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OBSTETRIC FISTULA AMONG WOMEN AGED 15-49 YEARS IN ZAMBIA

by

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A research report submitted to the faculty of the Humanities at the University of Witwatersrand in partial fulfilment of the degree of Master of Arts in Demography and Population Studies

Supervisors

Professor Clifford Odimegwu

Dr Jeremy Gumbo (Late)

DATE: 26th June, 2017

DECLARATION

I **Mwiza Gideon Singini**; declare that this research report is my own work. It is being submitted for the degree of Master of Arts in Demography and Population Studies at the University of the Witwatersrand, Johannesburg**.** To the best of my knowledge, it has not been submitted before in part or in full for any degree or examination at this or any other University.

……. [Signature of candidate]

…… day of ……, 20….

DEDICATION

I dedicate this work to my late sister Chimwemwe Catharine Singini , late Uncle Pajuzi Gideon Singini and Late Dr Jeremy Gumbo who at his passing was still my co-supervisor.

ACKNOWLEDGEMENTS

First and foremost, I thank God the almighty for making it possible for me to have my postgraduate studies at University of Witwatersrand.

Secondly, I thank my supervisors Professor Clifford Odimegwu and late Dr. Jeremy Gumbo. It was a great honour working with you. I am so thankful for the encouragement you gave to me throughout the research process even though the going was tough. I extend my gratitude to my parents and family for the financial support rendered to me throughout my studies here in South Africa.

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Abstract

Background An estimated 2,000 women in Zambia suffer from obstetric fistula. Suggestions are that more women could be suffering from the same condition but do not report it due to fear of stigmatization. Incidences of obstetric fistula in Zambia may indicate that most pregnant women do not access the much-needed maternal health services, especially at the time of delivery. Therefore, understanding the factors that lead to obstetric fistula is vital for developing primary preventive interventions. This study estimated the prevalence and investigated the factors associated with obstetric fistula among women in Zambia.

Methodology The study used data from the 2013-14 Zambia Demographic and Healthy Survey (ZDHS). A sample of 16,411 women aged 15-49 years old took part in the fistula module of the ZDHS. Descriptive and Complementary log-log regression model were conducted to assess the relationship between the covariates and obstetric fistula.

Results The prevalence of obstetric fistula was estimated at 5.91 obstetric fistulas per 1000 women of reproductive ages. Age at first sex (AOR=0.86, CI: 0.77-0.97) and being in households of rich wealth status (AOR=0.36, CI: 0.14-0.79) were negatively associated with obstetric fistula.

Conclusion Evidence suggest that in order to eradicate obstetric fistula in Zambia, there is need to implement interventions that will focus on improving the socioeconomic, health status, reproductive status, access to health care and use of healthcare resources of women.

Keywords Obstetric fistula, autonomy, women, Zambia.

Chapter 1 Introduction

1.1. Background

An obstetric fistula is defined as an abnormal link between a woman's genital tract and bladder or rectum, which results in the continuous leakage of urine and/or faeces (Barageine et al., 2014). Across the globe, it is estimated that about 50,000 to 100,000 new cases of obstetric fistula develop each year (Kimani et al., 2014; Tebeu et al., 2012). In addition, the World Health Organization (WHO) estimates that at least 2 million women are living with fistula worldwide, however, Middle-Eastern, Asian, and African regions are the most affected (WHO, 2014).

In Africa, only a few studies have been done on obstetric fistula mainly due to the scarcity of data. For example, only a small number of sub-Saharan African countries have included questions on obstetric fistula in their Demographic and Health Survey (DHS), that is, Ethiopia, Uganda, Malawi and Zambia (Maheu-Giroux et al., 2015; Tunçalp et al., 2015). In the first three countries, researchers have taken advantage of this national representative data to conduct studies at a national level (Biadgilign et al., 2013; Johnson, 2007; Maheu-Giroux et al., 2015; Sagna et al., 2011). For instance, in Ethiopia Biadgilign et al. (2013), analysed data from the 2005 Ethiopia National DHS and found that women from rural areas had lower odds of reporting obstetric fistula compared to women from the urban areas. In Malawi, Johnson (2007) conducted a study using the Malawi DHS (2004-2005) and reported a fistula prevalence rate of 15.6 obstetric fistulas per 1,000 live births. While in Uganda, Sagna and colleagueset al (2011) used the 2006 Uganda DHS and found that lack of autonomy among women was an important risk factor of obstetric fistula.

In contrast to the three mentioned countries, no related study has been done at a national level in Zambia despite the DHS providing such an opportunity. Related studies in Zambia that were conducted at a local level include a study in the Southern province of Zambia that investigated obstetric fistulae among women managed at Monze Mission Hospital. This study found that the education level for women with obstetric fistula was low, that they were short with a height of about 148.0 cm, and that 75% of the women with fistula were married (Holme et al., 2007). A study at the University Teaching Hospital in Lusaka reviewed urinary fistula, and found that out of the 61 fistula cases, 54 cases (89%) were a result of prolonged obstructed labour, 25% were teenage pregnancies, and 38% had given birth to their first child (Wadhawan & Wacha, 1983). Another study at Katete and Chilonga Mission Hospitals investigated the intention to prevent the

recurrence of obstetric fistula and knowledge of the risk factors. Findings revealed that approximately 69% of the women with Vesicovaginal fistula (a subtype of obstetric fistula which develops between the vagina and rectum) were girls and young women between the ages of 12 and 20 years (Nambala et al., 2012). While these three studies presented evidence on a small sample of women with obstetric fistula, Zambia is still lacking a population-based sample of the prevalence of obstetric fistula. In addition, a study by Holme et al. (2007) on obstetric fistula in Zambia recommended that population-based studies be undertaken in order to accurately estimate the prevalence of obstetric fistula. The present study is different in that it estimated the prevalence and investigated the factors that are associated with obstetric fistula at a national level in Zambia.

As indicated by a local study which reported that 259 obstetric fistula patients were treated between 2003 and 2005, it can be suggested that the incidence of obstetric fistula is relatively high in Zambia (Holme et al., 2007). In 2001, the United Nations Population Fund (UNFPA) indicated that the prevalence of fistula was at 350 cases of vesicovaginal fistula per 1,000,000 deliveries (UNFPA, 2007). In 2003, the total prevalence of vesicovaginal fistula was estimated at 0.46% in all the provinces of Zambia (Mkumba et al., 2003). Persistence of obstetric fistula in Zambia may indicate that most pregnant women do not access the much needed maternal health services, especially at the time of delivery (Kasamba et al., 2013).

In Zambia, a majority (59.9%) of the women reside in rural areas (Zambia Central Statistical Office (CSO), 2012). The distances from rural areas to the nearest health facilities is vast (Chatt & Roberts, 2010). Long distances may delay rural pregnant women from seeking Emergency Obstetric Care (EmOC) and they subsequently suffer from obstructed labour (Wall, 2012). Obstetric fistula is more prevalent in poor countries where EmOc is lacking and home deliveries are a common practice (Wall, 2012). Estimates show that in Zambia, 67.5% of delays in receiving EmOC were experienced at home and 49.4% of the delays were experienced at the clinics, mainly because of transport challenges (Holme et al., 2007). Rural households are characterised by high levels of poverty with poor options to meet health related costs for services at the facility itself, forcing about half (52%) of Zambian women to deliver at home (Nakambale et al., 2015). Indicators show that in Zambia, the health care system is also grappling with a lack of experts such as gynaecologists, midwives, and other skilled birth attendants as well as inadequate and inconsistent medical supplies (Holme et al., 2007).

Socio-economic, demographic and maternal factors, such as place of residence, age, marital status, education level, wealth index, women's decision-making power, use of contraceptives,

height, parity, and type of birth attendant, might be some of the factors exacerbating obstetric fistula (Gulati et al., 2011; Roka et al., 2013; Sagna et al., 2011). Therefore, this study aimed to estimate the prevalence and investigate the factors that are associated with obstetric fistula at a national level in Zambia.

1.2. Statement of the problem

In 2003, UNFPA and its partners started a global campaign to end fistula in line with the Millennium Development Goals (MDGs), and this aim pertains to the MDGs which were due to be met by 2015.The aim was to improve maternal health and to reduce the number of obstetric fistula cases to zero by 2015, especially in developing countries. For instance, in Zambia, this campaign has been supported by the government. However, despite the strides that have been made, recent estimates show that at least 2,000 fistula patients wait for surgery each year (UNFPA, 2015). Suffice it to say that these values may be underestimated since many affected women remain unidentified owing to social isolation by their partners and their communities (Badlani & Wall, 2009; Kasamba et al., 2013). It is for this reason that the UNFPA, with the support of the government of Zambia, as well as local and other international partners, have committed technical and financial support to address challenges related to the development of obstetric fistula (UNFPA, 2015). Some of the interventions so far include timely and sustained access to antenatal care services (both prenatal and postnatal), increasing the number of skilled personnel to be responsible for deliveries, and empowering young girls through supporting their education. In addition, as part of the intervention to reduce obstetric fistula in Zambia, the government launched a campaign in 2013 to end child marriage and early pregnancies. Currently, the Zambian government through the Ministry of Gender has developed a 2016-2021 national strategy to end child marriage (Ministry of Gender, 2016).

Obstetric fistula is a condition that is a public health concern because it has devastating consequences (Kalembo & Zgambo, 2012; Wall, 2006). Obstetric fistula should not be diverted from being recognised as a public health problem, especially considering the fact that this condition is preventable and can be treated (Adler et al., 2013). An untreated obstetric fistula may result in infertility, neurological disorders, stillbirths and the death of the baby within the first seven days of life (Baba, 2013). In addition, an inability to conceive and give birth to another child could leave women grief-stricken (Wilson et al., 2015).

The negative psycho-social consequences that result from obstetric fistula are detrimental to the well-being of affected women and their relations (Sagna et al., 2011). Common experiences, such as stigma, divorce, rejection and isolation as a result of bad odour may limit their probabilities to secure jobs and effectively participate in community development work (Ahmed et al., 2007, p. S1; Cook et al., 2004; Melah et al., 2007). Some women have been reported to be involved in commercial sex and begging as a survival strategy (Cook et al., 2004; Macklin, 2012).

Furthermore, obstetric fistula has also resulted in the dissolution of intimate relationships between women suffering from the condition and their partners (Yeakey et al., 2009). In Zambia, a study by Holmes et al. (2007) found that women that experienced fistula conditions during childbirth often fall prey not only to divorce and depression, but they also suffer from poverty. Therefore, despite this reiteration, little is known about the extent to which educational attainment, wealth status, and women autonomy relate to fistula conditions. Therefore, the study of the maternal factors and their association with obstetric fistula among women, cannot be overstated.

1.3. Justification

Studies on obstetric fistula in Zambia have always been at a local scale (Holme et al., 2007; Nambala et al., 2012; Wadhawan & Wacha, 1983). Therefore, these studies could not accurately estimate the prevalence of obstetric fistula, nor could they yield generalizable results. Nationally, there are no studies to provide reliable results which can guide policies and intervention programmes (Cowgill, Bishop, Norgaard, Rubens & Gravett, 2015). This study therefore aimed to fill the knowledge gap, by using a population-based dataset from the 2013-14 ZDHS. Furthermore, the present study will provide additional information for evidence-based policy formulation and improvement in the design and implementation of programmes at both national and local level.

Previous studies that looked at obstetric fistula in Zambia were descriptive in nature (Holme et al., 2007). In their analysis, no statistical models were used to study risk factors of obstetric fistulas. Therefore, this study used a statistical model in order to better understand the risk factors of obstetric fistulas.

1.4. Research Question

i. The main research question for this study was: What factors are associated with obstetric fistula among women of reproductive age in Zambia?

1.4.1. Specific-research questions

The specific-research questions for this study are:

i. What are the levels of obstetric fistula in Zambia?
ii. What are the demographic and socio-economic factors associated with obstetric fistula among women in Zambia?

1.5. Research Objective

i. The main research objective for this study was: To investigate the factors associated with obstetric fistula among women in Zambia.

1.6. Specific objectives of the study

The specific research objectives for this study were:

i. To examine the levels of obstetric fistula in Zambia.

ii. To determine the demographic and socio-economic factors associated with obstetric fistula among women in Zambia.

1.7. Definition of terms:

Cephal-pelvic disproportion: A situation in which the size of the head/body of a baby is larger than the pelvis of the mother which makes it difficult for the baby to pass through the birth canal.

Grand-Multiparous: A woman who has given birth at least five times.

Genitourinary fistula: An abnormal link between genital and urinary organs.

Obstetric Fistula: A hole between the vagina and bladder/rectum that forms as a result of injury during childbirth.

Obstructed labour: This is also referred as labour dystocia, a situation whereby a baby is blocked in the birth canal to pass through the pelvis during the time of giving birth.

Parous: A woman who has given birth between two and four times.

Premiparous: A woman who has given birth only once or is pregnant for the first time.

Rectovaginal fistula: An abnormal connection between the rectum and vagina.

Urogenital fistula: a link between the urinary and vaginal/rectum that results in the leaking of urine or faeces.

Vesicovaginal fistula: A subtype of obstetric fistula that occurs between the vagina and bladder.

Woman decision-making power: Defined as the ability of a woman to make her own decisions regarding seeking health care services and contraceptive use.

Chapter 2 Literature Review

2.1 Introduction

This chapter provides a review of literature on the prevalence of obstetric fistula at multiple levels: globally, sub-Saharan Africa, Southern Africa and Zambia, and the factors associated with it. It also provides a global map on the prevalence of obstetric fistula, as well as the conceptual and theoretical framework which guided the process of interpreting the results to ensure that they were not driven by the researcher's personal instincts or assumptions.

2.2 Obstetric fistula

Globally, the prevalence of obstetric fistulae differs between developed and underdeveloped countries. In the USA and Europe, obstetric fistula ceased to exist between 1935 and 1950, due to the high quality of obstetric care (Ahmed & Tunçalp, 2015a). While the prevalence of obstetric fistula in developed countries remains very low, studies have found that obstetric fistula is more common in low-income countries (Biadgilign et al., 2013; Gulati et al., 2011; Jokhio et al., 2014; Kasamba et al., 2013). This difference may be attributed to the fact that obstructed labour still remains a major challenge in low-income countries (Neilson et al., 2003). For instance, a study that looked at the prevalence of obstetric fistula in rural Pakistan reported a prevalence rate of 0.39% (Jokhio et al., 2014), while a study in India indicated that obstetric fistula ranged from 0.3% to 3.4% (Gulati et al., 2011). In Afghanistan, the prevalence of obstetric fistula was 0.4% (Mohmand et al., 2011).

Sub-Saharan Africa has relatively high incidences of obstetric fistula evident by 33,000 cases reported in a year in the region (Stanton et al., 2007). A study that was conducted on the prevalence of symptoms of obstetric fistula in 19 sub-Saharan African countries using DHS data showed that there were 3 fistula cases per 1,000 women of reproductive age (Maheu-Giroux et al., 2015). The study further indicated that among the 19 countries, Ethiopia had the highest prevalence of women with symptoms of obstetric fistula. Among the 19 countries, there was a variation in prevalence between countries, ranging from 0.4 in Burkina Faso to 19.2 in Uganda (Maheu-Giroux et al., 2015). Conversely, another study reported that the prevalence of obstetric fistula was 1.62 cases per 1,000 women in Ethiopia, 0.96 cases per 1,000 women in Gambia, and 1.41 cases per 1,000 women in Benin (Adler et al., 2013). In Tanzania, the annual incidence rate of obstetric fistula has been reported to be 3.38 cases per 1,000 births (Tsui et al., 2007).

In addition, the grounded theory that was used to investigate the prevalence of obstetric fistula in Kaptembwa Kenya, showed that out of 74 cases of obstetric fistula, 70 (94.6%) were among women aged 29-39 years (Kimani et al., 2014). In Sudan, the estimated prevalence of obstetric fistula showed that for every 100,000 women there were at least 30 cases of fistula (Adler et al., 2013). A retrospective study conducted in Burkina Faso on urogenital fistula found that for every 100,000 deliveries, there were 23.1 new cases of obstetric fistula (Sombie et al., 2007). In Cameroon, the occurrence of new obstetric fistula cases was estimated at around 350 to 1,500 cases annually (Tebeu et al., 2009a).

The findings of Patel et al. (2014) in Sierra Leone showed that the prevalence of obstetric fistula was 606 cases per 100,000 women. Furthermore, data obtained from the global fistula map indicates that in the year 2013, about 2,300 fistulas cases were treated in Uganda, 1,600 fistula cases were treated in Ethiopia, and 1,300 fistula cases were treated in Nigeria (Ahmed & Tunçalp, 2015a). In Nigeria, fistula incidence was estimated at 2.11 obstetric fistula cases per 1,000 births, and the annual incidence rate for Niger was 5.61 (Tsui et al., 2007). It is also worth noting that most of the estimated incidences and prevalence of obstetric fistula reported in these studies were from hospital-based studies.

In Southern Africa, studies on obstetric fistula have been mostly published in Malawi and Tanzania. For example, a study that focused on the prevalence of obstetric fistula in Malawi found that the prevalence of obstetric fistula was 1.6 per 1,000 women (Kalilani-Phiri et al., 2010). In another study conducted in Malawi, the crude prevalence of obstetric fistula was 15.6 per 1,000 women (Johnson, 2007). From the results of the two studies in Malawi, there is a contradiction in the prevalence of obstetric fistula. The contradiction may be due to the fact that the sizes of the study population in the two studies were different. For instance, a study by Kalilani-Phiri et al. (2010) estimated the prevalence of obstetric fistula using a community survey of 9 districts and hospital records, whereas Johnson (2007) used Malawi DHS data which covers 28 districts. In Zimbabwe, the prevalence of fistula is not known. However, there are concerns that the number of obstetric fistula cases at Chinhoyi provincial hospital is growing (UNFPA, 2016).

In Zambia, as indicated in chapter 1, it is suspected that the prevalence of obstetric fistula is high, but that most women do not report it, and die in silence (Holme et al., 2007). Although certain countries managed to come up with rates of obstetric fistula, very little is known about the prevalence and the factors that are associated with the risk of developing the condition (Gulati et al., 2011; Kasamba et al., 2013; Kazaura et al., 2011).

A global map of the prevalence of obstetric fistula

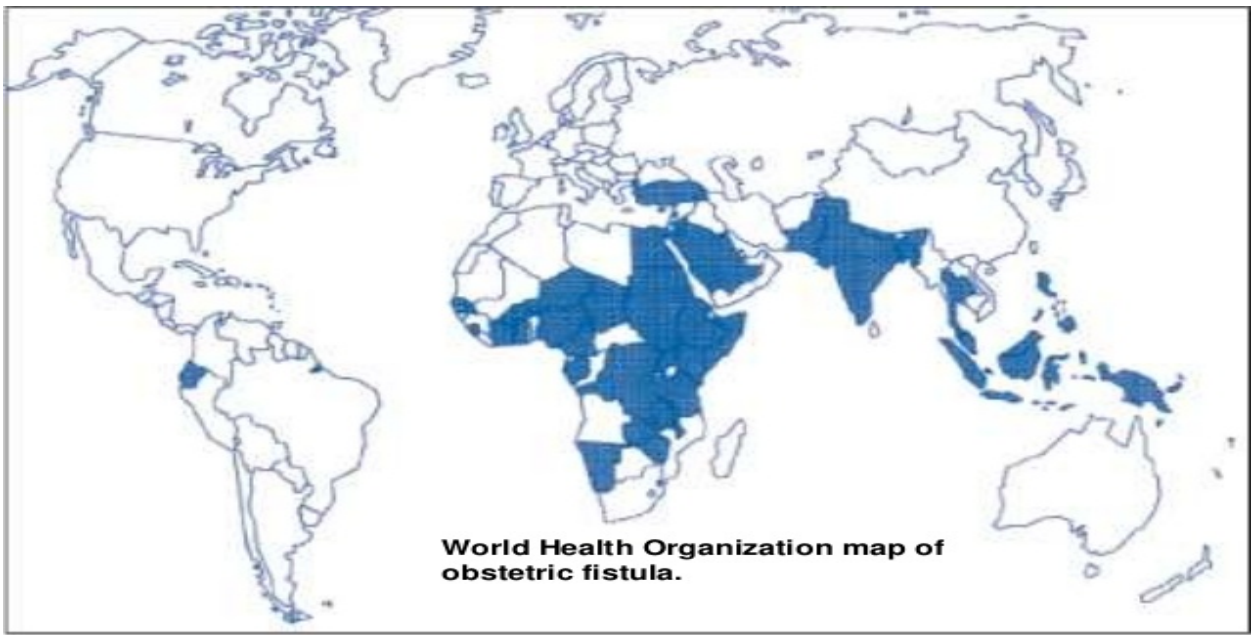


Figure 1: Map Showing the Prevalence of Obstetric Fistula across the Globe 2016

Source: https://www.google.co.za/search?q=obstetric+fistula+prevalence+map&tbm

2.3 Possible factors associated with obstetric fistula

Obstetric fistula is caused by obstructed labour, which is a direct result of limited and/or delayed access to health services. Research has shown that socio-economic factors such as women's education levels have an influence on the risk of developing fistula (Roka et al., 2013). For example, women with a higher education level have been found to have a lower risk of fistula as compared to those with lower educational levels (Barageine et al., 2014). This study also found that a post-primary level of education serves as a protective factor against the risk of developing obstetric fistula in relation to women with no education (Barageine et al., 2014). This is because education improves an individual's knowledge, as well as empowers a woman to make healthy decisions regarding health seeking behaviours during pregnancy (Mabeya, 2004). In a study that was done in Zambia, the findings revealed that women with obstetric fistula had low levels of education (Holme et al., 2007).

Accessing appropriate and quality obstetric care and services is one of the challenges in developing countries, including Zambia. This is compounded by the high level of poverty, poor

health systems, and costs related to obstetric treatment (Kelly & Winter, 2007). It has been reported that 25% of women had a fistula that was caused by poor caesarean surgical services (Sjøveian et al., 2011). Studies also show that women in the lowest wealth quintile exhibit a higher risk of obstetric fistula as compared to those women in the highest wealth quintile (Johnson, 2007). This may be attributed to the fact that most poor women lack the financial resources to access good obstetric care services and may not have adequate means of transportation to take them to the hospital (Essendi et al., 2011). As a result, this leads to delays in seeking health care services, thereby causing obstructed labour (Ensor et al., 2014). However, in Uganda no association was established between socio-economic status and obstetric fistula (Sagna et al., 2011). With high poverty levels in Zambia, most women, unfortunately, cannot access such quality obstetric care services. Therefore, about 67.5% of women deliver at home as compared to 49.4% at clinics (Holme et al., 2007). The World Health Organization has called fistula "the single most dramatic aftermath of neglected childbirth" (Di Marco, 2008, p. 144). This implies that if a woman receives proper medical attention, she will not develop a fistula.

It has also been reported that fistula is associated with the height of the mother. The height of the mother sometimes reflects her nutritional status during childhood (Wall, 2012). Literature shows that women with fistula are often small and are shorter in height (Biadgilign et al., 2013). Their risk is exacerbated by Cephalo-Pelvic Disproportion (CPD) complications (a situation whereby the baby's head is large in relation to the relatively small size of the mother's pelvis) (Wall, 2012). A study that conducted a clinical review of the risk factors of obstetric fistula in 15 sub-Saharan African countries and 4 middle east countries' findings, showed a strong association between obstetric fistula and the height of the mothers (Tebeu et al., 2012). For instance, 40%–79.4% of the women who were living with fistula were found to be shorter than 150cm (Tebeu et al., 2012). In addition, similar findings have shown that women who are shorter than 150cm are 2.6 times more likely to develop a fistula in comparison to females who are taller than 150cm (Barageine et al., 2014; Raassen et al., 2008; Roka et al., 2013; Wall et al., 2004). In contrast, a study that looked at the risk factors of obstetric fistula in Cameroon, found that in the majority of fistula cases, the women were taller than 150cm (Tebeu et al., 2009). More research needs to be done in Cameroon on the average height of women in order to have a clear association between mother's heights and obstetric fistula.

Different studies have shown that obstetric fistula is linked to a number of socio-economic and cultural factors including demographic factors (Holme et al., 2007b; Roka et al., 2013; Sagna

et al., 2011; Wall, 2012). For instance, a study conducted in Zambia indicated that fistula development was associated with giving birth at an older age (Holme et al., 2007). Similar findings were also reported in Uganda (Sagna et al., 2011). Nevertheless, birth related complications have been found to be associated with obstetric fistula. Women aged 20-24 years were 2.45 times more likely to develop obstetric fistula compared to women aged 15-19 years (Sagna et al., 2011). Furthermore, the authors clarified that the results referred to the period that women in the age group 20-24 years were exposed to the risk of obstetric fistula as compared to those in the age group of 15-19 years old. At one treatment centre in Cameroon, teenagers accounted for 8.9% to 86% of the obstetrical fistulae patients at the time of treatment (Tebeu et al., 2012). In Zimbabwe, most of the women with fistula ranged between 17 to 31 years old (Maunganidze et al., 2015). Despite the fact that younger women have a higher risk, it has also been found that the older the women at childbirth the higher the risk of obstetric fistula. For instance, women 45-49 years of age had 3.0 times the risk when compared to those aged 15-19 years (Sagna et al., 2011). However, from the results of the two studies above, there is a contradiction as to when women are susceptible to obstetric fistula.

Parity is another factor that predisposes women to obstetric fistula (Sih et al., 2016). It is believed that young primiparous women with prolonged labour are at a higher risk of experiencing obstetric fistula (Merson et al., 2005). In contrast, a study conducted in Malawi found that obstetric fistula was higher among multiparous women (Sih et al., 2016). Similar findings were observed in the Democratic Republic of Congo (Sjøveian et al., 2011). However, a study conducted on the characteristics of women admitted with obstetric fistula in the rural hospitals in west Pokot, Kenya, indicated that most of the patients with fistula were primiparous (Mabeya, 2004). In Zambia, about half (49%) of the women with fistula were primiparous and 27.6% were multiparous (Holme et al., 2007a). A primiparous woman has a higher chance of developing obstetric fistula during her first delivery because a first delivery has been associated with a longer duration of obstructed labour and more severe tissue damage (Muleta et al., 2010). Nonetheless, more research needs to be done to determine whether parity has a clear association with predisposition to developing obstetric fistula.

Marital status is a significant factor for studying the risk of developing obstetric fistula (Barageine et al., 2014). Women who marry at a young age are more likely to give birth at an earlier stage. Early childbearing has been found to be associated with pregnancy complications during delivery such as obstructed labour which in turn leads to obstetric fistula (Khisa et al.,

2011). In Uganda, a study that looked at obstetric fistula found that being married at a young age placed women at an increased risk of developing obstetric fistula (Sagna et al., 2011). In Zambia, as shown in Chapter 1, using hospital record data, marital status was associated with obstetric fistula (Holme et al., 2007a). Similarly, in Cameroon, the majority (62%) of fistula patients were married (Tebeu et al., 2009b). In contrast, other studies have found no association between marriage and obstetric fistula (Melah et al., 2007). For instance, the prevalence of fistula among divorced women has been found to be lower in other studies (Larissa et al., 2007; Muleta, 2004).

Place of residence is another factor that has been associated with obstetric fistula as most women live in rural areas and so lack access to EmOC. In India, women from rural areas were at a higher risk of experiencing obstetric fistula compared to women from urban areas (Gulati et al., 2011; Jungari & Govind Chauhan, 2015). Similarly, obstetric fistula was found to be common in rural Pakistan (Jokhio et al., 2014). Rural women are mostly affected as a result of high levels of poverty and lack of knowledge regarding obstetric fistula (Onolemhemhen et al., 2008). In addition, rural women have an increased challenge in accessing medical services resulting in home deliveries (Wall, 2012). However, place of residence was not considered in one study conducted in Zambia (Holme et al., 2007). Since most women in Zambia come from the rural areas (Zambia Central Statistical Office (CSO), 2012), where culture plays a role, it is likely that most births are assisted by a traditional birth attendant who does not have labour skills (Sialubanje et al., 2015). Furthermore, place of delivery and a mother's nutritional status among others are also perceived as some of the other factors contributing factors of obstetric fistula (Tebeu et al., 2012).

Research has also shown that the level of skill a birth attendant has, is associated with obstetric fistula (Gulati et al., 2011). In Uganda, delivery by an unskilled birth attendant was found to be a risk factor for developing an obstetric fistula compared to delivery by a skilled birth attendant (Kasamba et al., 2013). Someone with medical training will understand how to prevent complications, whereas an unskilled birth attendant with no formal education will not. For example, women in rural areas with a lack of transportation to formal medical centres will be treated by these unskilled birth attendants thereby exacerbating the problem. Absence or inaccessibility of antenatal care services are known to be contributing factors of obstetric fistula (Tebeu et al., 2012). In Zambia, rural women are at a higher risk of developing obstetric fistula, as most of them deliver at home with no skilled birth attendant and limited access to emergency obstetric care (Nakambale et al., 2015).

Consistent use of contraception prevents against unwanted or early pregnancy (Lopez et al., 2014). An obstetric fistula develops during delivery. Therefore, someone who has successfully used contraception will have no risk of developing obstetric fistula because she is less likely to become pregnant. There are very few studies which have been conducted on the association between contraceptive use and obstetric fistula (Benfield et al., 2011; Lawani et al., 2015; Tukur et al., 2015). For example, a study conducted in Nigeria found a strong association between lack of contraceptive use and the risk of developing obstetric fistula (Tukur et al, 2015). According to the study, the use of contraceptives was very low among fistula patients before the development of obstetric fistula (Tukur et al, 2015). Similar findings were reported in Democratic Republic of Congo (DRC) (Benfield et al., 2011). Other studies have also looked at the use of contraceptives among fistula patients after surgical treatment. In a study on contraceptive use after surgical treatment of obstetric fistula in the south-east of Nigeria, it was found that contraceptive use among fistula survivors was very low with only 37.2% of subjects reported to having been using contraceptives (Lawani et al., 2015). However, looking at contraceptive use after surgical treatment is not in the interest of the present study. In Zambia, previous studies on obstetric fistula did not look at the association between contraceptive use and the risk of developing obstetric fistula (Holme et al., 2007a).

Obstetric fistula has also been found to be associated with women's decision-making power (Sagna et al., 2011). Research has shown that most obstetric fistula patients are poor, uneducated and live in rural areas (De Bernis, 2007; Melah et al., 2007; Muleta et al., 2010; Tebeu et al., 2012). These are the factors associated with lack of a woman's decision-making power (Roush et al., 2012). For example, in a study that was conducted in Tanzania, findings showed that fistula cases were higher (60%) among women who had their partners or in-laws make decisions for them about the place of birth compared to women who made the decision themselves (Mselle et al., 2011). Other researchers also believe that obstetric fistula is a result of the delay in seeking treatment which stems from women waiting for permission from their husbands to seek medical help (Bellows et al., 2015; Mehta & Bangser, 2006). In a study that was done in Zambia on autonomy dimensions and care seeking delivery, the findings showed a strong association between women's decision-making power regarding health care seeking and facility delivery (Gabrysch, 2016). Furthermore, 65% of women in Zambia have reported that they lack the ability to make their own decision to seek health care (Hindin, 2005). This may also suggest that women's decision-making power could also be an important determinant of obstetric fistula in Zambia.

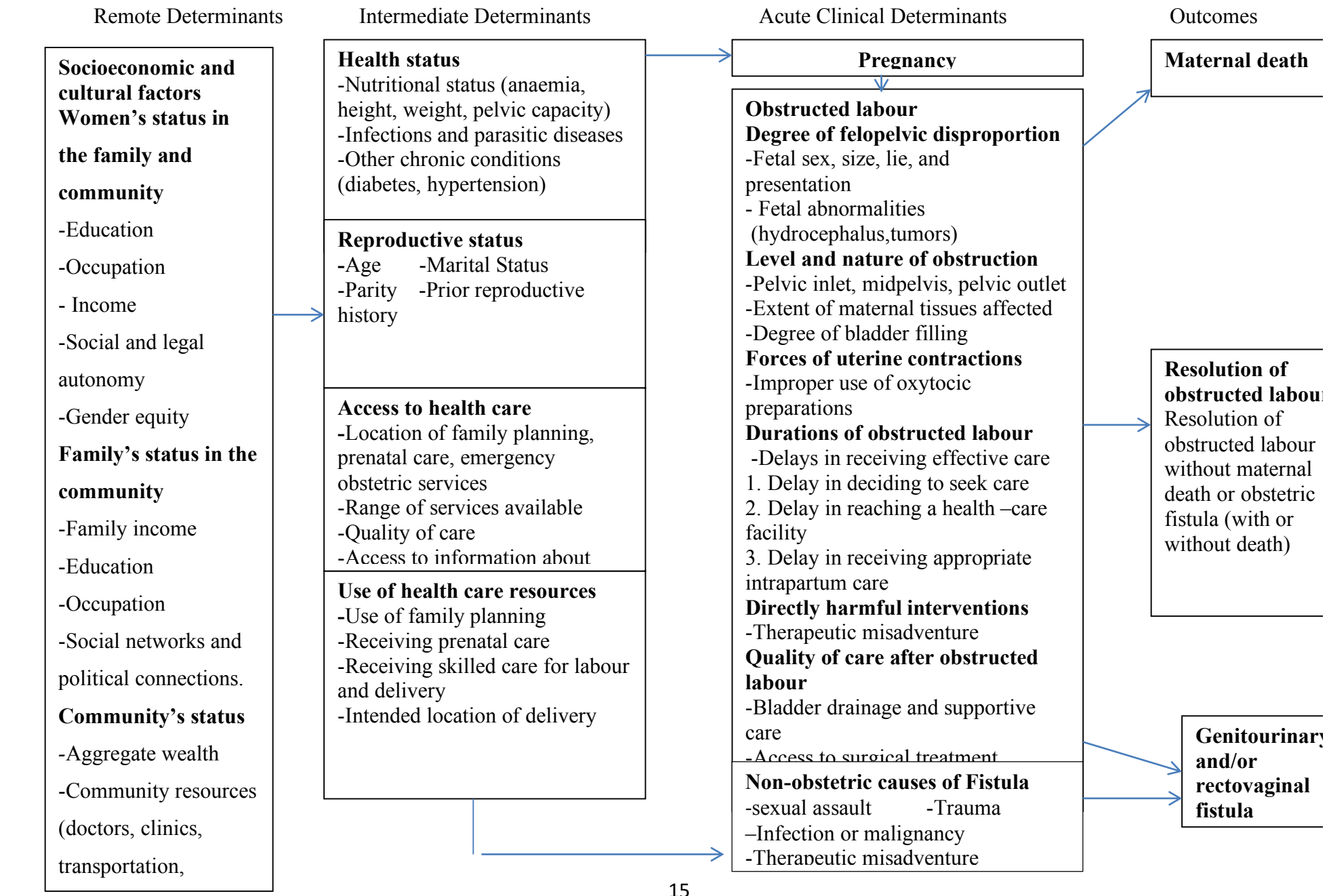
2.4 Theoretical framework

Wall's framework for analysing the determinants of obstetric fistula formation was used to analyse the determinants of obstetric fistula in this study. This framework was developed by Lewis Wall with the aim of reducing fistula formation (Wall, 2012). The framework has three key stages for the factors thought to be influencing the formation of fistula.

The three stages are remote, intermediate and acute determinants. The framework shows that any factor that is assumed to influence obstetric fistula, and thus any efforts to reduce the formation of obstetric fistula, will operate through one of the three mechanisms that were proposed by McCarthy and Maine (1992). First, by reducing the likelihood that a woman will become pregnant; secondly, reducing the likelihood that a pregnant woman will develop obstructed labour; and thirdly, improving the outcomes for women whose labour becomes obstructed (Wall, 2012). In addition, Wall's framework for analysing the determinants of obstetric fistula is theoretically indistinguishable to that of McCarthy and Maine (1992). However, the only difference is that Wall's framework specifically focuses on obstructed labour and obstetric fistula.

According to Wall, the remote determinants must operate through the intermediate determinants then through the acute clinical determinants in order for the outcomes to occur (Wall, 2012). The framework identified three sets of outcomes: maternal death, resolution of obstructed labour, and genitourinary and/or recto vaginal fistula. Maternal mortality is the most serious outcome of obstructed labour and obstetric fistula is the closest serious birth outcome (Wall, 2012). The framework also identified obstetric fistula formation to be directly influenced by obstructed labour. At an individual level, the framework identified a set of socioeconomic and cultural factors such as education, occupation, social and legal autonomy and gender equity. These factors influence a set of intermediate determinants such as health status, reproductive status, access to health care and use of health care resources. The intermediate determinants act as the background where pregnancy is formed which places women at risk of developing fistula. Figure 2 below illustrates the theoretical framework.

Figure 2: A FRAMEWORK FOR ANALYSING THE DETERMINANTS OF OBSTETRIC FISTULA FORMATION (WALL, 2012)



Adapted from Wall (2012)

2.5 The Conceptual Framework

The conceptual framework used in the study was adapted from Wall's framework for analysing the determinants of obstetric fistula formation (Wall, 2012). As shown in figure 2 above, the conceptual framework used three sets of determinants of obstetric fistula formation. According to this framework, socioeconomic covariates have a direct influence on intermediate determinants such as health status, reproductive status, access to health care and use of health care resources, which in the end have an indirect influence on the development of obstetric fistula. For example, place of residence could have an impact on the health status of a mother, for example their nutritional status. Women from rural areas are more likely to be malnourished and stunted which eventually affects their height. Women who are short in height compared to women who are taller in height are more likely to experience pregnancy complications when giving birth, which could result in obstetric fistula.

Place of residence and wealth status may also influence the reproductive status of women. Women from rural areas and poor households, compared to women from urban areas and rich households, are more likely to give birth at an early age, become sexually active at a younger age, get married at a younger age and have many children. The aforementioned factors could have an influence on pregnancy and its outcomes; i.e. obstetric fistula. Women who lack autonomy in their household are less likely to make a decision on the type of birth attendant when they are pregnant. They would wait for their husbands to decide for them whether to deliver at a health facility by a skilled birth attendant or deliver at home by an unskilled birth attendant. In the event that their husbands decide that they have to deliver at home by an unskilled birth attendant because of related financial costs at the health facility, the pregnant women may be at a higher risk of obstetric fistula if their labour becomes obstructed due to a lack of EmOC.

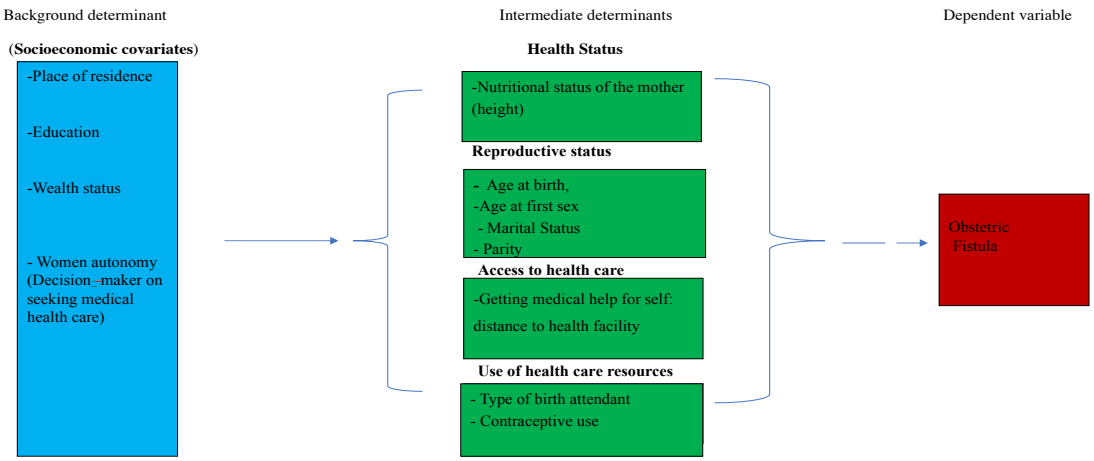


Figure 3: Conceptual framework for the study of obstetric fistula in Zambia (adapted from Wall (2012) framework

Note: In this study, the causal pathway of obstetric fistula formation was not considered because most of the acute determinants are a result of human anatomy. Hence, from intermediate determinants to obstetric fistula, a dotted arrow was used to show an indirect link.

2.6 Hypothesis statement:

Based on the reviewed literature and the conceptual framework presented in Figure 2, the following hypotheses were articulated and tested in this study.

H_1: Place of residence is associated with obstetric fistula.

H_2: Age at first sex is associated with obstetric fistula.

H_3: Household wealth status is associated with obstetric fistula.

Significance level (α) < 0.05/0.01/0.001

In this study, the choice of the level of the significance was informed by the null hypothesis. Furthermore, this was done in order to guard against a type 1 error and also to make sure that the association in the outcomes were not as a result of random chance.

Chapter 3 Research Methodology

3.1. Introduction

This chapter describes the data source and methods of analysis that have been employed in this study. It includes information on how the study achieved its objectives. The chapter also highlights information about the study design, population of interest, sample size and variables of this study. In addition, the chapter discusses statistical techniques, procedures on data management and analysis that are employed, and the strengths and limitations of the study.

3.2. Study Setting

Zambia is a landlocked country located in Southern Africa. It covers 752,612 square kilometres and it has a population density of 17 people per square kilometre (CSO, 2014). It shares borders with Malawi and Mozambique to the east, the Democratic Republic of Congo to the north, Namibia to the south-west, Angola to the west and Zimbabwe and Botswana to the south. There are 10 provinces in Zambia. These are Central, Copperbelt, Eastern, Luapula, Lusaka, Muchinga, Northern, North Western, Southern and Western. According to the 2010 Zambian census report there were 13,100,000 people in Zambia (CSO, 2014). Zambia is a former British colony, which attained political independence on 24 October 1964. Figure 4 below shows the Map of Zambia.



Figure 4: Map of Zambia

Source: http://www.mapsofworld.com/zambia

3.3. Study Design

This study was cross-sectional by design. The study used data drawn from the 2013-14 Zambia Demographic and Healthy Survey (ZDHS). The ZDHS is the latest dataset and the first of its kind to collect cross-sectional data on obstetric fistula in Zambia (UNFPA, 2014). The Central Statistical Office (CSO) in Zambia has conducted a number of surveys. The 2013-14 ZDHS is one of the surveys implemented by CSO in collaboration with the Ministry of Health (MOH), the University of Zambia Teaching Hospital (UTH) Virology Laboratory, the Tropical Diseases Research Centre (TDRC), and the Department of Population Studies at the University of Zambia (UNZA) under the supervision of the National Steering Committee (NSC) with technical support from ICF International (CSO, MOH and ICF International, 2014). The Zambian government, through the MOH and Ministry of Finance (MOF), funded the survey.

A two-staged stratified cluster sampling design was used. During the first stage enumeration EAs were selected, the probability proportional to size was used to select 722 EAs, with 305 EAs in urban areas and 417 EAs in rural areas. Zambia was stratified according to its provinces by splitting each province into urban and rural areas. The 20 sampling strata were obtained by stratifying the 10

provinces. During the second stage, a completed list of households was used to determine a sampling frame for the selection of the households in the EAs. A total of 18,052 households were selected in the second stage.

3.4. Study Population

The population of interest was women of reproductive age groups (15-49) in Zambia. The weighted sample size for this study was the 16,411 women who took part in the fistula module of the 2013-14 ZDHS.

3.5. Study Variables

3.5.1. Dependent variable

Table 3.1: The dependent variable

Obstetric fistula: Code in ZDHS (s461a)	Coded
No Fistula	0
Fistula	1

In the 2013-14 ZDHS, women were asked about the symptoms of obstetric fistula. They were asked if they had ever experienced a constant leakage of urine or stool from their vagina during the day and night after a difficult childbirth, sexual assault or after pelvic surgery. The response to this question was coded 0 if the answer was “no” and 1 when the answer was “yes” indicating the woman had fistula. It was from the above responses that an outcome variable called obstetric fistula was identified.

3.5.2. Covariates

The covariates were grouped into socioeconomic, health status, reproductive status, access to health care and use of health care resources based on the conceptual framework:

Table 3.2: List of covariates and category

Covariates	Name of Covariates and code in DHS	Original Code	How variables were coded in this study
Socioeconomic	Place of residence (v025)	Rural (1), Urban (2)	Rural (1), Urban (2)
	Education level (106)	No education (0), Primary (1), Secondary (2), Higher (3)	No education (1), Primary (2), Secondary+ (3)
	Wealth status (v109)	Poorest (1), Poor (2), Middle (3), Richer (4), Richest (5)	Poor (1), Middle (2), Rich (3)
	Decision-maker on seeking medical health care (v743)	Respondent alone (1), Respondent and husband/partner (2), Husband/partner alone (4), Someone else (5), Other (6)	Respondent alone (1), Joint decision (2), Husband/partner (3)
Health status	Nutritional status (height) (v438)	Continuous variable 1006 centimetres to 1967 centimetres	<150 cm (1), >=150 cm (2)
Reproductive status	Age at first birth (v212)	11, 12…42	15,16, 17…42
	Age at first sex (v525)	Not had sex (0), 11, 12…39, At first union (96)	15,16, 17…39
	Marital status (v501)	Never in union (0), Married (1), Living with a partner (2), Widowed (3), Together/separated (5)	Never married (1), In union (2), No longer with partner (3), Widowed (4)
	Parity level (v220)	0, 1 2, 3 4 , 5, 6+	Premiparous (1) Paraous (2) Grand multiparous (3)
Access to health care	Distance to health facility (v467d)	Big problem (1), Not a big problem (2)	Big problem (1), Not a big problem (2)
Use of health care resources	Type of birth attendant: Generated from prenatal birth attendant traditional and medical	No (0) Yes (1)	Medical assisted (1) Not medical assisted (2)
	Contraceptive use (v364)	Using modern method (1), traditional method (2), Non-use-intends to use (3)	Not using contraceptive(1), Using modern contraceptive (2), Using traditional contraceptive (3)

3.6. Ethical issues

There were no ethical issues in the context of this analysis as de-identified secondary data were used with all the participant identifiers removed. For the purpose of this study, ethical permission to use the data was granted by ORC Macro Inc. The procedures regarding data-collection protocols can be found on the Measures Demographic and Health Surveys (DHS) website (http://www.measuredhs.com).

3.7. Data Management

This involved applying weightings to the dataset in an effort to more accurately reflect the population and include a multiplier which projects the results to a country's population. Weightings were done by using the 'Svy' survey commands in order to adjust for the cluster-sampling design and sampling weights. Recoding some of the independent variables was done in order to gain meaningful results and analysis as shown in Table 3.2 above. It is important to note that the covariate wealth status used in this study was applied at household level and not at an individual level since the DHS ask questions on wealth status of the household. STATA version 14 (STATA Corporation, College Station, TX, USA) was used for data management and Microsoft excel 2016 was used to draw the graphs and tables.

3.8. Data Analysis

For the purpose of this study, data analysis was both descriptive and analytic.

Descriptive statistics

This involved tabulation of the all the variables used in the study in order to describe the frequency distribution of respondents. For continuous variables, means were used to estimate the distribution of respondents. Tabulation of the dependent variable was performed in order to answer the first objective of the study. The results of this were presented in tabular form. Obstetric fistula prevalence was estimated as follows:

Prevalence of Obstetric fistula =

$$\left(\frac{\text{the number of women of aged 15–49 years old in an area living with Obstetric Fistula.}}{\text{Total number of females age 15–49 years old who live in the same area}}\right)\times 1000$$

Source: https://www.measureevaluation.org/prh/rh_indicators/specific/of/number-percent-of-women-living-with-of

Prevalence of Obstetric fistula = $= \frac{97}{16{,}411}\ x\ 1000$

=5.91 obstetric fistula per 1000 women of reproductive ages.

Analytic

The first stage of the analysis involved a cross tabulation of the dependent variable and each of the covariates as well as a chi-square test in order to determine if the distributions of the variables differed from one another. In order to check the relationship between obstetric fistula and the covariates that were categorical in nature, a chi-square test was used. For continuous variables a simple complementary log log was performed. This was being tested at p-value <0.05. All the covariates which had a p-value <0.05 were considered statistically significant.

The Chi-square test is given by $X^2 = \sum \frac{(O-E)^2}{E}$

Where: O = the frequencies observed

E = the frequencies expected

$\sum$ = the 'sum of ' (McHugh, 2013)

i. **Multivariate analysis**

A complementary log log regression model was performed in order to determine covariates of obstetric fistula. Covariates that were fitted into this model were those that were significant at a bivariate analysis of simple complementary log log regression model. However, there were also other variables that did not qualify for inclusion in the final model based on the p-value, but they were still included in the final model. This was because in some of the previous studies they have been considered potential factors of obstetric fistula. A complementary log log regression model is used when the data is symmetrical, the outcome is a binary and the events are rare (Penman & Johnson, 2009). In this study, obstetric fistula had an uneven distribution of 0.56% in the population of women aged 15-49 years old. The complementary regression model is given by the following equation:

$$\Pr(Y = 1|X) = 1 - \exp\{-\exp(X\beta)\}$$

Where:

$\Pr(Y = 1|X)$ denotes the probability of experiencing obstetric fistula.

exp is the exponential term.

(X) represents the covariates in the model.

(β) is the coefficient term of X in the model. (Williams, 2016)

The linktest command was used to check how well the model fits the data. According to this command, the model is considered well specified when p-value of a _hatsquare is > 0.05 (Archer & Lemeshow, 2006). In this study the test of goodness of fit was not violated. The p-value for the _hatsquare was not significant at 5 per cent with a p-value of 0.111. The results of a linktest are shown in figure 6 in the Appendix.

3.9. Multicollinearity

Inclusion of Marital status in the final model was avoided as it was found to be highly correlated with decision-maker regarding seeking medical health care. A Pearson's Correlation (pwcorr) command was used to check for multicollinearity, any relationship of the independent variables with a p-value of > 0.70 was a cause of concern. Table 5 in the Appendix shows the results for checking of multicollinearity.

Chapter 4 Results

4.1. Introduction

This chapter provides the results of the analysis. Section 4.2 gives a profile of the study population while section 4.3 gives the results of bivariate analysis. In sections 4.4 and 4.5 the results of bivariate complementary log log and multivariate complementary log log regressions are presented respectively.

4.2. Profile of respondents

The descriptive results of Table 4.1 below were very important in providing the basic characteristics of the study population. The findings in Table 4.1b below show that in this study, the median age at birth among women of reproductive ages in Zambia was 18 years old. The median age for women starting sexual intercourse was 16 years old. About 39% of women were premiparous, 38% were parous and 24% were grand multiparous. With regard to marital status, a higher percentage (60%) of respondents were in a union and only 27% had never been married. While 46% of women indicated that they belonged to rich households in terms of wealth status, about 34% reported that they belonged to poor households. More than half (53%) of the women lived in rural areas and 47% were from an urban area.

The results in Table 4.1 also shows the variation in levels of education among respondents, with about 45% having at least secondary education, and only 8% without basic education. About 42% of the respondents reported that they made a joint decision with their partners regarding seeking health care and only one quarter reported that a husband decided on their behalf. The majority of women (65%) were not using contraceptive methods, 32% were using modern contraceptive methods, and 3% used traditional contraceptive methods. Regarding type of birth attendance, about 34% reported having been medically assisted during pregnancy, 22% were traditionally assisted, and 43% were assisted by others. A large proportion (90%) of the respondents had a height greater than 150cm and about 10% had a height less than 150cm. The majority (63%) of women reported that the distance they travelled to a hospital was not a big problem, while 37% reported that it was a big problem. The results in Table 4.1 below also show that in Zambia, 0.59% of women of reproductive ages reported having suffered from obstetric fistula.

Table 4.1: Distribution of Frequency, Percentage, Mean and Standard Deviation

Covariates	(N=16411) Frequency (n)	Percent (100 %)
Place of Residence		
Urban	7585	46.22
Rural	8826	53.78
Education Level		
No education	1375	8.38
Primary	7677	46.78
Secondary +	7347	44.77
Wealth Status		
Poor	5720	34.86
Medium	3077	18.75
Rich	7613	46.39
Decider on seeking medical health care		
Husband/partner	2540	25.41
Joint decision	4178	42.47
Respondent alone	3120	31.72
Height of the mother		
< 150cm	1609	9.82
>=150cm	14802	90.18
Parity Level		
Premiparous	6367	38.8
Parous	6155	37.51
Grand multiparous	3889	23.7
Marital Status		
Never married	4572	27.86
In union	9859	60.07
No longer with partner	1406	8.57
Widowed	574	3.50
Distance to Hospital		
Not a big problem	10362	63.22
A big problem	6030	36.78
Type of birth attendant		
Medical assisted	5689	34.67
Traditional assisted	3635	22.15
Others	7087	43.18
Contraceptive Use		
Not using contraceptives	10643	64.86
Using modern contraceptives	5326	32.45
Using traditional contraceptives	442	2.69
Obstetric fistula		
No obstetric fistula	16314	99.41
Obstetric fistula	97	0.59

Continuation of Table 4.1

Covariates	N=16411	Median	Interquartile range
Age at first birth	12421	18	3
Age at First Sex	9 798	16	3

4.3. Distribution of obstetric fistula cases cross provinces in Zambia

In Table 4.2a below, results showed a distribution of obstetric fistula across different provinces in Zambia. There were no cases of obstetric fistula in the Central province, while Muchinga had the highest levels (1.3%) of obstetric fistula compared to the other provinces in country. The study went further to look at the frequency distribution of obstetric fistula and their covariates in the 8 provinces.

Table 4.2b below presents the frequency distribution of obstetric fistula in relation to certain of the covariates. In almost all of the provinces, the cases of obstetric fistula were higher among women with a primary level of education compared to those with at least a secondary education; with 10 cases of obstetric fistula in Eastern province, 9 cases in Southern, 7 cases in Luapula and Muchinga provinces, 6 cases in the Northern Province and 3 cases in the North-west province. In Lusaka, when education level was considered, there was no marginal difference on the number of obstetric fistula cases among women with at least a secondary education (4) compared to women with a primary education (4). Interestingly, in Copperbelt, out of the 17 obstetric fistula cases, 12 of the cases had a secondary education, 4 of the cases had a primary level of education, and 1 of the cases had no education.

Table 4.2a: Frequency and percent distribution of obstetric fistula across provinces in Zambia

Province	Obstetric fistula	
	Non cases (n=16316)	Cases (n=98)
	Frequency (%)	Frequency (%)
Central	1467 (100)	0 (0.00)
Copperbelt	2819 (99.40)	17 (0.60)
Eastern	1916 (99.24)	15 (0.76)
Luapula	1133 (99.16)	10 (0.84)
Lusaka	3259 (99.78)	7 (0.22)
Muchinga	858 (98.75)	11 (1.25)
Northern	1187 (98.92)	13 (1.08)
North west	709 (99.36)	5 (0.64)
Southern	1991 (99.16)	17 (0.84)
Western	997 (99.67)	3 (0.33)

Table 4.2b: A bivariate frequency distribution of obstetric fistula and some of the covariates across different provinces in Zambia

	Provinces							
	Copperbelt		Eastern		Luapula		Lusaka	
Obstetric fistula	Non-cases (n=2818)	Cases (n=17)	Non-cases (n=1910)	Cases (n=15)	Non-cases (n=1133)	Cases (n=10)	Non-cases (n=3259)	Cases (n=7)
	n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Covariates								
Education level								
No education	75 (98.79)	1 (1.21)	347 (98.71)	5 (1.29)	124 (99.42)	1 (0.58)	161 (4 100)	0 (0.00)
Primary	929 (99.51)	4 (0.49)	1064(99.10)	10 (0.90)	702 (99.05)	7 (0.95)	1059 (99.65)	4 (0.35)
Secondary +	1815 (99.37)	12 (0.63)	499 (99.90)	1 (0.10)	307 (99.30)	2(0.70)	2039 (99.82)	4 (1.76)
Parity level								
Premiparous	1311 (99.87)	2 (0.13)	662 (99.23)	5 (0. 77)	350 (99.51)	2 (0.49)	1514 (99.80)	3 (0.20)
Parous	1013 (98.99)	10 (1.01)	718 (99.13)	6 (0.87)	415 (99.39)	3 (0.61)	1331(99.72)	4 (0.28)
Grand multiparous	494 (99.03)	5 (0 .97)	536 (99.40)	3 (0.60)	368 (98.57)	5 (1.43)	414 (99.85)	1 (0.15)
Wealth status								
Poor	234 (98.85)	3 (1.15)	1080(99.34)	7 (0.66)	733 (99.14)	6 (0.86)	79 (98.37)	1 (1.63)
Medium	410 (99.23)	3 (0.77)	431 (98.5)	7 (1.50)	240 (99.02)	2(0 .98)	238 (99.74)	1 (0.26)
Rich	2175 (99.49)	11 (0.51)	405 (99.78)	1(0.22)	159 (99.49)	1 (0.51)	2941 (99.82)	5 (0.18)
Place of residence								
Urban	2367 (99.45)	13 (0.55)	282 (99.68)	1 (0.32)	243 (99.16)	2 (0.84)	2869 (99.84)	5 (0.16)
Rural	452 (99.17)	4 (0.83)	1634(99.16)	14 (0.84)	890 (99.16)	8 (0.84)	390 (99.33)	3 (0.67)

Continuation of Table 4.2b

	Provinces							
	Muchinga		Northern		North west		Southern	
Obstetric fistula	Non-cases (n=858)	Cases (n=11)	Non-cases (n=1187)	Cases (n=13)	Non-cases (n=709)	Cases (n=5)	Non-cases (n=1991)	Cases (n=17)
	n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Covariates								
Education level								
No education	84 (98.71)	1(1.29)	112 (96.24)	4 (3.76)	81(100)	0 (0.00)	104 (100)	0 (0.00)
Primary	500 (98.54)	7(1.46)	751 (99.16)	6 (0.84)	350 (99.14)	3 (0.86)	1029 (99.12)	9 (0.88)
Secondary +	274 (99.14)	2 (0 .86)	323 (99.31)	2 (0 .69)	277 (99.44)	2 (0.56)	856 (99.11)	8 (0.89)
Parity level								
Premiparous	294 (99.04)	3 (0 .96)	357 (98.90)	4 (1.10)	257(99.75)	1 (0.25)	685 (99.47)	4 (0. 53)
Parous	298 (98.21)	5 (1.79)	415 (99.02)	4 (0.98)	254 (99.49)	1 (0.51)	764 (99.03)	7 (0.97)
Grand multiparous	266 (99.03)	3 (0.97)	416 (35.02)	5 (98.82)	197 (98.67)	3 (1.33)	541 (98.96)	6 (1.04)
Wealth status								
Poor	511 (98.76)	6 (1.24)	788 (98.63)	11 (1.37)	365 (99.25)	3 (0.75)	666 (99.80)	1 (0.20)
Medium	166 (98.81)	2 (1.19)	216 (100)	0 (0.00)	172 (99.63)	1 (0.37)	604 (98.45)	10 (1.55)
Rich	181 (98.64)	2 (1.36)	184 (98.90)	2 (1.10)	171 (99.30)	1 (0.70)	721 (99.18)	6 (0.82)
Place of residence								
Urban	187 (99.33)	1 (0.67)	248 (98.88)	3 (1.22)	200 (99.71)	1 (0. 29)	530 (98.76)	7 (1.24)
Rural	670 (98.58)	10 (1.42)	939 (98.93)	10 (1.07)	509 (99.22)	4 (0.78)	1461 (99.31)	10 (0.69)

4.4. Analysis of independent covariates and Obstetric fistula

The results in Table 4.2 below, shows the percentage in each category of explanatory variable and the chi-square test between obstetric fistula and each of the independent variables considered. Overall the results showed that parity level, marital status and health care decider were significantly associated with obstetric fistula in Zambia. With regard to parity level and obstetric fistula, the highest percentage (0.8%) of obstetric fistula cases were among grand mulitparous women, followed by parous women (0.7%) and lastly premiparous women (0.4%). About 0.8% of obstetric fistula cases were among women who were in union, and the lowest percentage (0.28%) of obstetric fistula cases were among the never married. In relation to wealth status at the household, 0.83% of women with obstetric fistula were from households of medium wealth status. Furthermore, the results in Table 4.2 indicate that 0.71% of women with obstetric fistula came from rural areas.

Table 4.2: Analysis of independent covariates and Obstetric fistula

		Obstetric Fistula		
		No obstetric fistula	With obstetric fistula	
Covariates	**Total**	Frequency (%)	Frequency (%)	p- value
Socioeconomic				
Place of residence	**N=16411**			0.0838
Urban	7585	7551(99.55)	34 (0.45)	
Rural	8826	8763 (99.29)	63 (0.71)	
Wealth status	**N=16411**			0.0751
Poor	5720	5680 (99.30)	40(0.70)	
Medium	3077	3052(99.17)	26 (0.83)	
Rich	7613	7582 (99.59)	31(0.41)	
Education level	**N=16411**			0.3061
No education	1375	1364 (99.15)	12 (0.85)	
Primary	7677	7625 (99.33)	52 (0 .67)	
Secondary +	7347	7313 (99.54)	34 (0.46)	
Decider on seeking medical health care	**N=16411**			0.04**
Husband/partner	2513	2513 (98.97)	26 (1.03)	
Joint decision	4178	4158 (99.53)	20 (0.47)	
Respondent alone	3091	3091 (99.07)	29 (0 .93)	
Health status				
Height of the mother	**N=16411**			0.8281
< 150cm	1609	1597 (99.3)	11 (0.71)	
>=150cm	1477	14687(99.42)	86 (0.58)	
Reproductive status				
Parity level	**N=16411**			0.0360*
Premiparous	6367	6344 (99.63)	23 (0.37)	
Parous	6155	6112 (99.30)	43 (0.70)	
Grand multiparous	3889	3859 (99.22)	30 (0. 78)	
Marital status	**N=16411**			0.0068***
Never married	4572	4559 (99.72)	13 (0.28)	
In union	9859	978 (99.24)	75 (0. 76)	
No longer with partner	1406	1400 (99.44)	6 (0.56)	
Reproductive status				
Age at first birth	12,421			0.8620
Age at first sex	9,798			0.1589
Access to health care				
Distance to hospital	**N=16411**			0.9665
Not a big problem	10362	10301 (99.41)	61 (0.59)	
A big problem	6030	5994 (99.40)	36 (0.60)	
Contraceptive use	**N=16411**			0.5027
Not using	10643	10683(99.46)	57(0.54)	
Using modern	5326	5289 (99.32)	36 (0.68)	
Using traditional	442	439 (99.29)	3(0.71)	

Note: *** Significant at p-value <0.01; **significant at p-value <0.05

4.5. Bivariate and Multivariate binary complementary log log regression

With reference to Table 4.3 below, the results showed a strong relationship between decision-makers regarding seeking medical health care and obstetric fistula. The findings from this study indicated that those women who jointly made the decision with their husband on seeking health care, compared to those women whose husbands or partners made the decision for them, had lower odds of obstetric fistula (OR=0.46, CI: 0.25-0.83). Furthermore, the results in Table 4.3 show that there is a strong association between parity level and obstetric fistula. The odds of obstetric fistula among parous women was 0.92 times higher compared to premiparous women. The results also showed that the higher the parity level, the higher the odds of obstetric fistula. Grand-multiparous women were 4 times more likely to develop obstetric fistula as compared to premiparous women. With regard to marital status and obstetric fistula, the findings from this study showed that being in union puts women at higher odds of obstetric fistula compared to those in the reference category. The odds of obstetric fistula were 70% greater among women who were in union compared to those who were never married. In this section, all the covariates that were found to be significant at bivariate analysis were incorporated into the final model. There were other variables which were also included into the final model but they were not significant at the bivariate analysis because in other studies they have been reported as important risk factors for obstetric fistula.

In the multivariate analysis, wealth status (rich) and an increase in age at first sex, were found to be protective factors against obstetric fistula in Zambia. Women from households of rich wealth status were 67% less likely to develop obstetric fistula compared to women from households of poor wealth status. An increase in age at first sex reduced the odds of obstetric fistula by 13%.

Table 4.3: Bivariate and Multivariate binary complementary log log regression

Covariates	Obstetric fistula					
Socioeconomic	**uOR**	**p-value**	**(95% CI)**	**aOR**	**p-value**	**(95% CI)**
Place of residence						
Urban=(R.C)	1.00			1.00		
Rural	1.57	0.09	(0.94-2.65)	0.98	0.98	(0.37-2.62)
Education level						
No education=(R.C)	1.00			1.00		
Primary	0.79	0.46	(0.43-1.47)	0.89	0.84	(0.29-2.71)
Secondary and above	0.54	0.07	(0.28-1.06)	2.65	0.10	(0.84-8.36)
Wealth status						
Poor=(R.C)	1.00			1.00		
Medium	1.19	0.61	(0.62-2.28)	0.57	0.31	(0.19-1.68)
Rich	0.59	0.06	(0.34-1.02)	0.34	0.01**	(0.14-0.79)
Decider on seeking medical health care						
Husband/partner=(R.C)	1.00			1.00		
Joint decision	0.46	0.01***	(0.25-0.83)	0.61	0.33	(0.23-1.65)
Respondent alone	0.91	0.77	(0.48-1.71)	0.94	0.92	(0.31-2.88)
Health status						
Height of the mother						
< 150cm ((R.C)	1.00					
>=150cm	0.82	0.57	(0.42-1.62)			
Reproductive status						
Age at first birth	1.01	0.86	(0.93-1.09)	1.13	0.10	(0.98-1.31)
Age at First Sex	0.87	0.16	(0.72-1.06)	0.86	0.02**	(0.77-0.97)
Marital Status						
Never married=(R.C)	1.00					
In union	2.70	<0.01***	(1.40-5.18)			
No longer with partner	1.48	0.45	(0.53-4.15)			
Widowed	1.99	0.23	(0.65-6.06)			
Parity Level						
Premiparous=(R.C)	1.00			1.00		
Parous	1.92	0.03*	(1.08-3.39)	1.82	0.46	(0.38-8.77)
Grand multiparous	2.13	0.02*	(1.13-4.03)	2.40	0.24	(0.5610.23)
Access to health care						
Distance to hospital						
Not a big problem=(R.C)	1.00			1.00		
A big problem	1.01	0.96	(0.61-1.69)	0.62	0.24	(0.28-1.37)
Use of healthcare resources						
Contraceptive use						
Not using contraceptives=(R.C)	1.00					
tradition contraceptives	1.02	0.92	(0.62-1.69)			
modern contraceptives	1.07	0.89	(0.41-2.76)			
Birth attendant						
Medical assisted=(ref. grp)	1.00			1.00		
Traditional assisted	1.29	0.35	(0.76-2.20)	1.25	0.56	(0.59-2.66)

Note:*** Significant at P<0.01; **significant at p<0.05; R.C=Reference Category,

Chapter 5 Discussion, Conclusion and Recommendation

5.1. Introduction

The objectives of this study were to examine the levels of obstetric fistula, along with the factors associated with obstetric fistula in Zambia. In this chapter, conclusions from the findings of the study will be drawn. This chapter will provide a reflection on the conceptual and theoretical frameworks and recommendations.

5.2. Discussion

The findings from this study shows that age at first sex and household wealth status (rich) are the covariates significantly associated with obstetric fistula in Zambia. Being in the household of rich wealth status was found to be a protective factor against obstetric fistula. This also supports the findings on a clinical review of factors associated with obstetric fistula, where it was found that obstetric fistula was associated with women who were from households of poor wealth status (Tebeu et al., 2012). This was expected in this study, since it is assumed that individuals in this category have the financial means to seek care from trained health care providers. A possible explanation for this finding could be that in most cases, wealthy people tend to live in urban settings, where access to EmOC is not usually a problem. Another possible explanation is that women from a wealthy household are likely to make independent decisions regarding antenatal care visits without waiting for consent from their husbands. This supports the findings of a recent study in Zambia, which found a strong association between women's decision-making power regarding health care seeking and facility delivery (Gabrysch, 2016). Early and regular prenatal care visits help women from wealthy households to know about the condition of their pregnancy and reduces the risk of pregnancy complications which in turn reduces the risk of obstructed labour and obstetric fistula. This study has contributed to the body of knowledge on the relationship between wealth status and obstetric fistula.

This study also found that increasing age at first sex prevents women from developing obstetric fistula. This complements what other studies have found, namely, that age at first sexual intercourse is a significant factor of obstetric fistula (Sagna et al., 2011). Age at first sex is a key indicator for early childbearing as it exposes a woman to pregnancy (Gigante et al., 2004). Therefore, a delay in age at first sex would mean that a young woman would delay the age at which she first gives birth, therefore allowing her pelvis to mature before giving birth.

In this study, some of the covariates that were found significant in a bivariate analysis in terms of their effects on obstetric fistula, were attenuated in a multivariate analysis. The following are the covariates: decision maker regarding seeking medical health care, and parity. Surprisingly, no association between education level and obstetric fistula was found. This finding contradicts the findings of a previous study in Uganda, where it was found that a higher education level reduced the risk of developing obstetric fistula (Barageine et al., 2014). A possible explanation for this finding may be as a result of a type 2 error (lack of statistical power). The other possible explanation for this finding could be that the occurrences of obstetric fistula in these women were a result of negligence by medical personnel to attend to these women at the time of emergency obstetric care. As indicated by Holme and colleagues (2007), about half of the delays in receiving EmOC were experienced at the clinics. This could also be an indication of a lack of sufficient health facilities for EmOC in Zambia. In addition, poverty could be a possible factor that contributed to this despite these women attaining secondary and higher education levels. Future research should focus more on the relationship between education level and obstetric fistula.

Thus, the present study supports Wall's (2012) conceptual framework for analysing the determinants of obstetric fistula. This is because the study found that covariates such as age at first sex, and wealth status (rich) can significantly influence obstetric fistula in Zambia.

5.3. Conclusion and Recommendations

This study used national data that contains a question about obstetric fistula in Zambia in order to investigate both the prevalence and the factors associated with obstetric fistula. The findings from this study suggest that age at first sex and wealth status at household level are the leading factors of obstetric fistula in Zambia. Furthermore, a lack of a woman's decision-making ability regarding seeking health care has negative consequences on pregnancy outcomes such as obstetric fistula. Therefore, based on these findings, the study concludes and recommends: prevention/awareness campaigns are needed in the poor areas and ideally programmes should be created where the necessary services to prevent obstetric fistulae are brought close to such high-risk areas.

5.4. Strength and Limitation of the Study

One of the strengths of this study is that it used a nationally representative dataset in order to address factors associated with obstetric fistula in Zambia. Nevertheless, it also had certain limitations: for instance, due to the type of dataset, the study could not examine the post effects of obstetric fistula

among women who were treated from this condition. In addition, the study only examined women of reproductive ages. However, there could be other women who may have been excluded from this study but also suffered from the same condition since they were outside the age range. Analysis of this study came from data that was self-reported; as such, the results from this analysis may either underestimate or overestimate the prevalence of obstetric fistula in Zambia. The DHS does not clinically validate obstetric fistula. Another limitation of this study was failing to account for those women who at the time of the survey were suffering from the condition and were ostracized, as DHS did not incorporate homeless or institutionalized individuals. Lastly, this study failed to establish causation.

5.5. Frontier for further studies

This study used a quantitative or statistical approach to investigate obstetric fistula in Zambia. Future studies should apply a mixed method approach in order to provide greater insights on other factors that may have been overlooked in this study.

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Appendix A:

pwcorr Placeof_residence level_education wealth_status healthcare_decider height Ageat_firstbirth Ageat_firstsex parity_level distanceto_hospital Marital_Status birth_attendant, sig star (.05)

Table 5: Results for multicollinearity

	Placeo~e	level_~n	wealth~s	health~r	height	Ageat_~h	Ageat_~x
Placeof_re~e	1.0000						
level_educ~n	-0.3540*	1.0000					
	0.0000						
wealth_sta~s	-0.6594*	0.4682*	1.0000				
	0.0000	0.0000					
healthcare~r	-0.1600*	0.1229*	0.1454*	1.0000			
	0.0000	0.0000	0.0000				
height	-0.0568*	0.0785*	0.1008*	0.0459*	1.0000		
	0.0000	0.0000	0.0000	0.0000			
Ageat_firs~h	-0.1138*	0.1733*	0.1527*	0.0519*	0.0329*	1.0000	
	0.0000	0.0000	0.0000	0.0000	0.0002		
Ageat_firs~x	-0.1585*	0.2371*	0.2460*	0.0671*	0.0657*	0.5396*	1.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
parity_level	0.1987*	-0.3847*	-0.2241*	-0.0181	0.0760*	-0.1740*	-0.0948*
	0.0000	0.0000	0.0000	0.0759	0.0000	0.0000	0.0000
distanceto~l	0.4233*	-0.2208*	-0.3663*	-0.0874*	-0.0383*	-0.0740*	-0.0858*
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Marital_St~s	0.0704*	-0.2432*	-0.1503*	.	0.0653*	0.0188*	-0.0173
	0.0000	0.0000	0.0000	.	0.0000	0.0360	0.0871
birth_atte~t	0.3603*	-0.2871*	-0.3599*	-0.0836*	-0.0158	-0.1180*	-0.1442*
	0.0000	0.0000	0.0000	0.0000	0.1278	0.0000	0.0000

	parity~l	distan~l	Marita~s	birth_~t
parity_level	1.0000			
distanceto~l	0.1530*	1.0000		
	0.0000			
Marital_St~s	0.4849*	0.0708*	1.0000	
	0.0000	0.0000		
birth_atte~t	0.2428*	0.2548*	0.0793*	1.0000
	0.0000	0.0000	0.0000	

Table 6.: Results of a linktest command

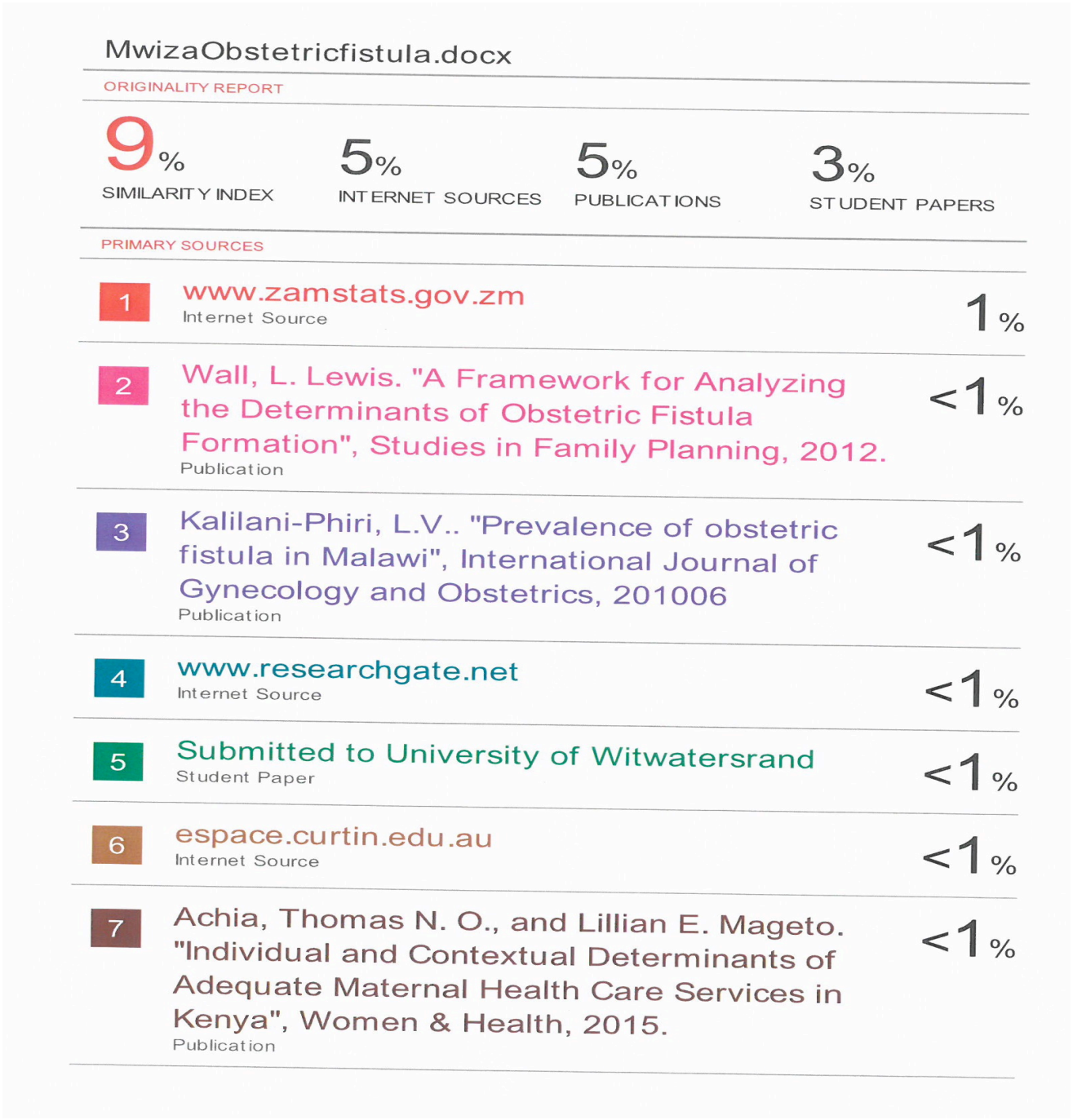
```
.     linktest
(running cloglog on estimation sample)

Survey: Complementary log-log regression

Number of strata   =        20                  Number of obs      =      4,359
Number of PSUs     =       706                  Population size    =   4,515.78
                                                Design df          =        686
                                                F(   2,    685)    =       9.16
                                                Prob > F           =     0.0001
```

obstetric_fistula	Coef.	Linearized Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	-2.454923	2.175864	-1.13	0.260	-6.727076	1.817231
_hatsq	-.3729786	.2335482	-1.60	0.111	-.8315338	.0855766
_cons	-7.81992	5.01783	-1.56	0.120	-17.67207	2.03223

Appendix B: Turnitin Report



MwizaObstetricfistula.docx

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