vaginal-to-Bladder Injury from an Obstructed Labor Pattern. Obstet Gynecol; 117: 468-70.*

Altman, DG. 1999. *Practical Statistics for Medical Research. New York, NY: Chapman & Hall/CRC Press.*

American Psychiatric Association [APA]. 2013. *Diagnostic and Statianual. 5th edition. Arlington, Va: Washington, Dc: American Psychiatric Association.*

Anderson, C, Day, K & Mclaughlin, PA. 2006. *Mastering the Dissertation: Lecturers' Representations of the Purposes and Processes of Master's Level Dissertation Supervision. Studies In Higher Education; 31(2):149-168.*

Anthony, JV & Joanne, MG. 2005. *Understanding inter-observer agreement: the Kappa Statistics. Fam Med 2005;37(5):360-3*

Anwar, F & Low YC. 2016. *Assessing Normality For Data With Different Sample Sizes Using SAS, Minitab And R. ARPN Journal Of Engineering and Applied Sciences; 11(18): 10845-10850*

Arrowsmith, SD, Barone, MA & Ruminjo, J. 2013. *Outcomes in Obstetric Fistula Care: A Literature Review. Curr Opin Obstet Gynecol; 25:399-403.*

Awang, Z. 2015. *Validating the Measurement Model: Confirmatory Factor Analysis. Chapter 3: page 54-74. Universiti Sultan Zainal Abidin | UniSZA. MPWS Publisher*

Awang, Z. 2014. *Structural Equation Modeling Using Amos Preface. Universiti Sultan Zainal Abidin|UniSZA.MPWSPublisher.*

Bailey,KD. 1984. A Three-Level Measurement Model. Quality and Quantity: Elsevier Science Publishers B.V., Amsterdam - Printed in The Netherlands.

Baingana, F, Bannon, I & Thomas, R. 2005. *Conceptual Framework and Approaches: Mental Health and Conflicts. Discussion Paper Series. HNP: World Bank's Human Development Network.*

Ballard, K, Ayenachew, F, Wright, J & Atnafu, H. 2016. *Prevalence of Obstetric Fistula and Symptomatic Pelvic Organ Prolapse In Rural Ethiopia. Int Urogynecol J;1-5*

Bangser, M, Mehta, M, Singer, J, Daly, C, Kamugumya, C & Mwangomale, A. 2011. *Childbirth Experiences of Women with Obstetric Fistula in Tanzania and Uganda and their Implications for Fistula Program Development. International Urogynecology Journal; 22: 91-98.*

Bangser, M & Abonesh, H. 2010. *Assessment of USAID support for fistula activities in Ethiopia. POPLINE; K4Health. AvailableAt:https://www.popline.org/node/227827. [Accessed May 2, 2016].*

Beck, J. 2011. *Cognitive Behavior Therapy: Basics and Beyond. Guilford Press. 2nd edition. Newyork:London: The Guilford Press.*

Belete, A, Andaregie, G, Tareke, M, Birhan, T & Azale, T. 2014. *Prevalence of Anxiety and Associated Factors among People Living with HIV/ADIS at Debretabor General Hospital Anti Retro Viral Clinic Debretabor, Amhara, Ethiopia. American Journal of Psychiatry and Neuroscience; 2:109-114.*

Berhan, Y & Berhan, A. 2014. *Causes of Maternal Mortality in Ethiopia: A Significant Decline in Abortion-Related Death. Ethiop J Health Sci. Special Issue: 15-28.*

Bettany-Saltikov, J. 2012. *How to Do A Systematic Literature Review In Nursing: A Step-By-Step Guide. Maidenhead: Mcgraw-Hill/Open University Press.*

Biadgilign, S, Lakew Y, Reda, AA & Deribe, K. 2013. *A Population-Based Survey in Ethiopia Using Questionnaire As Proxy to Estimate Obstetric Fistula Prevalence: Results From Demographic And Health Survey. Reproductive Health; 10:1-8.*

Booth, A, Sutton A & Papaioannou D. 2016. *Systematic Approaches to A Successful Literature Review. Los Angeles, Ca: SAGE.*

Bowen, NK. 2014. *Requesting and Using Modification Indices In Mplus. Available at: https//ssw.unc.edu/sswsig/sites/default/files/Modification Indices. [Accessed February 2, 2017].*

Brink, Y. 2012. *Clinical instruments: reliability and validity critical appraisal. Journal of Evaluation in clinical practice; 18: 1126-1132.*

Bruce, JC & Klopper, HC. 2010. *A model for incorporating specialist nurse education into a university context.Part1: Methodological perspectives', Health SA   Gesondheid 15(1): 494-500.*

Bryman, A. 2012. *Social Research Methods, New York, Oxford University Press.*

Bryman, A, Bell, E, Hirschsohn, P, Dos Santos, A, Du Toit, J, Masenge, A, Van Aardt, I & Wagner, C. 2014. *Research Methodology: Business and Management Context. Cape Town: Oxford University Press.*

Burns, N & Grove, S. 2011. *Understanding Nursing Research: Building And evidence Based Practice. 5th edition. Elsevier Saunders.*

Burns, N, Grove, SK & Gray, JR. 2013. *The Practice of Nursing Research Appraisal, Synthesis and Generation of Evidence.7th edition.St Louis: Elsevier/Saunders.*

Buttia, C. 2015. *Investigation of Successful Interventions in Mitigation of Female Genital Mutilation/Cutting (Fgm/C) among Selected Kenyan Communities: Maasai, Kisii, and Kuria. Hochschule für Angewandte Wissenschaften Hamburg. University of Applied Sciences*

Byamugisha, J, Ayadi, EA, Obore, S, Mwanje, H, Kakaire, O, Barageine, J, Lester, F, Butrick, E, Korn, A, Nalubwama, H, Knight, S & Miller, S. 2015. *Beyond Repair - Family and Community Reintegration After Obstetric Fistula Surgery: Study Protocol. Reprod Health, 12.115-121*

Carvalho, J & Chima, F. 2014. *Applications Of Structural Equation Modeling In Social Sciences Research. American International Journal Of Contemporary Research 4, 6-11.*

Central Statistical Agency [CSA]. 2016. *Ethiopia Demographic and Health Survey 2016. Addis Ababa, Ethiopia, and Calverton, Maryland, USA, CSA.*

Chilisa, B & Kawulich, B. 2012. Selecting a research approach: Paradigm, methodology and methods. CHAPTER 3: University of West Georgia; *Available at https://www.researchgate.net/publication/257944787.[Accessed November 2, 2017].*

Chinn, P & Kramer, M. 2011.*Theory and Nursing: Integrated Knowledge Development. 8th edition. St Louis: Mosby.*

Chinn, PL & Kramer, MK. 1991. Theory and Nursing: A Systematic Approach. St Louis: Mosby.

Cowgill, KD, Bishop, J, Norgaard, AK, Rubens, CE & Gravett, MG. 2015. *Obstetric Fistula in Low-Resource Countries: An Under-Valued and Under-Studied Problem–Systematic Review of Its Incidence, Prevalence,and Association with Stillbirth. BMC Pregnancy and Childbirth;15.193-200.*

Creswell, JW. 2014. *Research Design: Qualitative, Quantitative, And Mixed Method Approaches. 4th edition.Thousand Oaks: SAGE.*

Creswell, JW & Plano-Clark, VL. 2011. *Designing and Conducting Mixed Methods Research. 2nd edition. Thousand Oaks, Ca: SAGE.*

Dadi, AF, Dachew, BA, Kisi, T, Yigzaw, N & Azale, T. 2016. A*nxiety and Associated Factors among Prisoners in North West of Amhara Regional State, Ethiopia. BMC Psychiatry; 16: 83-9*

De Vos, A, Delport, C, Fouche, C & Strydom, H. 2011. *Research At Grass Roots: A Primer For The Social Science and Human Professions, Pretoria, South Africa, Van Schaik.*

De Vos, AS. 2011. *Research at grassroots: for social sciences and human services profession. 4th edition. Pretoria: Van Schaik*

Delamou A, Diallo, M, Beavogui, AH, Delvaux, Millimono S, Kourouma, M, Beattie, K, Barone, M, Barry, TH, Khogali, M, Edginton, M, Hinderaker, SG, Ruminjo, J, Zhang, W, & Brouwere, VD. 2015. *Good Clinical Outcomes from a 7-Year Holistic Programme of Fistula Repair In Guinea. Tropical Medicine and International Health; 20: 813-819.*

Delamou, A, Delvaux, T, Beavogui, AH, Toure, A, Abdoulaye, Kolié, D, Sidibé, S, Camara, M, Diallo, K, Barry, TM, Diallo, M, Leveque, A, Zhang, WH & Brouwere VD.2016. *Factors Associated with the Failure of Obstetric Fistula Repair In Guinea: Implications for Practice. Reproductive Health; 13:135-43*

Dennis A, Wilson, SM, Mosha, MV, Masenga, GG, Sikkema, KJ, Terroso K & Watt M. 2016. *Experiences of social support among women presenting for obstetric fistula repair surgery in Tanzania. International Journal of Women's Health; 8:429-439.*

Diana, S, Shay, M. [Sa]. 2017. *Guidelines for Reliability, Confirmatory and Exploratory Factor Analysis. The University of Northern Colorado, Greeley Co & Cherry Creek Schools,DenverCo.http://Www.Wuss.Org/Proceedings09/09wussproceedings/Papers/ Anl/Anlsuhrshay. [Accessed June 1, 2017].*

Diana, R. 2012. *The Literature Review: A Step-By-Step Guide For Students. Los Angeles, Ca: SAGE.*

Doty, DH & Glick, WH.1998. *Common methods bias: Does common methods variance really bias results? Organizational Research Methods; 1(4); 374-406.*

Drew, LB, Wilkinson, JP, Nundwe, W, Moyo, M, Mataya, R, Mwale, M & Tang, HJ. 2016. *Long-Term Outcomes for Women after Obstetric Fistula Repair In Lilongwe, Malawi: A Qualitative Study. BMC Pregnancy and Childbirth;16:2-12*

Duby, F & Hailey, J. 2013. *Situation Assessment Of Obstetric Fistula In Ethiopia. Health resource facility. AusAID HRF. Canberra City*

Edward, JC, Marius, R, Jules, HS &Piergiorgio, S. 2015. *Longitudinal Studies. J Thorac Dis; 7(11):537-540.*

Ellen, DJ, Susan L & Thomas, PM. 2013. *Reliability and Validity of the Jefferson Scale of Attitudes Toward Physician-Nurse Collaboration for Nurse Practitioners. Journal of Nursing Measurement; 21 (3): 463-476.*

Etikan, I, Abubakar, SM & Alkassim, RS. 2016. C*omparison of Convenience Sampling and Purposive Sampling. American Journal of Theoretical and Applied Statistics; 5(1): 1-4*

European Commission, Joint Research Centre [ECJR].2015. *Reference and Measurement. Available on: Https://Ec.Europa.Eu/Jrc/En/Reference-Materials. [Accessed January 2, 2016].*

Federal Ministry of Health [FMOH]. 2016a. *Strategic plan for elimination of obstetric fistula in Ethiopia by 2020. Ministry of Health, Addis Ababa; Ethiopia.*

Federal Ministry of Health [FMOH].2016b. *Implementation Guide for Communications to Support Elimination of Obstetric Fistula by 2020. Ministry of Health, Addis Ababa; Ethiopia.*

Federal Ministry of Health [FMOH].2015. *Health sector transformation plan 20162015/16-2019/20. Ministry of Health, Addis Abab,; Ethiopia.*

Federal Ministry of Health [FMOH].2012. *Ethiopia's National Mental Health Strategy 2012/13-2015/16. Ministry of Health, Addis Ababa, Ethiopia.*

Fekadu A, Hanlon, C, Gebre-Eyesus, E, Agedew, M, Solomon, H, Teferra, S, Gebre-Eyesus, T, Baheretibeb, Y, Medhin, G, Shibre, T, Workneh, A, Tegegn, T, Ketema, A, Timms, P, Thornicroft, G & Prince, M. 2014. *Burden of Mental Disorders and Unmet Needs Among Street Homeless People in Addis Ababa, Ethiopia. BMC Medicine; 12:1-12.*

Fink, A. 2014.*Conducting Research Literature Reviews: From the Internet to Paper. Thousand Oaks, Ca: SAGE.*

Frajzyngier, V, Ruminjo, J & Barone, MA. 2012. *Factors Influencing Urinary Fistula Repair Outcomes In Developing Countries: A Systematic Review. Am J Obstet Gynecol; 207: 248–258.*

Grant, C & Osanloo, A. 2013. U*nderstanding, Selecting, and Integrating a Theoretical Framework in Dissertation Research: Creating the Blueprint for Your "House". Administrative Issues Journal Education Practice and Research; 12-26*

Gravetter, F & Wallnau, L. 2014. *Essentials of Statistics for the Behavioral Sciences. 8*[th] *edition, Wadsworth, Belmont, Ca.*

Hair, JF, Black, WC, Babin, BJ & Anderson, RE. 2010. *Multivariate data analysis. 7*[th] *edition. New Jersey: Pearson Prentice Hall.*

Hamlin Fistula[Hamlin].2015. *Fistula. [online]. Http://Www.Hamlinfistula.Org/What-Is-A-Fistula/Fast-Facts-And-Faqs. Ethiopia: Hamlin Fistula. [Accessed April 8, 2016].*

Hasson, F & Keeney, S. 2011. *Enhancing Rigor in the Delphi Technique Research. Technological Forecasting & Social Change; 78 (2011):1695-1704.*

Hooper, D, Coughlan, J & Mullen, MR.2008. "*Structural Equation Modelling: Guidelines for Determining Model Fit." The Electronic Journal of Business Research Methods;6(1):53-60*

Ibadin, PO. 2015. *Re-ordering Structural Dimensions for Nigerian Organizations. Available on. www.ajol.info/journals. [Accessed May 20, 2017].*

Jill, J. 2011.*Doing Your Literature Review: Traditional and Systematic Techniques. Los Angeles,Ca: SAGE.*

Kalembo F, Zgambo M. 2012.*Obstetric Fistula: A Hidden Public Health Problem In sub-Saharan Africa.ArtsSoc.Sci.J;41.Available:http://astonjournals.com/manuscripts. [Accessed December 8, 2016]*

Kandala, NB, Nwakeze, N & Kandala, SNII. 2009. *Spatial Distribution Of Female Genital Mutilation In Nigeria. Am. J. Trop. Med. Hyg; 81:784–792.*

Karanja, E, Zaveri, J & Ahmed, A. 2013. *How Do Mis Researchers Handle Missing Data in Survey-Based Research: A Content Analysis Approach. International Journal of Information Management; 33(5):734-751.*

Kathleen, EC & Murowchick, E. 2014. "*Do Literature Review Skills Transfer From One Course to Another?" Psychology Learning And Teaching; 13: 3-11.*

Katja, W, Ylva, K, Matthias, Z & Alexander, K.2015. *Latent Change Score Modelling as a Method for Analysing the Antidepressant Effect of a Psychosocial Intervention in Alzheimer's Disease. Psychother Psychosom; 84:159–166*

Kayondo, M, Wasswa, S, Kabakyenga, J, Mukiibi, N, Senkungu, J, Stenson, A & Mukasa, P. 2011. *Predictors and Outcome of Surgical Repair of Obstetric Fistula at A Regional Referral Hospital, Mbarara, Western Uganda. BMC Urol;11: 23-31*

Kimani, ZM, Ogutu, O & Anthony, K.2014. *The Prevalence And Impact Of Obstetric Fistula On Women Of Kaptembwa –Nakuru, Kenya. International Journal Of Applied Science And Technology; 4(3):273-87.*

Kinser, PA & Lyon, DE. 2014. *A Conceptual Framework Of Stress Vulnerability, Depression, and Health Outcomes in Women: Potential Uses in Research on Complementary Therapies For Depression. Brain Behav; 4:665-74.*

Klaus, K, Pham, H & Pham, T. 2012. E*pidemiology: Key To Prevention statistics for Biology and Health, Doi 10.1007/978-1-4614-1205-2.*

Kline, R. 2011. *Principles and Practice of Structural Equation Modelling.3rd edition. New York, The Guilford Press.*

Kroenke, KL, Spitzer, R, Williams J & Dsw, BLW. 2001. *Validity Of Abrife Depression Severity Measure. J Jen Inter Med;16:606-13.*

Kuhn, T. 2011. *The Stanford Encyclopedia of Philosophy. Available on Website: Http://Plato.Stanford.Ed/Archives/. [Accessed September 9, 2016].*

Kuo, SY, Chen, SR & Tzeng, YL. 2014. *Depression and Anxiety Trajectories Among Women Who Undergo An Elective Cesarean Section. Plos One; 9.*

Lacobucci, D. 2010. *Structural Equations Modelling: Fit indices, Sample Size, and Advanced Topics.Journal Of Consumer Psychology 20.90-98*

Landis, JR & Koch, GG. 1977. T*he Measurement of Observer Agreement for Categorical Data. Biometrics; 33:159-174.*

Landrya, E, Vera, F, Ruminjo, J, Asiimw, F, Thiernoh, B, Bello, A, Danladi, D, Ganda, S, Idris, SA, Inoussa, M, Kanomah, B, Lynch, M, Mussell, F, Podderl, DC, Wali, A, Mielke, E &Baronea, MA. 2013. P*rofiles and experiences of women undergoing genital fistula repair: Findings from five countries. Global Public Health, 8 926-942.*

Leddy, S & Pepper, J M. 1998. *Conceptual Bases of Professional Nursing.* 4th edition. Philadelphia: Lippincott.

Lazarus, R & Folkman, S. 1984. *Stress, Appraisal and Coping. Springer Publishing Company; New York, NY.*

Lowe, B, Decker, O, Muller, S, Brahler, E, Schellberg, D, Herzog, W & Herzberg, PY. 2008. *Validation and Standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the General Population. Med Care; 46: 266-74.*

Luse, A, Mennecke, B & Townsend, A. 2012. *Selecting a Research Topic: A Framework for Doctoral Students. International Journal Of Doctoral Studies; 7: 143-152.*

Lysaght, Z.2011.E*pistemological and Paradigmatic Ecumenism In "Pasteur's Quadrant:" Tales from Doctoral Research.Official Conference Proceedings of the Third Asian ConferenceOn Education In Osaka, Japan. IntroductionToSpss: Available at: Https://Www.Researchgate.Net/Publication/26215189.[Accessed January 4, 2017]*

Maheu-Giroux, M, Filippi, V, Samadoulougou, S, Castro, MC, Maulet, N, Meda, N & Kirakoya-Samadoulougou, F. 2015. *Prevalence of Symptoms of Vaginal Fistula In 19 sub-Saharan Africa Countries: A Meta-Analysis of National Household Survey Data. The Lancet Global Health; 3: 271-278.*

Mary, SFI, Richard, MM, Berthold, K, Kathy, K, Andy, N & Lucas, A. 2013. *How Much Loss To Follow-Up Is Acceptable In Long-Term Randomised Trials And Prospective Studies? Arch Dis Child June 93 (6)*

Maulet, N, Keita, M & Macq J. 2013. *Medico-Social Pathways of Obstetric Fistula Women in Mali and Niger: An 18-Month Cohort Follow-Up. Tropical Medicine and International Health; 18:524–533*

Megabiaw, B, Awoke, T, Adefris, M, Azale, T & Awoke, A. 2013. *Depression Among Women With Obstetric Fistula, and Pelvic Organ Prolapse In Northwest Ethiopia. BMC Psychiatry; 13:236-41*

Meleis, AI. 2007. *Theoretical nursing: development and progress. 4*[th] *edition. Philadelphia: JB Lippincott.*

Meyer, R & O'Brien-Pallas, L. 2010. *Nursing Service Delivery Theory: An Open System Approach. Journal of Advanced Nursing; 66:2828-2838.*

Mohameda, HC, Amirb, K & Ng'ang, T. 2016. *Psychosocial Effects of Obstetric Fistula on Young Mothers in Western Kenya. International Journal of Sciences: Basic and Applied Research (Ijsbar); 26: 395-404.*

Mohr, S, Brandner, S, Mueller, MD, Dreher, EF & Kuhn, A. 2014. *Sexual Function After Vaginal and Abdominal Fistula Repair. American Journal Of Obstetrics & Gynecology; 211:741-6.*

Mossie, A, Kindu, D & Negash, A. 2016. *Prevalence and Severity of Depression and Its Association With Substance Use In Jimma Town, Southwest Ethiopia. Hindawi Publishing Corporation: Depress Res Treat;1-7*

Moule, P & Goodman, M. 2014. *Nursing Research: An Introduction, London, Oliver's Yard City Road*

Mselle, L, Moland, K, Evjen-Olsen, B, Mvungi, A & Kohi, T. 2011. *"I Am Nothing": Experiences Of Loss Among Women Suffering From Severe Birth Injuries In Tanzania. BMC Women's Health 11.*

Mueller, R & Hancock, G. 2013. *Structural Equation Modeling: A Second Course (Quantitative Methods In Education and The Behavioural Sciences), USA, Information Age Publishing Agency.*

Mugera, MW.2013. *Research Methods: Non-Probability Sampling Techniques: University of Nairobi.*

Nagin, Ds & Odgers Cl. 2010. *Group-Based Trajectory Modelling In Clinical research. Annu Rev Clin Psychol; 6: 109–138.*

National Bank of Ethiopia [NBE]. 2010. *National Bank of Ethiopia 2010/11 annual report. National Bank. Ethiopia. Addis Ababa*

National Ethics Advisory Committee [NEAC].2012. E*thical Guidelines for Observational Studies: Observational Research, Audits, and Related Activities.Revised Edition. Wellington: Ministry Of Health, New Zealand.*

Neuman, W. 2011.*Social Research Methods: Qualitative and Quantitative Approaches.7th Edition. Boston: Pearson.*

Nielsen, H, Lindberg, L, Nygaard, U, Aytenfisu, H, Johnston, O, Sørensen, B & Duffy, S.2009. *A Community-Based Long-Term Follow Up Of Women Undergoing Obstetric Fistula Repair In Rural Ethiopia. Bjog: An International Journal Of Obstetrics & Gynaecology;116:1258-1264.*

Nigeria Federal Ministry of Health [NFMOH]:2012.*National strategic framework for the elimination   of obstetric fistula in Nigeria 2011-15. Ministry of Health; Nigeria*

Onsrud, M, Sjoveian, S & MukwegeD.2011. *Cesarean Delivery-Related Fistulae In The Democratic Republic of Congo. International Journal of Gynaecology and Obstetrics;114:10-14.*

Onwuegbuzie, JA & Frels, R. 2016. Seven Steps To A *Comprehensive* Literature Review: A Multimodal And Cultural Approach, Los Angeles, Ca: SAGE.

Osotimehin, B. 2014. *Obstetric Fistula: Ending The Health and Human Rights Tragedy. The Lancet; 381:1702-1703.*

Pathfinder International. 2014. *Strengthening the Continuum of Care for Fistula Prevention and Repair In Ethiopia. Available at: http://Www.Pathfinder.Org/Publications/Strengthening-The-Continuum-Of care.[Accessed October 25, 2017]*

Podsakoff, PM, Mackenzie, SB & Podsakoff, NP. 2012. *Sources of Method Bias In Social Science Research And Recommendations On How To Control It. Annual Review of Psychology;63(1): 539-569.*

Polit, D & Beck, C. 2012. *Nursing Research: Generating And Assessing Evidence For Nursing Practice. 9th edition. Philadelphia: Jb Lippincott.*

Pope, R, Bangser, M & Harris, RJ. 2011. *Restoring Dignity: Social Reintegration After Obstetric Fistula Repair In Ukerewe, Tanzania. Global Public Health:1-15.*

Porter, S, Millar, C & Reid, J. 2012. *Cancer Cachexia Care. Cancer Nursing; 35(6):30-38.*

Raassen, TJIP, Carrie, J, Ngongo & Mahendeka, MM. 2014. I*atrogenic Genitourinary Fistula: An 18-Year Retrospective Review Of 805 Injuries. Int Urogynecol J; 25:1699-1706.*

Rahm, G, Renck, B & Ringsberg, KC. 2013. *Psychological Distress Among Women Who Were Sexually Abused As Children. International Journal Of Social Welfare; 22:269-278.*

Rajasekar, S, Philominathan, P & Chinnathambi, V. 2013. *Research Methodology. Page 1-53. Available At: www. Arxiv: Physics/0601009. [Accessed February 27, 2017]*

Ravitz, AD, Sapirstein, A, Pharm, JC & Doyle, PA. 2013. *Systems Approach and Systems Engineering Applied to Health Care: Improving Patient Safety and health care delivery. Johns Hopkins APL Technical Digest, 30(4):354-365.*

Rees, C. 2011.*Introduction To Research For Midwives.3rd Edition. Churchill Livingstone: Elsevier Limited.*

Riessman. 2007. *Thematic Analysis: Chapter 3: page 53-75. SAGE Publications Inc*

Roka, ZG, Akech, M, Wanzala, P, Omolo, J, Gitta, S & Waiswa, P. 2013. *Factors Associated With Obstetric Fistulae Occurrence Among Women Attending Selected Hospitals In Kenya, 2010: Bmc Pregnancy and Childbirth;13:56-63*

Roni, SM. 2014*. Partial least square in a nutshell. Edith Cowan University Available on https://www.researchgate.net/publication.[Accessed October 13, 2017]*

Roush, K, Kurth, A, Hutchinson, MK & Van Devanter, N. 2012. *Obstetric Fistula: What About Gender Power? Health Care Women Int;33:787-98.*

Rowe, G & Wright, G. 2011. *The Delphi Technique: Past, Present and Future Prospects-Introduction to The Special Issue. Technological Forecasting & Social Change;78:1487-1490.*

Rubin, ABE. 2011.*Essential Research Methods For Social Worker,* USA, Brooks/Cole,

Sanat, KS, Yiyong, Fu & Weng, G. 2016. *Improving Holm's Procedure Using Pairwise Dependencies, Biometrika;103 (1): 237-243.*

Schumacker, R & Lomax, R. 2010. *A Beginner's Guide To Structural Equation Modeling. 3rd Edition. New York, London: Taylor &Francis Group, Llc.*

Siddle, K, Mwambingu, S, Malinga, T & Fiander, A. 2013. *Psychosocial Impact Of Obstetric Fistula In Women Presenting For Surgical Care In Tanzania. Int Urogynecol J;24:1215-20.*

Sideridis, G, Simos, PS, Papanicolaou, A, & Fletcher, J. 2014. *Using Structural Equation Modeling to Assess Functional Connectivity in the Brain: Power and Sample Size Considerations. Educ Psychol Meas;74:733-758.*

Smeltzer, SC, Bare, BG, Hinkle, JL, & Cheever, KH. 2010. *Brunner and Suddarth's Textbook of Medical-Surgical Nursing. 12th edition. Philadelphia: Lippincott Williams & Wilkins.*

Spitzer, RL, Kroenke, K, Williams, JBW & Lo¨We, B. 2006. *A Brief Measure for Assessing Generalized Anxiety Disorder. Arch Intern Med;166.*

Stephen, E. 2012. *Principles of Research Methodology. AGuide for Clinical Investigators. Springer New York Heidelberg Dordrecht London.*

Stevens BJ. 1994. *Nursing theory: Analysis, Application, and Evaluation. 4th edition.* Glenview: Scott, Foreman, and Company

Tayler-Smith, Katiezachariah, Rony, M, Marcel, VB, Wilma, V, An-Bishinga, Aristide DP, Eva, L, Vincent, C, Bavo, S, Gamaliel, T, Miguel, G, Stephan, R, Tony, H & Anthony. 2013. *Obstetric Fistula in Burundi: A Comprehensive Approach To Managing Women With This Neglected Disease. BMC Pregnancy And Childbirth;13:164.*

Tebeu PM, Fomulu, JN, Khaddaj, S, Bernis, LD, Delvaux, T & Rochat CH. 2012. *Risk Factors For Obstetric Fistula: A Clinical Review. Int Urogynecol J; 23:387-394.*

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists. 2014. *Standards of Maternity Care in Australia and New Zealand. Ranzcog Publications: East Melbourne.*

Tshabalala, J & Visser, M. 2011. *Developing A Cognitive Behavioural Therapy Model To Assist Women To Deal With Hiv And Stigma South African Journal Of Psychology; 41:17-28.*

Tunçalp, Ö, Tripathi, V & Ahmed, S. 2015. M*easuring The Incidence And Prevalence Of Obstetric Fistula: Approaches, Needs And Recommendations. Bull World Health Organ; 93:60-62.*

Twisk, JWR. 2003. *Applied Longitudinal Data Analysis For Epidemiology: Practical Guide, Cambridge University Press*

Ullman, J. 2006. S*tructural Equation Modelling: Reviewing The Basics And Moving Forward. Journal Of Personality Assessment; 87(1):35-50.*

UNDP. 2015. *Briefing Note For Countries On The 2015 Human Development Report Ethiopia. Addis Ababa*

UNICEF.2014.[online]. *Available At: Https://Www.Unicef.Org/Ethiopia/About_12886.[Accessed November 8, 2016*

University of Guelph. 2013. Writing a Literature Review. *Available At: Www.Learningcommons.Uoguelph.Ca. [Accessed March 7, 2016].*

University of South Africa[UNISA]. 2015. *Department of Health Studies; Genera tutorial letter for proposal, dissertation and thesis writing. Tutorial letter 301/0/2015. Pretoria.*

University of South California[USC]. 2013. *Organising Your Social Sciences Research Paper. Library Guides.[Online]. Available At: Http://Libguides.Usc.Edu/Writingguide. Accessed July 7, 2016].*

University of Wisconsin.2013. *Definition of General: Literature Review. www.wisc.edu/writing/Handbook/ReviewofLiterature.[Accessed March 7, 2016].*

University Putra Malaysia [UPM]. 2013. *Guideline for research involving Human subjects: Ethical committee for research involving Human subject. Research Management center, UPM printing press*

Van-Belle, G, Fisher, L & Heagerty, PjEA. 2004. *Biostatistics: A Methodology For The Health Sciences.Longitudinal Data Analysis.New York, NY: John Wiley And Sons.*

Van't Hof, E, Cuijpers, P, Waheed, W & Stein, Dj. 2011.*Psychological Treatments For Depression And Anxiety Disorders In Low- And Middle-Income Countries: A Meta-Analysis. Afr J Psychiatry;14:200-207*

Walker, LO & Avant, KC. 2011. *Strategies for Theory Construction in Nursing. 5th edition. Norfolk: Appleton-Century-Crofts*

Wang, J & Wang, X. 2012. *Structural Equation Modelling. 1st edition. John Wiley & Sons, Ltd.*

Watt, MH, Wilson, SM, Sikkema, KJ, Velloza, M, Mosha, J, Masenga, GG, Margaret, B, Andrew B & Nyindoc, PM. 2015. *Development of an Intervention to Improve Mental Health For Obstetric Fistula Women In Tanzania. Eval Program Plann;50:1-9.*

Weinstein, O'Brien, B, John H, Jackson, J, Johannesson, M, Mccab, C & Luce, BR. 2003. *Principles of Good Practice For Decision Analytic Modeling In Health Care Evaluation: Report Of The Ispor Task Force On Good Research Practices Modeling Studies.*

Wertz, FJ. 2011. T*he Qualitative Revolution and Psychology Science, Politics, and Ethics. The Humanistic Psychologist;39:77–104.*

Weston, K, Mutiso, S, Mwangi, JW, Qureshi, Z, Beard, J & Venkat, P. 2011. *Depression among women with obstetric fistula in Kenya. Int J Gynaecol Obstet, 115(1):31-3.*

Wilson, SM, Masenga, GG, Sikkema, KJ, Watt, MH & Mosha, MV. 2016. *Psychological Symptoms And Social Functioning Following Repair Of Obstetric Fistula In A Low-Income Setting. Matern Child Health J; 20: 941-945.*

Wilson, SM, Sikkema, KJ, Watt, MH & Masenga, GG. 2015. *Psychological Symptoms Among Obstetric Fistula Women Compared To Gynecology Outpatients In Tanzania. Int J Behav Med; 22:605-13.*

Wolf, EJ, Harrington, KM, Clark, SL & Miller, MW. 2013. *Sample Size Requirements For Structural Equation Models: An Evaluation Of Power, Bias, And Solution Propriety. Educ Psychol Meas; 76(6): 913–934.*

World Health Organization [WHO]. 2005a. Mental health: facing the challenges, building solutions. Report from the WHO European Ministerial Conference. WHO Regional Office for Europe: Copenhagen, Denmark

World Health Organization [WHO]. 2005b. *Promoting Mental Health Concepts, Emerging Evidence, Practice.*

World Health Organization [WHO]. 2006. O*bstetric fistula: Guiding principles of clinical management and programme development. WHO; Geneva: 2006.*

World Health Organization [WHO]. 2012. *A Systems Approach to Improving Maternal Health In The Philippines. Bulletin of The World Health Organisation; 104-110.*

World Health Organization [WHO]. 2014. *WorldHealthOrganization:10Facts On ObstetricFistula:Availeble on: Www.Who.Int/Features/Factfiles/Obstetric_Fistula/Facts/En/Index. [Accessed May10, 2016].*

Wright, J, Ayenachew, F & Karen, BD. 2016. *The Changing Face of Obstetric Fistula Surgery In Ethiopia. International Journal Of Women's Health; 8:243–248.*

Yang, S-N, Shen, L-J, Ping T, Wang, Y-C & Chien, C-W. 2011. *The Delivery Mode And Seasonal Variation Are Associated With The Development Of Postpartum Depression.J Affect Disord; 132:158-164.*

Yeakey, MP, Chipeta, E, Rijken, Y, Taulo, F & Tsui, AO. 2011. *Experiences With Fistula Repair Surgery Among Women And Families In Malawi. Glob Public Health 6: 153-67.*

Yousuf, M. 2007. *Using Expert Opinions Through Delphi Technique. Practical Assessment, Research and Evaluation;12(4).*

ANNEXES

Annex A: operationalisation of the model

The proposed guidelines for operationalising the model are aimed at making it achieve two intermediate objectives:

- To enhance mental health need of women with obstetric fistula access to holistic care. Holistic care means addressing the physical, psychosocial/psychological, spiritual, and material and other care needs of women with obstetric fistula.
- To increase demand for, and utilization of obstetric fistula services through strengthened health facility systems. Uptake and utilization of integrated obstetric fistula surgical repair, treatment and care services are critical in enhancing mental health outcome of women with obstetric fistula.

The integrated treatment model (intervention) by program experts is in two phases: the initial phase and the intervention phase.

➢ **Initial phase**

This phase constitutes a diagnosis of the gaps and the needs are addressed in the treatment (intervention) phase. It involves assessment of the factors underlying deficiencies in implementing integrated mental health treatment of women obstetric fistula. A critical assessment of provider and therapist and also beneficiaries' perceptions and capabilities to meet mental health needs of women with obstetric fistula are critical for developing an effective model of intervention. Also at this stage, program experts determine strengthens and weaknesses of integrated services.

➢ **Intervention phase**

During this phase, program experts develop and implement strategies for addressing the gaps identified in the initial phase. The integrated mental health treatment model initial curriculum development is will built upon the techniques of CBT and the current and previous research activities on psychological distress among women with obstetric fistula.

To accommodate the clinical flow, the research team decided that the treatment model should be contained six grouped therapy sessions. The therapy session content was adopted based on theories of cognitive behavioural therapy (Beck 2011:59), coping models (Lazarus & Folkman 1984:185-6), mental health structural model (WHO 2005b:48) and mental health intervention model (Watt, Wilson, sikkema et al 2105:8). The first two therapy sessions intended for delivery before the women surgery and the remaining four therapy sessions were intended to take place after surgery.

The therapy session combined the components of CBT, including relaxation training, identifying thoughts and emotions, cognitive restructuring/reforming, and identify stressors and effective coping strategies (Beck 2011:127-155; Watt et al 2105:6-7). This study finding argues that when the six therapy sessions (sets of intervention) are presented or implemented in combination, they are expected to result in the desired outcomes. The model is premised on delivering different therapeutic techniques, such as medical education, role-play, homework, and validation was used to reinforce concepts and facilitate the greatest and broadest impact of the obstetric fistula mental health outcome. The sets of intervention aim to achieve two intermediate objectives, which lead to achieving one main objective: enhance mental health need of women with obstetric fistula. Each therapy session element will be described separately.

Session one: Recounting the fistula story
The focus of this session is to normalize the woman's experience by acknowledging the negative and positive impacts of the fistula experience in relation with others, to begin an exploration of how the women's experience of obstetric fistula impacts her feelings and thoughts about herself. List and discuss common negative and positive impacts that fistula women often experience such as loss of a child, social and family relationship. The trained Therapist will spend the majority of the time hearing the woman's story of how she developed the fistula and all the ways that it has impacted her life. In the course of the women telling her story, the Therapist helps the women to acknowledge the effects that the fistula has had on her thoughts and emotions. Behavioral change is emphasised in this session through generating and recording goals for therapy. Before concluding the session, the Therapist

leads the women through a deep breathing and relaxation exercise to reduce muscle tension and decreased distress and inform to the patient to practice this exercise daily before the next session.

Session 2: Creating a new story about obstetric fistula

Before starting this session, practice the relaxation exercise and review any assignment from the previous session. The main aim of this session is to *promote cognitive reframing* of the fistula experience through medical education. The Therapist educates the women using drawn handouts of the reproductive system and discusses common myths of fistula. Education involves opportunities for the women to ask questions, as well as reverse role play in which the women explains to the Therapist how a fistula develops. Following this reframing, the Therapist provides education to the women about her upcoming fistula repair surgery. The woman is asked to disclose her hopes, anxieties and /or question about treatment. The assigned practice exercise includes the daily relaxation exercise, as well as an assignment to ask a health care provider at least one question (about the prospects of her surgery), which she identified together with the Therapist. This activity is intended to build self-efficacy to engage with providers and increase health literacy and was incorporated because health care workers reported that women felt very shy to ask questions to providers.

Session3: Identifying thoughts and emotions

This session is delivered three or four days after the woman's surgery, or as soon as she is pain-free while sitting. Introduce about the cognitive model to the women and teach her how to reframe negative or unhelpful thoughts. Using the emotion wheel, the woman identifies situations in which she has felt each emotion (e.g., shame in relation to leaking, pride in reaching the hospital). The objective of this exercise is to introduce the women to the process of identifying and discussing her emotions. After discussing emotions, the Therapist defines and discusses thoughts. The Therapist asks the women to endorse which of a list of negative and positive thoughts she has had (e.g., "I am worthless" or "This problem is not my fault" or "I am a bad person and deserve to die").

The Therapist chooses one negative thought and works with the women to reframe the negative thought into more helpful, positive, and accurate thoughts. At the end of the sessions, the Therapist introduces the "Serenity Prayer" and relates it to the woman's experience. This prayer was chosen because it reinforces the concepts of managing thoughts and emotions, and begins to introduce the idea of coping. The woman's homework for this session is to practice reframing another one of her endorsed negative thoughts and to practice deep breathing daily.

Session 4: Social relationships

The main objective of this session is to examine the effect of social relationships on the woman's life and to generate specific strategies to strengthen social relationships. The Therapist defines social support and guides the women in identifying primary sources of social support (family, friends, and health care providers). The Therapist and patient categorize types of support (e.g., emotional, financial, practical). They also discuss with whom the women has talked about her fistula and the pros and cons of talking about her fistula with others. The Therapist and women role-play potential discussions about fistula that she might have with people in her life, referring back to the medical education about fistula she has previously received. The Therapist then facilitates a telephone call between the women and a chosen social support person, intended to facilitate social support and practical plans for returning home after repair. Because women with obstetric fistula typically come to the hospital independently, telephone communication is the most appropriate way to engage a support person, if there is no one available for the women to speak with, and then the Therapist and women spend time continuing to discuss opportunities and challenges around social support.

Session 5: Uncertainty about the future

The main objective of this session is to help the women recognize and respond to stressors in her life and to utilize appropriate and effective life and coping skills. The women are taught stress management and alternative coping skills. They are tasked to set future goals, beginning with creating a list of life stressors, and then categorizing each stressor as changeable and unchangeable. The therapist teaches the women to address the issues they

are facing in changing their lifestyle and discusses how coping behaviors can be helpful. They will discuss successes and setbacks and they will practice new skills through cognitive practice to deal with setbacks. The therapist helps to consolidate gains and assists the respondents in employing coping skills

Session 6:   Planning for the future-Realism and hope

The main objective of this session is to prepare the women for her return home, which maximizes the likelihood of a positive reintegration experience. This session begins with the women discussing her thoughts and emotions about going home. The Therapist discusses these thoughts and feelings and helps to with developing problem-solving strategies to deal with various circumstances and to cope with potential stressors. The information discussed is then used to make a detailed step-by-step action plan for the woman's first two weeks home after discharge. The Therapist then assists the women to conduct a second phone call with her social support person, where she has the opportunity to share some of her reintegration plans and solidify support. The therapist educates the women about life-skills; and builds their capacity on how to generate income, especially focusing on vulnerable women with no social support. Before concluding the final session, the Therapist provides a summary of post-surgery medical recommendations (e.g., three months of sexual abstinence, no heavy work, and family planning (contraception for at least one year). The women also have an opportunity to ask any additional questions about her fistula, surgery, or health. The Therapist provides realistic information about the possibility of further leaking that might occur due to either an unsuccessful repair or residual stress incontinence, and when it is appropriate to seek further treatment. The session concludes by reviewing the woman's goals for therapy, discussing her progress in reaching the goal, and making a plan to help her continue working on her goals in the future. The Therapist then congratulates the woman on her completion of the treatment and wishes her well in her reintegration back to her community and home.

Annexure B: Translation process


```
┌──────────────────────────────────────────┐
│   English version of the questionnaire    │←───────────┐
└──────────────────────────────────────────┘            │
        │                      │                          │
        ▼                      ▼                          │
┌───────────────────┐   ┌───────────────────┐            │
│ Amharic translator 1│  │ Amharic translator 2│          │
└───────────────────┘   └───────────────────┘            │
        │                      │                          │
        ▼                      ▼                          │
┌─────────────────┐     ┌─────────────────┐              │
│ Amharic version 1│     │ Amharic Version 2│             │
└─────────────────┘     └─────────────────┘              │
             │           │                                │
             ▼           ▼                                │
       ┌──────────────────────────┐                       │
       │ Discussion b/n translators│                      │
       └──────────────────────────┘                       │
                   │                                       │
                   ▼                                       │
    ┌──────────────────────────────────────┐              │
    │ Amharic version of the questionnaire  │             │
    └──────────────────────────────────────┘              │
          │                    │                           │
          ▼                    ▼                           │
┌───────────────────┐   ┌───────────────────┐             │
│ English Translator 1│  │ English Translator 2│           │
└───────────────────┘   └───────────────────┘             │
          │                    │                           │
          ▼                    ▼                           │
┌─────────────────┐     ┌─────────────────┐               │
│ English version 1│     │ English version 2│              │
└─────────────────┘     └─────────────────┘               │
          │                    │                           │
          ▼                    ▼                           │
┌──────────────────────────────────────────────┐          │
│ Harmonisation of Vocabulary Discussion b/n     │          │
│ translators                                    │          │
└──────────────────────────────────────────────┘          │
                   │                                       │
                   ▼                                       │
┌──────────────────────────────────────────────────────┐  │
│ Back translated in to English version of the          │──┘
│ questionnaire                                          │
└──────────────────────────────────────────────────────┘
```

Annex C: Respondent information sheet

Title: **Modelling the effects of surgical obstetric fistula repairs on the severity of depression and anxiety among women with obstetric fistula in Ethiopia**

Dear respondents,

My name is Bekele Belayihun Tefera with a student number: 58551417; undertaking a research on the topic: Modelling the effects of surgical obstetric fistula repairs on the severity of depression and anxiety among women with obstetric fistula in Ethiopia, which is being carried out under the supervision of Professor AH Mavhandu-Mudzusi from the University of South Africa, Department of Health Studies. The project is part of my study towards achieving a Doctor of Literature and Philosophy in Health Studies and therefore, we are inviting you to participate in a study Modelling the effects of surgical obstetric fistula repairs on the severity of depression and anxiety among women with obstetric fistula in Ethiopia. Kindly, it is important for you to understand why the research is being done and what it will involve before you decide whether to take part

WHAT IS THE PURPOSE OF THE STUDY?

The purpose of this study is to dig deeper into the obstetric fistula injury and assess the effect of surgical obstetric fistula repairs after and before surgical treatment faced by the sufferer and find out a form of knowledge that can be used in the efforts against the problem. The aims of this study are expected to collect important information that could be determined the magnitude of depression and anxiety, measure the effect of following fistula repaired surgery on the severity of depression and anxiety, examine the linear effect of leaking severity on the severity of depression and anxiety after treatment, and determine associated risk factors. We hope to gain insight into what it means to have a mental illness, how treatment providers are treated fistula women with affective disorder, what kind of treatment fistula women with the affective disorder may receive, and any other ideas that you may have.

WHY AM I BEING INVITED TO PARTICIPATE?

We invite you to take part in this research study, because, you are a woman with obstetric fistula, newly admitted in Fistula Hospital, with a physician diagnosis of fistula, will follow fistula surgical repair and you are above 18 years old ages. The expected sampled number of respondents will be 410 women's with obstetric fistula.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

The study will use structured questionnaires that will be containing some socio-demographic characteristics, gynaecological information, psychological distressed assessment questions, cure perception opinion, and behavioural change after treatment. This study will be consisting of one interview lasting up to 30 minutes and will be conducted in a comfortable and private area. Data collectors will be recording your response, and notes will be taken by the data collectors to make sure the information is correct.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

They would be respondents to be participating in this study is volunteers and that there is no penalty or loss of benefit for not participating. The research data collectors will stress that participation in the study is voluntary, that respondents will be permitted to withdraw consent and leave the study at any time without incurring any negative effect on their care. Potential respondents will also be told that they are free to take breaks and/or terminate the consent process; you are under no obligation to consent to participation. If at any time the potential respondent is not interested in the study, the research data collectors will thank them for taking the time to hear about the study. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

Study respondents can gain mental health information about themselves; however, they may not see any direct benefits to participating in this study. From a broader social perspective, the current study will have broad implications for the understanding of the magnitude and risk factors of affective disorder of women with fistula. It will be important to know the effect of following fistula repair surgery on the affective disorder. Knowing woman's information before and after treatment will help to identify an individual care plan that includes mental health counselling, pastoral service, transfer their knowledge to other untreated women in their community.

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE

Since the proposed study is observational, we foresee the minimal risk of harm to respondents. Three possible areas of risk are:

1. The primary risk to participate is related to breach of confidentiality. In order to minimize the risk of breach of confidentiality, all study contacts will take place in a private room, stored data be protected, respondents will be assigned a unique study ID, respondents' names will not be used in recorded interviews, and all forms will be kept in locked cabinets; all transcriptions will be anonymous, and with only a study ID number used; Electronic versions of the transcriptions will be password protected and stored on a secure network: a master list of respondent names and their study IDs will be stored in a locked file cabinet separate from the rest of the data.

2. Study procedures may also be associated with interview fatigue or personal discomfort in the event that sensitive questions are asked and as you may become tired during the interview, which could last up to 30 minutes. To minimize the risk of interview fatigue, respondents will be informed that they can take a break or stop at any time. To minimize the risk of personal discomfort, the research data collectors will be intensively trained and will inform respondents beforehand about the nature of the questions and assure the privacy of respondents. Respondents will be informed that they have the right to decline participation in the study, to refuse to answer any questions or to withdraw consent at any time without retribution from research personnel or adverse consequences.

3. We understand that respondent's minimal risk will be giving up their time when they participate in the interview.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

All information will be kept strictly confidential. We will ensure confidentiality, privacy and anonymity in the collection, storage and publication of research material by taking the following precautions: all names will be replaced with numbers to represent the respondents; any other party involved in handling the data will have to sign a confidentiality agreement and no personal details will be recorded so as to protect your privacy. The researcher will be submitting a report of the study for publication or conference proceeding, but individual respondents will not be identified in such a report. Only researcher and his supervisor will

have access your answer, which will be destroyed upon completion of the study. Your answers may be reviewed by people responsible for making sure that research is done properly, including the transcriber, external coder, and members of the Research Ethics Review Committee. Otherwise, records that identify you will be available only to people working on the study unless you give permission for other people to see the records. While every effort will be made by the researcher to ensure that you will not be connected to the information that you share during interviews, I cannot guarantee that you will talk or share your information to your colleagues after their interviews. For this reason, all respondents will be advised to not share or talk about any information after their interviews.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked file cabinet after the publication of the final journal article that uses this data in UNISA country sites for future research or academic purposes; Electronic versions of the transcriptions will be password protected and stored on a secure network. All USB flash drives and computers will be password protected; future use of the stored data will be subjected to further research ethics review and approval if applicable and hard copies of your answer will be destroyed permanently after five years.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

Potential respondents will not be given any incentives (compensation) to participate in this study, however, your participation will be a valuable addition to our research and findings could lead to a greater public understanding of affective disorder of women with fistula.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has received written approval from the Research Ethics Review Committee of the health studies higher degree committees, UNISA, and the copy of the approval letter can be obtained by the researcher if you so wish.

HOW WILL I BE INFORMED OF THE /RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact Mr. Bekele Belayihun Tefera on cell phone: +251-912055980 or email address bekalubel@gmail.com.

The findings are accessible after 2018. Should you require any further information or want to contact the researcher about any aspect of this study, please contact by cell phone: +251-0912055980 or email address: bekalubel@gmail.com. Should you have concerns about the way in which the research has been conducted, you may contact AH Mavhandu-Mudzusi (Prof) Cell phone: +278260494, email address: mmudza@unisa.ac.za

Thank you for taking time to understand this information sheet and for participating in this study.

Thank you.

Bekele Belayihun Tefera

Annex D: Questionnaire English version

CONSENT TO PARTICIPATE IN THIS STUDY

Title of the study **"Modelling the effects of surgical obstetric fistula repairs on the severity of depression and anxiety among women with obstetric fistula in Ethiopia "**

I, _____ (respondent name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

- I have read /had explained to me and understood the information presented in the information sheet about a study
- I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.
- I understand that my participation is voluntary and that I am free to withdraw at any time without penalty.
- I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential, with the understanding that the quotations will be anonymous.
- I agree with the recording of the semi-structured questioners will administer using face to face interviews.
- I agree to the use of anonymous quotations in any thesis or publication that comes from this research.
- With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.
- I have received a signed copy of the informed consent agreement.

Réspondent Name & Surname (please print)……………………………………………
Respondent Signature…………………………………………..Date…………………

Researcher's Name & Surname   Bekele Belayihun Tefera

Researcher's signature   Date…………………

Section 1:	IDENTIFICATION QUESTIONNAIRE	
Q101	a. Region name _____	b. Region code [_____]
Q102	a. Zone name _____	b. Zone code [__	__]
Q103	a. Woreda name _____	b. Woreda code [__	__	__]
Q104	a. Kebele name _____	b. Kebele code [__	__	__]
Q106	a.Facility name _____	b. Facility code: [__	__	__]
Q107	RESPONDENT ID NO:[__	__	__] [__	__]	
CONSENT HAS BEEN READ AND OBTAINED	1= Yes 2=No **If No, End**	
INTERVIEWER		
INTERVIEWER'S NAME_____ID----------Signature _____		
Date of completion of the Instrument	[__	__][__	__][__	__	__] dd mm yyyy	
Supervisor's name:_____	Signature:_____	

172

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
Section 2: BACKGROUND CHARACTERISTICS OF WOMAN
All questions should have ONLY ONE ANSWER unless the instructions say otherwise.
201	How old were you on your last birthday?	Age in years [___|___]	
202	Did you ever attend formal school	1=Yes　　　　2=No	2　→204
203	What is the highest grade you completed with?	Grade [___|___] 13=Technical/vocational certificate 14=University/college diploma 15=University/college degree or higher	
204	Able to read? (Circle one)	1= Yes 2=No	
205	Able to write? (Circle one)	1=Yes　2=No	
206	Place of residency	1=Urban　2=Rural	
207	What is your place of origin	1=Amhara　2=Oromo 3=Tigre 4= Sidama　88=others (Specify)-------	
208	What is your religion?	1=Orthodox Christian 2=Muslim 3=Protestant 4=Catholic 88=others(Specify)----------	
209	Did you involve yourself with any types of work before developing obstetric fistula problem?	1= Yes 2=No	
210	Currently, do you involve yourself in any type of work?	1= Yes 2=No	
211	Did you have a monthly/annual source of income before developing obstetric fistula problem?	1= Yes 2=No	
212	Currently, do you have a monthly/annual source of income?	1= Yes 2=No	
	If yes, estimate your monthly income	_____birr	
213	Is your biological mother still alive?	1=Yes 2=No	
214	Is your biological father still alive?	1=Yes 2=No	
215	Have you ever married to or lived together with a man as married couple?	1= Yes,　2= No	2 →218
216	What is your marital status now?	1= Married　2= Widowed , 3= Divorced　4=Single	2,3 &4 →217
217	Is your husband/partner living with you in this household now, or is he staying elsewhere?	1= Living together 2= Staying elsewhere	
218	How old were you when you first began to live with him?	Age in years [___|___]	
219	Currently, how is your living arrangement, and who live with you?	1= Live with biological mother/father 2= Live with another family, 3= Live alone	
220	In your lifetime, do you have Previous experience of sexual trauma?	1= Yes,　2= No	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP

Section3: *Childbearing Characteristics*

All questions should have ONLY ONE ANSWER unless the instructions say otherwise.

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
301	Have you ever given birth?	1= Yes 2=No	2 →sect^n 4
302	How old were you when giving your first brith?	Age in years [___|___]	
303	How many live-births have you delivered in your life?	[___|___] number	
304	Have you had a stillbirth?	1= Yes 2= No	2 →306
305	How many stillbirths have you delivered in your life?	[___|___] number	
306	Have you experienced the death of a child?	1= Yes 2=No	2 →308
307	How many of your children died?	[___|___] number	
308	How old were you when giving your last birth?	Age in years [___|___]	
309	Did you see anyone for antenatal care during your last pregnancy?	1=Yes 2=No	2 →311
310	How many times did you receive antenatal care during last pregnancy?	Number ANC visit [___|___] 98=Don't know	
311	During your last pregnancy, did you have signs of pregnancy complication?	1= Yes 2= No, 98= Don't know	2 →313
312	Which signs of pregnancy complications do you have?	1=Vaginal bleeding, 2= Vaginal gush of fluid, 3= Severe headache 4= Blurred vision, 5= Fever 6= Abdominal pain 88= Other(Specify)------	
313	Where did you give your last birth?	1= Your home 2= Other home 3= Hospital 4= Health centre 5= Health post 88= Other(Specify)	
314	Who assisted you during your last delivery?	1= Doctor, 2= Nurse/midwife, 3=Health extenstion worker 4= Traditional birth attendant 5= Relative/friend 6= No one 88. Other (Specify)--------------	
315	How did you deliver your last child?	1= Normal vaginal delivery 2 =CS delivery 88= Other (Specify)-------------	
316	How much time did you spend during your last delivery?	-------------------(Hour)	
317	Did you have any complication during your last delivery?	1= Yes 2= No, 98= Don't know	2 →319
318	Which complication did you have?	1=Prolonged labour 2= Precipitated labour 3= Forceps deliveries 4= Clinical fatal distress 88=Other (Specify)-------------	
319	What was your delivery outcome?	1=Still birth 2= Live birth	
320	Have you ever faced preterm delivery?	1= Yes 2= No	

Section 4: Fistula History characteristics		
401	Did your leakage problem start after the home or health facility delivery?	1=After home delivery 2=After hospital delivery
402	Did your leakage problem start after a normal labour/ delivery, or after a very difficult labour /delivery?	1=Normal labour/delivery 2= Very difficult labour/delivery
403	Did your leakage problem start after you delivered a live baby or had a stillbirth?	1=After delivered a live baby 2=After had stillbirth 88=Others (Specified)-----------------
404	What do you think the cause of this problem could be ?	1=Sexual assault 2= Pelvic surgery 3= Prolonged labour 88= Others(specify)---------- 98= Don't know
405	Have you ever heard of this problem before starting your leakage?	1= Yes 2= No
406	How many years/months did pass since the leakage start?	Years [___|___] Month [___|___]
407	Have you sought treatment for this condition before?	1=Yes 2=No
408	If no, why have you not sought treatment?	1= Do not know can be fixed 2= Do not know where to go 3= Probe and record all mentioned. 4= Too expensive 5= Too far, 6=poor quality of care 7= Could not get permission 8= Embarrassment 9= Problem disappeared 88=Others (Specify)……………
409	From whom did you seek treatment information for the last time?	1= Health professional 2= Health worker 3= Health development armies 4= HEW 5=Radio/TV/Magazine 88= Others(Specify)-----

Oslo-3 Social Support Scale (*OSS-3*)

Construct: Perceived social support

Instructions: Here is a list of some things that other people do for us or give us that may be helpful or supportive. Please listen carefully and tell me the number that is closest to your situation.

Response options: Social Support Scale

Citation: Kroenke et al., 2002:263

No	Items	Category
1	How many people are so close to you that you can count on them if you have serious problems?	1=None 2= 1 or 2 3= 3 to 5 4= 6 or more
2	How much concern do people show in what you are doing?	5=A lot of concern and interest 4=Some concern and interest 3= Uncertain 2=Little concern and interest 1=No concern and interest
3	How easy can you get practical help from neighbours if you should need it?	5=Very easy 4=Easy 3=Possible 2= Difficult 1= Very difficult

PATIENT HEALTH QUESTIONARIES' (PHQ-9)

Construct: Depression symptoms
Instructions: Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way over the last two weeks.
Response options: 0=not at all, 1=all several days, 2=more than half the days, 3=nearly every day
Citation: (Robert, Janet &Kroenke Kurt 1999: 1743; Kroenke, Spitzer &Williams, 2001: 609)

No.	During **the LAST TWO WEEKS**, I have…	0	1	2	3
1.	Little interest or pleasure in doing things				
2.	Feeling down, depressed, or hopeless				
3.	Trouble falling or staying asleep, or sleeping too much				
4.	Feeling tired or having little energy				
5.	Poor appetite or overeating				
6.	Feeling bad about yourself — or that you are a failure or have let yourself or your family down				
7.	Trouble concentrating on things, such as reading the newspaper or watching television				
8.	Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving. Around a lot more than usual				
9.	Thoughts that you would be better off dead or of hurting yourself in some way				
10	If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	1. Not difficult at all 2. Somewhat difficult 3. Very difficult 4. Extremely difficult		Answer	

Generalized Anxiety Disorder questionnaire (GAD-7)

Construct: Anxiety symptoms
Instructions: Below is a list of the ways you might have felt, behaved, or bothered. Please tell me how often you have felt or bothered this way over the last two weeks.
Response options: 0=not at all, 1=all several days, 2=more than half the days, 3=nearly every day
Citation: Lowe et al., 2008: 268; Robert et al., 2006: 1094

No.	During **THE LAST TWO WEEKS**, I have…	0	1	2	3
1.	Feeling nervous, anxious or on edge				
2.	Not being able to stop or control worrying				
3.	Worrying too much about different things				
4.	Trouble relaxing				
5.	Being so restless that it is hard to sit still				
6.	Becoming easily annoyed or irritable				
7.	Feeling afraid, as if something awful might happen				

Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C)

Construct Posttraumatic stress disorder symptoms

Instructions: Below is a list of problems and complaints that people sometimes have in response to stressful experiences. Please listen carefully and tell me the number that indicates how much you have been bothered by that problem in the past month.

Response options: 1=Not at all, 2=A little bit, 3=moderately, 4=Quite a bit, 5=extremely

Citation: Odenwald, Lingenfelder, Schauer, Neuner, Rockstroh, Hinkel & Elbert, 2007:5

No	During **THE PAST MONTH**, I have…	1	2	3	4	5
1	Repeated, disturbing memories, thoughts, or images of a stressful experience?					
2	Repeated, disturbing dreams of a stressful experience?					
3	Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?					
4	Feeling very upset when something reminded you of a stressful experience?					
5	Having physical reactions (e.g., heart pounding, trouble breathing, sweating) when something reminded you of a stressful experience?					
6	Avoiding thinking about or talking about a stressful experience or avoiding having feelings related to it?					
7	Avoiding activities or situations because they reminded you of a					
8	Trouble remembering important parts of a stressful experience?					
9	Loss of interest in activities that you used to enjoy?					
10	Feeling distant or cut off from other people?					
11	Feeling emotionally numb or being unable to have loving feelings for those close to you?					
12	Feeling as if your future will somehow be cut short?					
13	Trouble falling or staying asleep?					
14	Feeling irritable or having angry outbursts?					
15	Having difficulty concentrating?					
16	Being "super-alert" or watchful or on guard?					
17	Feeling jumpy or easily startled?					

Fistula Cure Perceptions

No	Items	Category
1	Did you have an operation to fix the leakage?	1=Yes 2=No
2	In your opinion; did the treatment stop the leakage completely?	1= Yes, stopped completely 2=Not stopped completely, but reduced 3= No, not stopped
3	In your opinion; How much are you leaking currently?	1=I am completely dry. 2=I am leaking with exertion. 3=I am wet walking, but dry sitting. 4=I am wet walking, and while sitting, usually dry, but sometimes pass urine. 5=I am wet all the time.
4	How many weeks stay in the hospital for treatment?	Weeks [___|___]
5	How satisfied was with the service he/she received	1=Very satisfied 2=Somewhat satisfied 3=Neither satisfied nor dissatisfied 4=Somewhat dissatisfied 5=Very dissatisfied 6=Don't know

Health Behaviours

No.	Items	Category
1	Will you return to Hamlin Fistula treatment centre for follow-up care?	1= Yes 2= No
2	Will you plan to socialize in the community	1= Yes 2= No
3	Will you plan to start your sexual intercourse	1= Yes 2= No
4	How long would you like to wait without start sexual intercourse?	Months [___|___]
5	*Did you want to have a baby later on or did you not want any children?*	1= Yes 2 = No
6	Will you plan to deliver your next pregnancy to Fistula treatment centre	1= Yes 2 = No

Annex E: Questionnaire Amharic version

የቃለ መጠይቅ መመሪያ

በኢትዮጵያ የፈሰሱላ ታማሚ ሴቶች ላይ የሚታየውን የአእምሮ መታወክ ህመም ገጽታ እንዲሁም ህክምና ከተደረገላቸው በፊትና በኋላ ያለውን ልዩነት ለመገንዘብ የሚደረግ ጥናት ነው።

ጤና ይስጥልኝ። ስሜ_____ ይባላል። ለዚህ ጥናት የምርምር አካል እንዲሆኑ ቃለ መጠይቅ ላደርግሎት ፈልጌ ነበር። ቃለ መጠይቁም በግምት ወደ 45 ደቂቃ አከባቢ ይፈጃል። የዚህ የዛሬው ቃለ መጠይቅ ዓላማ ስለ አእምሮ ህመም ያሎትን አሳብ፣ የፈሰቱላ በሽታ ለአእምሮ መታወክ ያለውን ተዕዕኖያሎትን መረዳት ለመስማት ነው። እርሶ የሚሉትን ነገር ለመስማት ከፍተኛ ፍላጎት አለኝ። የእርሶ ስም በመጠይቁ ወስጥ አይካተትም፣ቁጥር ይሰጠታል። ከመጠይቁ በኋላ የመልሱት መልስ ይጸፍና መልሱ በሙሉ ይደመሰሳል። በቃለ መጠይቁ ክፍል ጊዜ ስም ከጠቀሱ፣ ስሙ ወደ ጽሑፍ በሚገለበጥበት ጊዜ ይጠፋል። ይህን ጽሑፍ የሚመለከቱት በዚህ የምርምር ፕሮጀክት ውስጥ የሚሳተፉት ስዎች ብቻ ናቸው። በማንኛውም ጊዜ ቃለ መጠይቁን ለማቆም ከፈለጉ፣ እርፍት ቢያስፈልግ፣ እባክዎን ይንገሩኝ እና እኔም መጠይቁን እናቆመዋለን። በዚህ ጥናት ውስጥ ከመሳተፍ ማቆም ከፈለጉም፣ የተጠየቁትን ጥያቄ መመለስ ካልፈለጉ በፈለጉት ጊዜ ምርምሩን ከሚያካሂድ ሰራተኛ ምንም ዓይነት ጤና ሳይደረግ ወይም ክፉ ነገር ሳይገጥሞት ስምምነቱን የማቋረጥ ሙሉ መብት አሎት። ከመጀመራችን በፊት ማንኛውም ዓይነት ጥያቄ ካሎዎት ይጠይቁ?

የጥናት አድራጊው ወይም ስምምነቱን የተቀበለው ሰው የሰጠው መግለጫ:-
- በጥናቱ ውስጥ ለሚሳተፍ ግለሰብ ስለ ጥናቱ በቂ ማብራሪያ ሰጥቻለሁ።
- ስለዚህ ጥናት ለቀረቡ ሁሉም ጥያቄዎች ባለኝ ችሎታና እውቀት መጠን በቂ መልስ ሰጥቻለሁ

_____   _____
ስምምነቱን የተቀበለው ሰው   ቀን/ሰዓት

ከበቂ መረጃ ጋር ስምምነታቸውንና ፈቃዳቸውን የሰጡት ግለሰብ መግለጫ:-
- ይህንን የስምምነት ቅጽ አንብቤያለሁ/ተነቦልኛል
- ሊያጋጥሙ የሚችሉ አደጋዎችንና የሚኖሩ ጥቅሞችን ጨምሮ ስለዚህ ጥናት በቂ ማብራሪያ ተሰጥቶኛል
- ጥያቄዎችን መጠየቅ ችዬ ነበር
- የተሰጡኝ መረጃዎች ተረድቻቸዋለሁ

የጥናቱ ተሳታፊ ፈርማ:-
በዚህ የጥናትና ምርምር ስራ ውስጥ ለመሳተፍ እንዲሁም የጤና መረጃዎቼ ከዚህ በላይ እንደተገለጸው ጥቅም ላይ እንዲውሉና ለሌሎች ስዎች እንዲገለጹ ተስማምቻለሁ።

_____   _____
የጥናቱ ተሳታፊ   ቀን/ሰዓት

ክፍል 1፡ የጥያቄዎች መለያ	
Q101	የክልል ስም፣----------------------የክልል ኮድ (----------------)
Q102	የህኪም ቤት ስም፣------------የህኪም ቤቱ ኮድ፣------------------------
Q103	የታካሚው መለያ ቁጥር--------------------------

የስምምነት ፈቃዱን አንብ ፤ ፈቃደኝነቱን ይንገሩንምናላባትም ፈቃደኛ ካልሆነ፡ ጥያቄው እዚህ ላይ ይቁም

    1   ፈቃደኛ ነኝ   2   ፈቃደኛ አደለሁም

    የጠያቂው ስም፣------------------መለያ ቁጥር፣----------------

    ቃለ ምልልሱን ያካሄዱበት ቀን ፡ ቀን--------ወር---------ዓ.ም

የተቆጣጣሪው ስም------------------------ፈርማ------------------------

ተ.ቁ	ጥያቄ	ኮድ	መዝለል
	ክፍል 2፡ የተጣያቂዋ ሴት የተለያዩ ባህሪያት		
	የተለዩ ማኅሰቢያ ከሊለው በስተቀር ሁሉም ጥያቄዎች አንድ መልስ አሳቸው		
201	ዕድሜያ ስንት ነው?	በዓመት---------	
202	መደበኛ ትምህርት ተምረው ያውቃሉ?	1 =ተምሪያለሁ 2 =አልተማረኩም	መልሰዎ 2 ከሆነ ወደ ጥያቄ ቁጥር 204 ይሂዱ
203	መደበኛ ትምህርት ከተማሩ እስከ ስንተኛ ክፍል አጠናቀዋል? (ከከፍተኛ የትምህርት ተቋማት የተቀበለት ድግሪ/ ሰርትፍኬት ካለ ቢገለፁልን)	የት/ትደረጃ፡------- 13= ቴክኒክና ሙያ ሰርትፊኬት 14= ዩኒቨርስቲ/ኮሌጂ ዲፕሎማ 15= ዩኒቨርስቲ/ኮሌጂ ዲግሪ	
204	ማንበብ ይችላሉ? (አንዱ ላይ ያክብቡ)	1= አዎን 2= አልችልም	
205	መጻፍ ይችላሉ? (አንዱ ላይ ያክብቡ)	1= አዎን 2= አልችልም	
206	አሁን የሚኖሩበት አካባቢ የት ነው?	1=ከተማ 2=ገጠር	
207	የየትኛው ብሔር ተወላጂ ነዎት?	1=አማራ2= ኦሮሞ 3=ትግሬ4=ሲዳማ 88=ሌላ ካለ በግልፅ ይፃፍ-------------	
208	የየትኛው ሃይማኖት ተከታይ ነዎት?	1=ኦርቶዶክስ2= ሙሰሊም 3= ፕሮቴስታን4 = ካቶሊክ 88= ሌላ ካለ በግልፅ ይፃፍ----------	
209	የፊቱሏ በሽታው ከመከሰቱ በፊት ሥራ ላይ ተሳትፈ ነበርዎት?	1= አዎን2= አልሳተፍም	
210	በአሁኑ ስንት (የፊስቱላ በሽታው ከተከሰተ በኺላ) በተለያዩ የሥራ አይነቶች ላይ ይሳተፋሉ?	1= አዎን 2= አልሳተፍም	
211	የፊስቱላ በሽታው ከመከሰቱ በፊት ወረሀዊ/አመታዊ ገቢ ነበርዎት?	1= አዎን 2= አልነበረኝም	
212	በአሁኑ ስንት ወርሀዊ/አመታዊ ገቢ አለዎት?	1= አዎን 2= የለኝም	መልሰዎ 2 ከሆነ ወደ ጥያቄ ቁጥር 214 ይሂዱ
213	ገቢ ከለዎት፣በግምት በወር ስንት ብር ይሆናል?	በብር----------	
214	ወላጅ እናትዎ በህይወት አሉ?	1=አሉ2=የሉም	
215	ወላጅ አባትዎ በህይወት አሉ?	1=አሉ2=የሉም	
216	አግብተው ወይም ከወንድ ጋር እንደተጋባ ባለትዳር አብረው ኖረው ያውቃሉ?	1=አዎ 2=አላውቅም	መልሰዎ 2 ከሆነ ወደ ጥያቄ ቁጥር 220 ይሂዱ
217	በአሁኑ ስንት የጋብቻ ሁኔታዎ ምን ይመስላል?	1= አግብቻለሁ2=ሞቶብኛል 3=ፈትቻለሁ 4=አላገባሁም	መልሰዎ 2 ውይም 3 ቁጥር ከሆነ ወደ ጥያቄ ቁጥር 219 ይሂዱመልሰዎ 4 ከሆነ ወደ ጥያቄ ቁጥር 220 ይሂዱ
218	በአሁኑ ሰዓት ባለቤትዎ ከእርሶ ጋር ይኖራሉ ወይንስ ሌላ ቦታ ነው የሚኖሩት?	1= አብረን እየኖርን ነው 2= ሌላ ጋር ነው የሚኖረው	
219	ለመጀመሪያ ጊዜ ከባለቤትዎ ጋር አንድ ላይ ሲኖሩ ስንት ዓመትዎ ነበር?	በአመት -------	
220	በአሁኑ ስንት ከማን ጋር ነው የሚኖሩት ወይም ማነው አብሮዎት የሚኖረው?	1= ከዋላጂ እናት/አባቴ ጋር 2= ከሌላ ዘመድ ጋር 3= ለብቻዬ4= ከባለቤቴ ጋር	
221	በሂያት ዘመንዎ ያታዊ ማስፈራሪያ ወይም የማስደንገጥ ጥቃት አጋጥሞት ያውቃል?	1= አዎን, አጋጥሞኛል2= አጋጥሞን አያውቅም	

ክፍል 3፡ የተጠያቂዋ ሴት ከወሊድ ጋር የተገናኘ የተለያዩ ባህሪያት			
የተለየ ማሳሰቢያ ከሌለው በስተቀር ሁሉም ጥያቄዎች አንድ መልስ አላቸው			
ተ.ቁ	ጥያቄ	ኮድ	መዝለል
321	ልጅ ወልደው ያውቃሉ?	1 = አዎ፣ አውቃለሁ2 = አላውቅም	መልሱ 2 ከሆነ ወደ ክፍል 4 ይሂዱ
322	የመጀመሪያ ልጅዎትን ሲወልዱ ስንት አመትዎ ነበር?	እድሜ በአመት------	
323	እስካሁን ስንት ልጅ በህይዋት ወለደዋል?	በቁጥር ይግለፅ-----	
324	በህይዋት የሌለ ልጅ ወልደው ያውቃሉ?	1= አዎ፣ አውቃለሁ2= አላውቅም	መልሱ 2 ከሆነ ወደ ጥያቄ 306 ይሂዱ
325	እስካሁን ድረስ ስንት በህይዋት የሌለ ልጅ ወልደው ያውቃሉ?	በቁጥር-----	
326	ከወለዱ በኋላ ልጅ ሞቶብዎት ያውቃል?	1= አዎ፣ ያውቃል2=አያውቅም	መልሱ 2 ከሆነ ወደ ጥያቄ 308 ይሂዱ
327	ልጅ ሞተብዎት የሚያውቅ ከሆነ፣ ስንት ልጅ ሞተብዎት?	በቁጥር-----	
328	የመጨረሻ ልጅዎትንስ ሲወልዱ ስንት አመትዎ ነበር?	እድሜ በአመት------	
329	የመጨረሻ ልጅዎን እንዳረገዙ፣ የወሊድ ክትትል አድርገው ነበር?	1= አዎ፣ ተከታትያለሁ2= አልተከታተልኩም	መልሱ 2 ከሆነ ወደ ጥያቄ 311ይሂዱ
330	የመጨረሻ ልጅዎትን እንዳረገዙ ለስንት ግዜ የወሊድ ክትትል አደረጉ?	የወሊድ ክትትል(ANC) ያደረጉበት ግዜ በቁጥር------ 98= አላስታወስም	
331	የመጨረሻ ልጅዎትን እንዳረገዙ፣የእርግዝና ችግር ምልክቶችን አስተውለው ያውቃሉ?	1= አውቃለሁ 2=አላውቅም	መልሱ 2 ከሆነ ወደ ጥያቄ 313 ይሂዱ
332	ያስተዋሉት የእርግዝና ችግር ምልከቶች ካሉ፣ የትኞቹን ምልክቶች አስተውለዋል?	1 =የብልት መድማት 2 =ከብልት ፈሳሽ መፍሰስ 3 =ከፍተኛ እራስ ህመም 4= የእይታ ብዥታ 5 =ትኩሳት 6 =የሆድ ህመም 88= ሊላካለ ቢገለፅ---	
333	የመጨረሻ ልጅዎትን ሲወልዱ፣ የት ነበር የወለዱት?	1= ቤቴ ውስጥ 2= ሌላ ሰው ቤት 3= ሆስፒታል 4= ጤና ጣቢያ 5= ጤና ኬላ 88= ሊላካለ ቢገለፅ---	

334	የመጨረሻ ልጅዎትን ሲወልዱ፤ ማን አዋለድዎ?	1= ዶክተር 2= ነርስ/አዋላጇ ነርስ 3= ጤና እረዳት 4= የልምድ አዋላጅ 5= ዘመድ/ ጎደኛዮ 6= ማንም አላዋለደኝም 88= ሊላካለቢ.ገገፅ---	
335	የመጨረሻ ልጅዎትን ሲወልዱ በምን አይነት ሁኔታ ነበር የወለዱት?	1= በተለመደው በምጥ ነውየወለድኩት 2= በኦፐራሲዮን ነው የወለድኩት 3=በመሳሪያ ተነትቶ ነው የውጣው 4= ልጁን ቆራርጠ በማወጣት 88= ሊላካላ ቢ.ገገለፅ---	
336	የመጨረሻ ልጅዎትን ሲወልዱ፤ ምጥዎ ለስንት ስአት/ቀናት ቆየበዎት?	በቀናት (በስአት) -----------	
337	የመጨረሻ ልጅዎትን ሲወልዱ፤ የወሊድ ችግር አጋጥሞዎት ነበር?	1 =አም፤ አጋጥሞኛል 2 =አላጋጠመኝም 98= አላስታውስም	መልሱ 2 ከሆነ ወደ ጥያቄ 320 ይሂዱ
338	የወሊድ ችግር አጋጥሞዎት ከነበር፤ ምን አይነት ችግር እንዳጋጠመዎት ቢገልፁልኝ?	1 = ምጡ ቆይቶብኝ ነበር 2 = ያልተለመደና ፋታ የሚያሳጣ እና በጣም የሚገፋ ምጥ 3 = ልጁ በማህፀን ውስጥ የመታፈን 88.= ሊላ ካላ ቢ.ገገለፅ---	ከአንድ መልስ ሊኖረው ይችላል.
339	የወሊድ ችግር አጋጥሞት ከተገላገሉ በኋላ ውጤቱ ምን ነበር?	1= የተወለደው/ችው ልጅ በህይወት አልነበረም 2= የተወለደው/ችው ልጅ በህይወት ነበር/ች	
340	ያለግዜው (37 ሳምንት ያነሰ) የመጣ አወላለድ አጋጥሞት ያውቃል?	1= አም፤ አጋጥሞኛል 2= አላጋጠመኝም	

ክፍል 4፣ የፌስቱላ አመጣጥን በተመለከት የሚጠይቅ መጠይቅ			
የተለየ ማሳሰቢያ ከሌለው በስተቀር ሁሉም ጥያቄዎች አንድ መልስ አላቸው			
ተ.ቁ	ጥያቄ	ኮድ	መዝለል
401	በብልትም ሳያስቡት ፌሳሽ የመፍሰስ ችግር የጀመረዎት የት ከወለዱ ብሏላ ነው?	1 = እቤቴ ከወለድኩ በሏላ 2= በጤና ተቋም ከወለድኩ በሏላ	
402	በብልትም ፌሳሽ የመፍሰስ ችግር የጀመረው በምን ሁኔታ ከወለዱ ብኋላ ነው?	1= ያለምንም ችግር በተለመደው በምጥ ከወለድኩ በሏላ 2= በምጥ ወቅት በጣም ተቸግሬ ከወለዲኡ በኋላ	
403	በብልትም ፌሳሽ የመፍሰስ ችግር የጀመረው በምን አይነት ሁኔታ ላይ ያለ ልጅ ከወለዱ ብኋላ ነው?	1= በህይዋት ያለ ልጅ ከወለድኩ በሏላ 2 = በህይዋት የሌለ ልጅ ከወለድኩ በሏላ 88= ሌላ ካለ ቢገለፅ---	
404	የችግሩ ምክንያት ምን ይሆናል ብለው ያስባሉ?	1=ፃታዊ ጥቃት መድረስ 2=ቀዶ ጥገና 3=ረጂም ስንት ማማጥ 88= ሌላ ካለ ቢገለፅ--- 98 = አላውቅም	
405	ይህ ችግር ከመድረሱ በፊት ስለ ችግሩ ሰምተው ያውቃሉ?	1= ሰምቼ አውቃለሁ 2 =ሰምቼ አላውቅም	
406	በብልትም ፌሳሽ የመፍሰስ ችግር ከጀመረዎ ስንት ወር ወይም አመት ይሆናዎታል?	በወር-------- በዓመት-------	
407	ከዚህ በፊት ህክምና ሞክረው ያውቁ ነበር?	1= ሞክሬ ነበር 2= ሞክሬ አላውቅም	መልሱ 1 ከሆነ ወደ ክፍል 5 ይሂዱ
408	ህክምናውን ሞክረው የማያውቁ ከሆነ፣ ህክምና ያልሞከሩበት ምክንያት ምን ነበር?	1=መፈተሬ እዳለው ባለማወቄ 2= የት መሄድ እዳለብኝ ባለማወቄ 3= ህክምናው ውድ ስለሆነ 4= የህክምና መስጭያ ቦታው ሩቅ ስለሆነ 5= ህክምናው ጥራት ስለሌለው 6= ፈቃዲ ስላላገኘሁ 7= ህፍረት ስለሚሰማኝ 8= ሌላ ችግር ስላጋጠመኝ 88= ሌላካለቢገለፅ---	
409	አሁን ስለ ህክምናው መረጃውን ከማን አገኙ?	1= ከጤና ባለሞያዎች 2= ከጤና ሰራተኞች 3= ከጤና ሰራዋት 4= ከጤና ረዳት 5=.ከሬዲዮ/ከቲቪ/ከጋዜጣ 88= ሌላካለቢገለፅ---	

183

ክፍል 5 (OSS-3)

ከዚህ በታች ሌሎች ሰዎች እኛን ለመርዳት ብለው የሚያደርጉትን ጥረት በዝርዝር ተጠቅሰዋል፡፡ በጥንቃቄ አድምጡና ከእርስዎ ሁኔታ ጋር አመዛዝነው ይመልሱ፡፡
መመሪያ፡ ለመረጃ ሰብሳቢው፡ምላሾቹን ደግመው ያንብቡላቸው

ተ.ቁ	ጥያቄ	ኮድ
1	በጣም ሲያምዎት ወይም ችግር ሲያጋጥመዎት በቁጥር ስንት የሚሆኑ ሰዎች ከእርስዎ ጋር አጋርነታቸውን ያሳይዎታል?	1= ምንም ሰው አያገዘኝም 2=ከ 1 እስክ 2 ስው 3= ከ 3 እስክ 5 ሰው 4 = 6 ሰውእና ከዛም በላይ
2	እርስዎ ለሚያደርጉት ነገር ሰዎች ምን ያህል ይጨነቃሉ(ያስባሉ)?	5= በጣም ይጨነቃሉ/ያስባሉ 4 = በጥቂቱ ይጨነቃሉ/ያስባሉ 3= በግልፅ አይታወቅም 2=በትንሽ ይጨነቃሉ/ያስባሉ 1=ምንም ስለኔ የሚጨነቅ/የሚያስብ የለም
3	እርዳታ ሲያስፈልግዎ ከጎረቤት እርዳታ ለማግኘት ለእርሶ ምን ህል ቀላል ነው?	5=በጣም ቀላል 4= ቀላል 3= ተስፋ አለው 2 =አስቸጋሪ 1=በጣም አስቸጋሪ

184

ክፍል 6 (PHQ-9):- ባለፉት ሁለት ሳምንታት ከታች በተዘረዘሩት ገጠመኞች ምን ያህል ተቸግረው ነበር::

መመሪያ: ለመረጃ ሰብሳቢው:ምላሾቹን ደግመው ያንብቡላቸው

ተ.ቁ	ጥያቄ	በፍፁም	ብዙ ቀናት	ከግማሽ ቀናት በላይ	በየቀኑ እቸገራለሁ
10.	ነገሮችን ሲሰሩ ፍላጎትዎ ወይም የሚያገኙት ደስታ በጣም ትንሽ (እምብዛም) ነበረ?	0	1	2	3
11.	የጭንቀት፣የመደበር ወይንም ተስፋ የመቁረጥ ስሜት ነበረዎት?	0	1	2	3
12.	እንቅልፍ አለመተኛት ወይም ተኝቶ የመቆየት ችግር ወይንም ብዙ ከመጠን በላይ የመተኛት ችግር ነበረዎት?	0	1	2	3
13.	ድካም የመሰማት ወይንም አቅም የማነስ ሁኔታ ነበረዎት?	0	1	2	3
14.	የምግብ ፍላጎት አለመኖር ወይንም በጣም ብዙ የመብላት ችግር ነበረብዎት?	0	1	2	3
15.	ስለራስዎ መጥፎ ስሜት መሰማት፣ የበታችነት ስሜት፣ ራስዎን መጣል ወይንም ቤተሰዎ የመተው ስሜት ነበረብዎት?	0	1	2	3
16.	ነገሮች ላይ የማተኮር ችግር ነበረብዎት፣ ለምሳሌ ጋዜጣ ለማንበብ ወይንም ቴሌቪዥር ለመመልከት?	0	1	2	3
17.	ከተለመደው ውጪ ወዲያና ወዲህ የማለት፣እርፍት የማጣት ወይንም በተቃራኒውሌሎች ሰዎች ሊገነዘቡት በሚችሉትሁኔታ ቀስ ብሎ የመናገር ወይም የመንቀሳቀስ ችግር ነበረብዎት?	0	1	2	3
18.	ብሞት ይሻላል ወይንም እራሴን በሆነ መንገድ ብጎዳ ይሻላል ብለው ያሰቡበት ጊዜ ነበር?	0	1	2	3
		ምንም ችግር አልፈጠሩም	በመጠኑ ጭግር ፈጥረዋል	በጣም ተቸግሬያለሁ	እጅግ በጣም ተቸግሬያለሁ
10	ከነዚህ ከጠቀስናቸው ችግሮች አ ጋጥሞዎት ከነበር:ችግሮቹ ለእርስዎ ምን ያህል አስቸ ጋራ ነፉ ስራዎትን ለመስራት፣ ቤትዎ ያለን ነገር ለመንከባከብ፣ ራስዎን ለመጠበቅ ወይንም ከሌሎች ሰዎችጋር ባለዎት ግንኙነት	0	1	2	3

185

ክፍል 7 (GAD-7)፦ ባለፉት ሁለት ሳምንታት ከታች በተዘረዘሩት ገጠመኞች ምን ያህል ተቸግረው ነበር፡፡

መመሪያ፦ ለመረጃ ሰብሳቢዉ፣ምላሾቹን ደግመው ያንብቡላቸው

ተ.ቁ	ጥያቄ	በፍፁም	ብዙ ቀናት	ከግማሽ ቀናት በላይ	በየቀኑ እቸገራለሁ
8.	የመፈራት ወይም የመደንገጥ ስሜት ነበረዎት?	0	1	2	3
9.	ከትካዜ ወይም ከሚያሳስብዎት ነገር ቶሎ መላቀቅ ያለመቻል ስሜትስ ነበረዎት?	0	1	2	3
10.	በተለያዩ ነገሮች ከመጠን በላይ ማሰብ ወይም የመጨነቅ ስሜት ነበረዎት?	0	1	2	3
11.	ዘና ለማልት የመቸገር ስሜት ነበረዎት?	0	1	2	3
12.	የመቁነጥነጥ ወይም ለመቀመጥ ያለመረጋጋት ስሜት በእጅጉ ይታይብዎት ነበር?	0	1	2	3
13.	ቶሎ የመበሳጨት፣ የመቆጣት ወይም የመናደድ ስሜት ነበረዎት?	0	1	2	3
14.	መጥፎ ነገር የደረሰብዎት እስኪመስሎዎት ድረስ የፍርሀት ስሜት ነበረዎት?	0	1	2	3

<u>ክፍል 8 (PCL-C)</u>:- ከዚህ በታች የተዘረዘሩት ጥያቄዎች ሰዎች አስደንጋጭ ወይም አስጨናቂ ጊዜ ካሳለፉ በኋላ የሚያንጸባርቋቸው ስሜቶች ናቸው፡፡በጥንቃቄ ካዳመጥሽ በኋላ ስሜቱን ይወክላልብሽ ከምታስቢው መልስ ስርያሉትን አማራጮች ይንገሩን፡፡

መመሪያ፡ ለመረጃ ሰብሳቢው፡ምላሾቹን ደግመው ያንብቡላቸው

ተ.ቁ	ጥያቄ	በፍፁም የለም	በመጠኑ አለ	አልፎ አልፎ	ብዙግዜ	በጣም ብዙጊዜ
1	ከዚህ በፊት የገጠመዎት አስደንጋጭ ወይም አስጨናቂ ነገር በተደጋጋሚ በሀሳብዎ ወይም በምናብዎ እየመጣ ይረብሽዎታል?	1	2	3	4	5
2	ከዚህ በፊት የገጠመዎት አስደንጋጭ ወይም አስጨናቂ ነገር በጎልምዓ ደጋግመው የማየት ሁኔታ አለዎት?	1	2	3	4	5
3	ከዚህ በፊት የገጠመዎት አስደንጋጭ ወይም አስጨናቂ ነገር አሁንም በድጋሜ የተከሰተ እየመሰለዎት የተለየ እንቅስቃሴ ማሳየት?	1	2	3	4	5
4	ከዚህ በፊት የገጠመዎት ሁኔታ ሲያስታውሱት የመበሳጨት ስሜት?	1	2	3	4	5
5	ከዚህ በፊት የገጠመዎት አስደንጋጭ ወይም አስጨናቂ በሆነ ነገር ሲያስታውሱትየተለየ አካላዊ ለውጥ የማሳየት ስሜት (ለምሳሌ፡የልብምትመጨመር፡አተነፋፈስመረበሽ፡ማላብ)?	1	2	3	4	5
6	ከዚህ በፊት ስለደረሰብዎት አስደንጋጭ ወይም አስጨናቂነገር ላለማሰብ ፣ላለማውራት ወይም እሱን እያሰብሽ ስሜት ውስጥ ላለመግባት ጥረት አድርገው ያውቃሉ?	1	2	3	4	5
7	ከዚህ በፊት ስለደረሰብዎት አስደንጋጭ ወይም አስጨናቂነገር ከሚያስታውሱ አንዳንድ ኢጋጣሚዎች ወይም ስራዎች ሁኔታዎችን እዳያስታውስዎ የመራቅ ስሜት ?	1	2	3	4	5
8	አስደንጋጭ ወይም አስጨናቂነገር ባጋጠመዎት ወቅት የነበሩትን አንዳንድ ነገሮችለማስታወስ የመቸገር ስሜት?	1	2	3	4	5
9	አስደንጋጭ ወይም አስጨናቂነገር ከመከሰቱ በፊት ያስደስትዎት የነበሩ ነገሮች አሁን ላይ ፍላጎት የማጣት ስሜት አለዎት/ነበረዎት?	1	2	3	4	5
10	ከሰዎች ለመራቅ፡(ተገንጥሎ ለብቻ መኖር) የመፈለግ ስሜት አለዎት/ነበረዎት?	1	2	3	4	5
11	የመፍዘዝ ወይም ለሌሎች ሰዎች ጥሩ ስሜት አለመሰማት ወይም ጥሩስሜትለማሳየትመቸገር?	1	2	3	4	5
12	የወደፊት ሄወትዎ ባጭሩ እንደተቀጨ አይነት አድረጎ የማሰብ ሥሜት ወይም ለወደ ፊት ተስፋ የማጣት ስሜት?	1	2	3	4	5
13	እንቅልፍ ለመተኛት ወይም ከተኙ በኋላ በቂ እንቅልፍ ለመተኛት የመቸገር ስሜት?	1	2	3	4	5

14	የብስጭት ወይም ቁጡነት ስሜት መሰማት?	1	2	3	4	5
15	እአምሮዎ በነገሮች ላይ ትኩረት ለመስጠት የመቸገር ስሜት?	1	2	3	4	5
16	ለነገሮች በጣም ንቁ መሆን ወይም ራስን በንቃት የመከታተል ስሜት?	1	2	3	4	5
17	በድንጋጤ ዘሎ መነሳት ወይም ድንጉጥ /ደንጋጣ/ የመሆን ስሜት?	1	2	3	4	5

ክፍል 9 (ከፈስቱላ የመዳን አመለካከት)

ተ.ቁ	ጥያቄ	ኮድ
1	ቀዶ ጥ.ጋናው ፈሳሹን እንዲቆም ያደረገው ይመስሎታል?	1= አዎ 2 =አላስቆመውም
2	በእርሶዎ አመለካከት ህክምናው ፈሳሹን ያቆመው ይመስሎታል?	1=አዎ፤ በትክክል አቁሞታል 2 = በትክክል አላስቆመውም ግን ቀንሶታል 3= አላስቆመውም፤ አሁንም ይፈሳል
3	በእርሶዎ አመለካከት ህክምናው ፈሳሹን በምን ያህል መጠን ያቆመው ይመስሎታል?	1= በትክክል አቁሞታል፤ ምንም አይነት ፈሳሽ የለኝ 2= ከበድ ያለ ነገር ሲፈጠር ፈሳሽ ይፈሰኛል 3 = ስንቀሳቀስ ፈሳሽ አለኝ ግን ስቀመጥ ፈሳሽ የለኝም 4= ስንቀሳቀስና ስቀመጥ ይፈሰኛል ብዙ ጊዜ ግን ቆሞልኛል እንዳዲ ግን ሽንቴ የመልጠኛል 5= ሁልግዜም ይፈሳል፤ አልቆመልኝም
4	ለስንት ሳምንት ወይም ወር በዚህ ሆስፒታል ቆዩ?	ወር--------- ሳምንት---------
5	በሆስፒታል ቆይታዎ በተሰጠዎት/ባገኙት አገልግሎት ተደስተዋል/ረክተዋል?	5=በጣም ረክቻለሁ/ተደስቻለሁ 4=በተንሽምቢሆን ረክቻለሁ/ተደስቻለሁ 3=አልተደሰትሁም አለተከፋሁም 2=በተንሽ·ምቢሆን አልረካሁም/አልተደሰትሁም 1= በጣም አልረካሁም/አልተደሰትሁም 98= ስሜቱን አላወኩትም

ክፍል ፲(የጤንነት ባህሪዎች)

ተ.ቁ	ጥያቄ	ኮድ
1	ከዚህ ከሄዱ በኋላ ለክትትል ወደ ሆስፒታሉ የመመለስ ወይም የመምጣት ሃሳብ/እቅድ አለዎት	1=አዎ፤ እመለሳለሁ2=አይ፤ አልመለስም
2	ማህበረሰባዊ በሆኑ ነገሮች ላይ ለመሳተፍ/ ለመገናኘት እቅድ አለዎት	1=,አዎ እሳተፋለሁ2= አልሳተፍም
3	ከዚህ እነደተመለሱ ግብረ ስጋ ግንኙነት ለማድረግ እቅድ አለዎት	1=አዎ 2=አይ፤ የለኝም/አልፈልግም
4	ከዚህ እንደተመለሱ ግብረ ስጋ ግንኙነት ለማድረግ እቅድ ካለዎት ከስንት ግዜ ቆይታ በኋላ ነው ያሰቡት	ወር-----------
5	ከዚህ በሗላ ልጅ የመውለድ ፍላጎት አለዎት	1=አዎ፤ እፈልጋለሁ 2=አልፈልግም
6	ልጅ መውለድ ከፈለጉ፣ የሚቀጥለውን ልጅ በፊስቱላ ሆስፒታል የመውለድ ፈላጎት ወይም አሳማ አለዎት	1=አዎ፤ 2=አልፈልግም

189

Annex F: Scientific review committee report

REPORT: Scientific Review Committee

Date: 20 October 2016

Dear Dr J M Mathibe-Neke

TITLE OF THE STUDY:

Candidate: **Mr Bekele Belayihun Tefera**
Student number: 58551417
Supervisor: **Prof. AH Mavhandu-Mudzusi**
Co-Supervisor: NA

DLitt et Phil. X ☐   MA Nursing ☐   MPH ☐
Non-degree proposal ☐

Members of the review group who have participated in the review process:

Prof M Ganga-Limando
Prof J Roos
Dr FS Mfidi
Dr T Makua

Overall Comments:

The candidate attended to all our comments contained in the first report.

Final Recommendation:

Pass the proposal module ☐

Approved to submit for Ethics approval ☐ X

Signed: _Prof. M Ganga-Limando   Date: __20 October 2016
Scientific Review Committee Leader

Annex G: Ethical approval letter

UNISA | university of south africa

RESEARCH ETHICS COMMITTEE: DEPARTMENT OF HEALTH STUDIES
REC-012714-039 (NHERC)

2 November 2016

Dear Mr BB Tefera

| HSHDC/551/2016 |
| Mr BB Tefera |
| Student: 5855-141-7 |
| Supervisor: Prof AH Mavhandu-Mudzusi |
| Qualification: PhD |
| Joint Supervisor: - |

Decision: Ethics Approval

Name: Mr BB Tefera

Proposal: Modelling the effects of surgical obstetric fistula repairs on the severity of depression and anxiety among women with obstetric fistula in Ethiopia.

Qualification: DPCHS04

Thank you for the application for research ethics approval from the Research Ethics Committee: Department of Health Studies, for the above mentioned research. Final approval is granted for the duration of the research period as indicated in your application.

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the Research Ethics Committee: Department of Health Studies on 2 November 2016.

The proposed research may now commence with the proviso that:

1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Research Ethics Review Committee, Department of Health Studies. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.

Open Rubric

3) The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.

4) [Stipulate any reporting requirements if applicable].

Note:
The reference numbers [top middle and right corner of this communiqué] should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the Research Ethics Committee: Department of Health Studies.

Kind regards,

Prof L Roets
CHAIRPERSON
roetsl@unisa.ac.za

Prof MM Moleki
ACADEMIC CHAIRPERSON
molekmm@unisa.ac.za

UNISA | university of south africa

HAMLINE FISTULA CENTER

ADDIS ABABA

Dear Madam/Sir,

The University of South Africa (UNISA) extends warm greetings. By this letter, we want to confirm that Mr. Bekele Belayihun Tefera (student number 58551417) is a PhD student in the Department of Health Studies at the University of South Africa (UNISA). Currently, he has finalized his proposal and is about to go out for data collection on his doctoral research entitled *"Modeling the effects of surgical obstetric fistula repairs on the severity of depression and anxiety among women with obstetric fistula in Ethiopia."*
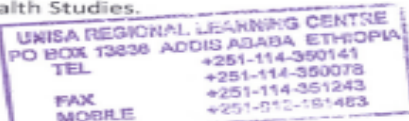
This is therefore to kindly ask you to assist the student in any way that you can. We would like to thank you in advance for all the assistance that you will provide to the student. Attached, please find the ethical clearance that he secured from the Department of Health Studies.

Sincerely,

Tsige GebreMeskel Aberra

Deputy Director — Academic and ICT Support

UNISA REGIONAL LEARNING CENTRE
PO BOX 13838 ADDIS ABABA ETHIOPIA
TEL   +251-114-350141
       +251-114-350078
FAX   +251-114-351243
MOBILE +251-912-161483

University of South Africa
Regional Learning Center
P.O. Box 13838, Addis Ababa, Ethiopia
Telephone: +251 11 435 2244 / +251 11 435 0078
Facsimile: +251 11 435 1242/ 43/ 44
Mobile: +251 912 19 1483
www.unisa.ac.za

Hamlin Fistula Ethiopia
Institutional Research Ethics Review Committee
Review Outcome

Date: 21/10/2016

Reference: IRERC/2016/ 011/Hamlin

Title of project:
'The effects of obstetric fistula treatment on the level of depression and anxiety among women with obstetric fistula treated in Addis Ababa fistula hospital and Hamlin fistula treatment centre, Ethiopia'

Dear Bekele Belayhun,

The Hamlin Fistula Ethiopia Institutional Research Ethics Review Committee (IRERC) has reviewed and approved the above proposal on conditions that:

- If you are willing to provide us a copy of detailed report of the study to Hamlin Fistula Ethiopia

The documents reviewed by the committee are as follows:

Document	Reviewed
Detailed proposal	*
Participant information sheet	
Consent form	*
Questionnaire	*
Topic guide for interviews	
Letter of support from institution where research taking place	
CVs for principal investigator & relevant co-investigator	
Letter of ethics approval from external institution	
Research ethics review application form	
Material transfer agreement	

Approval is given on the understanding that you address the conditions listed above and that you will comply with the national ethical guidelines set out in the *National Health Research Ethics Review Guideline* (Ethiopian Science & Technology Commission; 4th edition, June 2005). The approval is valid for two years from the date of this letter.

The committee should be notified of any amendments to the protocol, any adverse reactions suffered by research participants, and if the study is terminated earlier than expected. Please also be advised that the committee may audit the research to ensure that researchers are abiding by the IRERC requirements.

Yours sincerely,

Chairman Hamlin IRERC

CARRICULUM VITAE
Bekele Belayihun

I. Educational Background

- **2009/10-2011**: Master of public health *Specialisation*: Epidemiology & Biostatistics; Haramaya University, Ethiopia
- **2005-2007**: Bachelor of Science Degree in Statistics; Hawassa University, Ethiopia

II. Work Experience

- April 2017 to present: **Research Adviser**, USAID Transform: Primary Health Care project, Pathfinder International-Ethiopia
- July 2015 – April 2017: **Monitoring and Evaluation Officer**, Integrated family health Program, Pathfinder International-Ethiopia
- October 2012 – June 2015: **LSI Training Capacity Building Coordinator,** Ethiopian Public Health Association (EPHA)
- Sept 2007 – Oct 2012: **Lecturer**, Haramaya University, Ethiopia

III. Training and Workshop Attended

- *InsideNGO:* USAID Proposal Development, *October 2017: USAID Geneva*
- Research for Action: Sexual and Reproductive Health Research, *December 2016, Geneva Foundation for Medical Education and Research (7-month training)*

IV. PUBLICATION

A. Journal articles (Peer-reviewed)

1. Yewondwossen T, **Bekele B**, Kidest L, Candace L & Mengistu A (2017). *Improving access, utilization, and method mix by task sharing Implanon insertion to Frontline health workers The experience of the Integrated Family Health Program in Ethiopia: Journal Glob Health Sic Practice*

2. Girma K, Mengistu A, **Bekele B**, Kidest, Habtamu Z & Ismael A (2017). *The Use of Continuous Household Surveys to Generate Timely Data for Annual Program Outcome Monitoring: Experience from the Integrated Family Health Program in Ethiopia: African Evaluation Journal*

3. Daniel F, Teklu W, Alula M, **Bekele B**, Melake D, Saro A, Nega B, Eyoel B, Amha K & Yibeltal A (2017). *Predictors of Survival among Adult Ethiopian Women in the National ART Program at Seven University Teaching Hospitals: A Prospective Cohort Study. Ethiop J Health Sci.2017; 27 (2)*

4. Alula M, Teklu W, Kesetebirhan D, Mulu A, **Bekele B**, Esayas K & Abiy N (2017). *Exploratory Analysis of Time from HIV Diagnosis to ART Start, Factors and effect on survival: A longitudinal follows up study at seven teaching hospitals. Ethiop J Health Sci.2017;27 (2)*

5. **Bekele B**, Girma K, Habtamu Z, Ismael A & Mengistu A (2016). *Utilization and Determinants of Modern Family Planning among Women of Reproductive Age: Results from the Ethiopian Integrated Family Health Program. Ethiop. J. Health Dev.2016; 30 (1): 4-10*

6. **Bekele B** & Rahma N (2015). *Antiretroviral Treatment Adherence Rate and Associated Factors among People Living with HIV in Dubti Hospital, Afar Regional State, East Ethiopia, ISRN ADS, Article ID 187360.*

7. Desalew Z, **Bekele B**, Kedir T & Desalegn A (2014). *Factors Affecting Utilization of Maternal Health Care Services in Kombolcha District, Eastern Hararghe Zone, Oromia Regional State, Eastern Ethiopia, ISRN AIDS, Article ID 917058*

8. Shibre M, **Bekele B** & Abera K (2014). *Predictors of Survival in Adult HIV Infected Patient after Initiation of HAART in Zewditu Memorial Hospital, Addis Ababa. ISRN ADS, ArticleID250913*

9. **Bekele B (2014),** *How to Conduct Health Research, Research book, Published by LAP Lambert Academic Publishing: ISBN 10: 3659179620;*

10. **Bekele B,** Tesfay G & Lemessa O (2012). *Determinants of high fertility status among married women in kersa District, Eastern Ethiopia: case-control study: LAP Lambert Academic Publishing*

11. **Bekele B** & Nega B (2012). *Time series analysis of the cause of admission and mortality in Hiwot Fana Specialized University Hospital from 1994-2003Ec., Harar Bulletin of Health Science*

12. Frehiowt M & **Bekele B** (2012). *Infant feeding practice, nutrition and sero-status of the Children born from HIV positive mothers in Harar and Dire Dawa, Eastern Ethiopia, Prospective Cohort study: Harar Bulletin of Health Science*

B. Institutional publications;

13. Bekele B & Mesganaw E (2015). *Health Management Information system improvement in SNNPR, Ethiopia: regional health bureau printing press, 2015*

14. Gashaw A, Mesfin A, Yigzaw K, & **Bekele B (2014).** *Monitoring and Evaluation, surveillance and outbreak management training module: Ethiopian Public Health Association printing press, 2014*

15. Fsehaye A, Fikre E, Fasil T, **Bekele B,** Tadess A, Amsalu F, Negalign B, Abebaw G & Berihun M (2014). *Descriptive Epidemiology & Biostatistics training module: Ethiopian Public Health Association printing press, 2014*

16. Fikre E, Fsehaye A, Fasil T, Abebaw G, Berihun M, **Bekele B &** Tadess A (2014). *Analytical epidemiology and biostatistics with software application training module: Ethiopian Public Health Association printing press, 2014*

17. **Bekele B,** Fsehaye A, Fasil T, Abebaw G, Berihun M, Tadess A, Gashaw A, Mesfin A, Yigzaw K, Amsalu F & Negalign B (2014). *Leadership Strategic Information Training Trainer guideline: Ethiopian Public Health Association printing press, 2014*

18. **Bekele B (2013).** *Leadership strategic information training mentorship guideline: Ethiopian Public Health Association printing press, 2013*

19. **Bekele B (2013).** *Leadership, strategic information, training information bulletin: Ethiopian Public Health Association printing press, 2013*

20. **Bekele B (2010).** *Fundamental of Biostatistics and epidemiology: Lecture Note Series. Haramaya University printing press, 2010*

C. *Conference presentation and participation:*

1. Yewondwossen T, **Bekele B**, Kidest L, Candace L & Mengistu A (2017). *Considerations for ensuring access to implant removal in settings of community-based implant provision, Ethiopia, 1st NRAC conference Addis Ababa, Ethiopia, oral*

2. Girma K, Mengistu A, **Bekele B**, Kidest L (2017).*The Use of Continuous Household Surveys to Generate Timely Data for Annual Program Outcome Monitoring: Experience from the Integrated Family Health Program in Ethiopia. 8th AfRA annual conference, Uganda, oral presentation*

3. **Bekele B**, Girma K, Mengistu A, Habtamu Z & Ismael A (2016): *Partner Approval and Family Planning Use In Ethiopia: Result in IFHP Areas, Ethiopia: 27thEPHA annual Conference in Feb 22/2016 (poster)*

4. **Bekele B,** Girma K, Mengistu A, Habtamu Z & Ismael A (2016). *Trends in antenatal care attendance and their link to skilled delivery service: Result in IFHP Areas, Ethiopia: ESOG 24th Annual conference in Feb 27, 2016 (oral)*

5. **Girma K,** Mengistu A, Bekele B, Habtamu Z & Ismael A (2016): *Annual Program Trend Analysis and Outcome Monitoring Using Random Follow-up Visits: The Experience of Integrated Family Health Program (IFHP) In Ethiopia: 27th EPHA annual Conference, in Feb 21/2016 (oral)*

6. Netsanet S, Konjit K, Mengistu A & **Bekele B**, (2016): *"Addis Tesfa" (New Hope) Project's Lesson on the Prevention of Cervical Cancer in Ethiopia: 27thEPHA annual Conference; Feb 21/2016 (oral)*

7. **Bekele B** (2014). *Determinants of survival in Adult HIV women on Antiretroviral Therapy in North Ethiopia: A Hospital Based Retrospective Cohort Study: 25th EPHA anniversary conference on Feb 21, 2014 (poster).*

8. **Bekele B** (2014). *Predictors of Survival in Adult HIV Infected Patient after Initiation of HAART in Zewditu Memorial Hospital, Addis Ababa: 25th EPHA anniversary conference on Feb 20, 2014 (Oral)*

9. **Bekele B,** Lemessa O & Tesfaye G (2012). *Determinant of fertility status among married woman in kersa district: EEVA annual conference in 2012**(oral)***

10. Participated at the Ethiopian Public Health Association: *26thannual Conference: main theme "Health System and Sustainable Development: Health Sector Visioning 2035", from February 25-28/2015.*

11. Statistics in research and their application, *23th ESA annual conference, in 2014*

12. The role of statistics in health research, *22th ESA annual conference, in 2013*

13. Participated at the Ethiopian Statistical Association*: 23th annual conference: main theme " Statistics in research and their application" from march 22-23/ 2014*

V. References

1. Professor AH Mavhandu-Mudzusi: Department of health studies, university of South Africa: **mmudza@unisa.ac.za**

2. Professor L Monareng: Department of health studies, university of South Africa: **monarlv@unisa.ac.za**

Declaration

I solemnly declare that all the above information is correct to the best of my knowledge and belief.

Signature_____ Date: November 2017.