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Delays Contributing to the Development and Repair of Obstetric Fistula in Northern Tanzania

Cody Cichowitz^{1,2}, Melissa H. Watt², Bariki Mchome³, and Gileard G Masenga³

¹Johns Hopkins School of Medicine, Baltimore, MD, USA

²Duke Global Health Institute, Duke University, Durham, NC, USA

³Kilimanjaro Christian Medical Center, Moshi, Tanzania

Abstract

Introduction and Hypothesis—Delays in receiving obstetric care during labor contribute to high rates of maternal morbidity in sub-Saharan Africa. This exploratory study aims to identify important delays experienced during the development and subsequent repair of obstetric fistula in Northern Tanzania.

Methods—60 women presenting to a tertiary hospital in Tanzania with obstetric fistula completed structured surveys about the birth experience that led to the fistula and their experiences seeking surgical repair. A sub-set of 30 provided qualitative accounts. Clinical data were collected post-surgery. Data were analyzed according to a four-delay model, with iterative analysis allowing for triangulation of all sources.

Results—During the index pregnancy, women labored for a median of 48 hours. Most women (53/60; 88.3%) delivered in a facility but labored for a median of 12.4 hours before deciding to seek care (Delay 1). Women spent a median of 1.25 hours traveling to a facility (Delay 2). After presenting to care, 15/51 (29.4%) women waited at least an hour to see a medical provider, and 35/53 (66.0%) women required transfer to another facility (Delay 3). Women lived with fistula for a median of 10 years (Delay 4). Qualitative data provided context and a deeper understanding of the factors contributing to each delay.

Conclusions—Critical delays exist both outside and within the healthcare system that contribute to the development and timely repair of obstetric fistula. Health care system strengthening, particularly with regard to emergency obstetric care, is critical to reduce the burden of obstetric fistula in Tanzania.

Correspondence: Dr. Gileard Masenga, P.O. Box 3010, Moshi, Tanzania, +255 754 465 424, drgmasenga@yahoo.com.

Authors Contributions:

C Cichowitz: data analysis and manuscript writing

MH Watt: Duke principal investigator, project development, and manuscript writing

B Mchome: project implementation and manuscript review

GG Masenga: KCMC principal investigator, project development, and manuscript review

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Keywords

Tanzania; Obstetric Fistula; Delay; Emergency Obstetric Care; Fistula Surgery

INTRODUCTION

Obstetric fistula remains a debilitating cause of maternal morbidity in low-income countries, with an estimated 1–2 million women living with the condition globally [1,2]. Obstetric fistula is predominately caused by prolonged obstructed labor and results in the involuntary leaking of urine and/or feces into the vagina. In Tanzania alone, it is estimated that 1,200 – 3,000 women develop a fistula each year [3], resulting in approximately 46,000 women living with obstetric fistula [4].

A three-delay model is often used to conceptualize key events that contribute to maternal morbidity or mortality and to identify factors associated with adverse outcomes [5]. This model captures three important delays occurring between the onset of labor and a safe in-hospital delivery: (1) deciding to seek care; (2) identifying and reaching a medical facility; and (3) receiving adequate and appropriate treatment. This framework has been used extensively in maternal health research to understand the occurrence and context of each delay, to guide interventions, and to reduce maternal morbidity and mortality [6–11].

Obstetric fistula remains an under-studied international public health problem and additional research is needed to identify mechanisms to strengthen care systems, to prevent fistulas from occurring, and to promote access to effective and timely repair. The purpose of this study is two-fold: (1) to describe patients presenting for surgical treatment of obstetric fistula at a tertiary hospital in Moshi, Tanzania and their outcomes after surgical repair, and (2) to characterize delays in care during obstetric emergency that contributed to the development of fistula and subsequent repair of the fistula. To accomplish the second objective, we use the classic three-delay model [5] with the addition of a fourth delay that represents the time between the development of the fistula and its surgical repair (Figure 1).

MATERIALS AND METHODS

Study design

This is a mixed-methods analysis of survey data, clinical notes, and field notes that were collected as part of a pilot study evaluating a mental health intervention for obstetric fistula patients [12]. The research study and all procedures received ethical approval from the institutional review boards at Duke University, Kilimanjaro Christian Medical Centre, and the Tanzanian National Institute for Medical Research.

Study setting and participants

The study took place at Kilimanjaro Christian Medical Center (KCMC), a tertiary care hospital located in Moshi, Tanzania. KCMC provides free surgical repair of obstetric fistula for approximately 40 patients a year and has dedicated 12 beds in the gynecology ward for patients with obstetric fistula. 60 women were recruited from the ward by a study

coordinator and were invited to participate in the study if they were 18 years of age or older, able to effectively communicate in Swahili, able to provide informed consent, and had an obstetric fistula confirmed by a dye test.

Procedures

All participants completed a structured survey within 48 hours of admission to KCMC and prior to surgical repair. Surveys were interviewer-administered in Swahili, and captured basic demographic data (age, marital status, education, and employment status), as well as detailed information about the participant's obstetric history and fistula development. The survey specifically asked about: the number of total pregnancies before and after the fistula developed; details of the index pregnancy and labor, including care seeking behaviors and type of care received (home birth, in-hospital vaginal delivery, or cesarean section); and any medical or surgical care received after the fistula developed. To understand delays that occurred during the index pregnancy, participants were asked: when labor started; where they went to receive care; the time, cost, and method required to travel to the clinic or hospital; and the timeline of services received (e.g. time elapsed to see a provider, to be transferred to another facility, to deliver, etc.).

Clinical notes were completed just prior to discharge from the fistula ward and again at the three-month follow up appointment. The fistula surgeon completed a detailed clinical exam and documented each patient's level of continence, the severity of symptoms, and the likelihood of repeat surgery. A surgery was deemed to be successful if a woman had resolution of symptoms (excluding minor stress incontinence) and was unlikely to require a future surgery.

A random sub-set of 30 women were assigned to the intervention condition [12] and consequently had detailed qualitative field notes that included the participant's recount of the key events of the index pregnancy, her interactions with the health care system during delivery, and her process of accessing surgical treatment of the fistula.

Data analysis

To characterize the study participants and their surgical outcomes, descriptive statistics summarized demographic information, obstetric data, and surgical outcomes. To understand the delays in care that occurred during the obstetric emergency, we used a mixed-methods analysis to explore quantitative and qualitative data through the framework presented in Figure 1. Quantitative data were summarized with descriptive statistics. Within Delay 3, we assessed for differences between health care system delays based upon the type of facility women initially presented to using Mann-Whitney U tests. The qualitative field notes were compiled and analyzed in an iterative fashion to identify recurrent themes for each delay. Memos summarizing the content of participants' field notes were created and shared with other members of the research team along with the quantitative data to promote rigorous and accurate analysis. The iterative triangulation of data enhanced our understanding of quantitative and narrative data, allowing us to present an informative description of major delays and important themes that contributed to those delays.

RESULTS

Participants had a median age of 39.5 years (IQR: 26.5, 54.5) (Table 1). Just over half (34/60) of the women in the sample were married, 31/60 (51.7%) had completed primary school or higher, and 37/60 (61.7%) had income-earning activities. As noted in Table 2, just under half (28/60) of the participants were primiparous during the index pregnancy; 32/60 (53.3%) participants had pregnancies before the development of their fistula that resulted in a live birth, and another 8/60 (13.3%) participants had pregnancies after the development of their fistula that resulted in live births. A little over half (35/60) of the participants self-reported that they had undergone female circumcision.

At the time of the index pregnancy, participants had a median age of 26.5 years (IQR: 21.8, 35) (Table 2). A majority (49/60) of pregnancies ended in still birth. Most women (54/60) developed a vesicovaginal fistula (1 in combination with a rectovaginal fistula). Almost all (57/60) of the fistulas were caused by obstructed labor; 23/60 (38.3%) participants received a cesarean section (C-section). Prior to enrollment in this study, participants lived with a fistula for a median of 10 years (IQR: .6, 18; Range 0 – 44), and 13/60 (21.7%) participants had at least one prior attempt at surgical repair.

Overall, surgical repair of the fistula was successful for 40/60 (66.7%) participants. For participants undergoing a first repair, 35/47 (74.5%) surgeries were successful compared to 4/8 (50.0%) repeat repairs and 1/5 (20.0%) surgeries in women with a history of two or more attempted repairs. Two-thirds of women (40/60) returned for the recommend three-month follow up visit, but follow-up rates were higher for those deemed to have successful surgeries at the time of discharge (30/40; 75.0%) compared to those with unsuccessful surgeries (10/20; 50.0%). On examination three months after surgery, 28/30 (93.3%) of women who were considered cured at discharge remained symptom free with a low-likelihood of repeat surgery, while 4/10 (40.0%) women whose surgery had been considered unsuccessful at discharge had resolution of symptoms after discharge and were considered to be cured.

Table 3 summarizes the delays women experienced during the index pregnancy, and Table 4 highlights illustrative examples of delays captured in the qualitative field notes. Overall, women reported that they labored for a median of 48 hours (IQR: 24, 60; Range: 2 – 336) before delivery, with 17/59 (28.8%) laboring between 1–2 days, 12/59 (20.3%) laboring between 2–3 days, and 9/59 (15.3%) laboring for > 3 days. Analysis of both quantitative and qualitative data using the framework presented in Figure 1 revealed critical delays in the decision to seek care (Delay 1), transportation to health care facilities (Delay 2), receiving obstetric care within the health care system (Delay 3), and receiving surgical treatment for the resulting fistula (Delay 4).

Delay 1: Deciding to seek care

A majority (53/60) of the women in the study delivered in a health care facility (Table 3). For the participants who delivered at a health care facility, they waited at home for a median of 12.4 hours (IQR: 5, 45.8; Range 0 – 163) before deciding to seek care, and 18/52 (34.6%) labored at home for over one day.

The most common qualitative themes related to Delay 1 were being from a community that prefers to deliver at home (Table 4: Example 1) and perceiving limited access to transportation and health care services, especially at night. A few patients labored at home for an extended time because they only experienced slight labor pains and did not recognize the severity of the problem until it was a life-threatening emergency. Other patients' decisions were impacted by prior experiences with the health care system (Table 4: Example 2). One participant described wanting to stay at home because of complications she experienced in the hospital during a prior stillbirth. When it came time to deliver, she decided that she would rather be helped by an attendant at home, because she perceived it as more beneficial than paying for poor quality hospital services.

Delay 2: Identifying and reaching a medical facility

The median time of transportation from home to the health care facility was 1.25 hours (IQR: .5, 2; Range 5 min – 7 hours), and 12/50 (24.0%) participants traveled for over two hours to reach the facility. Walking was the most common mode of transportation (19/52; 36.5%), followed by a private car or taxi (18/52; 34.6%), and then Daladala/local bus (7/52; 13.5%) or motorcycle (7/52; 13.5%). The field notes were often brief when describing participants' experience with Delay 2. In addition to highlighting the lack of available transportation, participants described long travel times and high costs associated with accessing obstetric care, consistent with the quantitative data obtained from participant surveys. For example, one woman spent an entire day laboring at home after deciding to go to a facility, while her family searched for a motorcycle; the trip to the hospital then took two hours (Table 4: Example 3). The challenges associated with accessing transportation, and participants' anticipation of long and difficult travel, contributed to women's decision to seek care (Delay 1); they often labored at home for longer before deciding to seek care because transportation was limited and the clinic was far away.

Delay 3: Receiving adequate and appropriate treatment

Of the 53 participants who delivered in a facility, 18 (34.0%) delivered at the facility at which they initially presented (Facility 1), 30 (56.6%) were transferred from Facility 1 to a referral facility (Facility 2), and 5 (9.4%) were transferred from Facility 2 to another referral facility (Facility 3). About three-quarters (38/50) of the participants initially presented to a local clinic (i.e. dispensary or health center), while the remaining 12/50 (24.0%) presented to a hospital. Transfers were common, with 28/38 (73.7%) participants who presented to a local clinic requiring transfer before delivery and 5/12 (41.7%) of those who presented to a hospital. When comparing patients who initially presented to a local clinic versus patients who presented to a hospital, there were no statically significant differences between the median times within any of subcategories presented under Delay 3.

After arrival at Facility 1, a majority (36/51; 70.6%) of participants were triaged within 30 minutes, but a few (4/51) had to wait over three hours to be evaluated by a provider. For those participants who delivered at Facility 1, most (11/15) delivered within 24 hours of triage, but 4/15 (26.7%) participants labored for over 24 hours before delivery. For participants who were transferred from Facility 1 to a referral center, it took a median of 12 hours (IQR: 4.5, 25, Range 0 – 32) from the time of triage at Facility 1 to arrival at Facility

2; 8/32 (25.0%) participants who were transferred waited over 24 hours after being triaged at Facility 1 before arriving at Facility 2. After arriving at Facility 2, a majority (27/33) of patients delivered on arrival, and the remaining 6/33 participants labored for at least six more hours before delivery.

The qualitative field notes described several recurring and interconnected factors influencing the length of Delay 3, including: difficulties at the clinic recognizing potential emergencies (Table 4: Example 4); long labor times at Facility 1 before deciding to escalate care, offer a C-section, or transfer the patient; and logistical challenges transferring patients between facilities. For example, one participant labored in the hospital for almost two days after beginning labor, even though she had a history of obstructed labor and prior C-section. Delays in decisions to escalate care or transfer patients were compounded for participants who needed multiple referrals, as demonstrated by Example 5 (Table 4), who labored for approximately one day at Facility 1, before being transferred to Facility 2, only to wait another 12 hours before transfer to Facility 3. For many women, these transfers were complicated by limited access to transportation (Table 4: Example 6).

Delay 4: Receiving surgical treatment for obstetric fistula

Participants spent a median of 10 years (IQR: .6, 18; Range: 0 – 44) living with a fistula before receiving surgical care at KCMC. 18/60 (30.0%) participants were being treated within the first year of developing the fistula, 13/60 (21.7%) waited 2 – 10 years, 17/60 (28.3%) waited 10 – 20 years, and 12/60 (20.0%) waited over 20 years. 13/60 (21.6%) participants previously had an unsuccessful surgery.

Field notes indicated that some women experienced treatment-seeking delays due to misinformation received at the hospital after delivery. Many women were told that their fistula would get better on its own, despite multiple visits to the clinic (Table 4: Examples 7 and 8). Others were prescribed antibiotics and told that the problem would resolve after a short course of treatment. For women who had previously undergone surgery to repair the fistula, they were often lost to follow up or discouraged after the surgery failed and declined to seek further medical care (Table 4: Example 9).

DISCUSSION

This mixed-methods study highlights characteristics of patients who were undergoing surgical fistula repair at a tertiary care facility in Northern Tanzania. It applied a four-delay model (Figure 1) to describe critical delays that contributed to the development and timely repair of obstetric fistula. This study identified important delays across each of the four components of the model and highlights important factors both outside and within the health care system that are sources of maternal morbidity.

Our findings align with previous data that suggests women of all parities and ages are susceptible to fistula [13]. Over half of the participants in our sample had pregnancies that resulted in live births prior to the index pregnancy, and the study population included women who developed fistula as teenagers, as well as women who developed fistula in their late 30s. While this challenges the common description of women who develop fistula as young

primiparous mothers, this variability in characteristics is consistent with previous studies in Tanzania and East Africa [3,13,14]. These data suggest that fistula prevention and education efforts need to address the possibility of obstructed labor for all pregnant women, not just young, primiparous mothers.

The data describing the obstetric emergency and fistula development highlights the need for interventions that target all three delays. Deciding to seek care (Delay 1) remains an important contributor to obstetric fistula, as about one in ten women never went to facility and a third of those who did go to a facility labored at home for over 24 hours before seeking care. Women and communities often preferred to deliver at home, but the decision to seek care was often prolonged by fears and perceptions about poor transportation and a low quality of obstetric care offered in health care facilities. Community values and birthing preferences will likely shift when the value of care offered at healthcare facilities is greater than that experienced at home [15]; only then will the power of education and outreach efforts designed to encourage women to seek medical care early in labor be fully realized [6].

Women often experienced multiple delays during the index labor and presented to care after the situation became dire. In the setting of obstetric emergency, delays in transportation (Delay 2) and within the health care facility (Delay 3) may compound an already critical situation and further contribute to negative outcomes. Women experienced delays regardless of the type of facility they presented to, suggesting that improvements are needed both at local clinics (i.e. dispensaries and health centers) and at referral hospitals. Themes identified within Delay 3 have previously been shown in Tanzania and East Africa to be associated with of lack of appropriate staff at health care facilities, delivery of unskilled care, lack of supplies, and poor transportation between health care clinics [7,16,17]. Furthermore, despite the fact that C-section rates are rising throughout sub-Saharan Africa, recent studies in Tanzania have shown that many challenges exist in delivering safe emergency C-sections [18,19].

Interventions targeting Delay 3 will not only improve the quality of care offered, but also lead to more trust within the community and a reduction in Delay 1 [6]. Despite concerted efforts to distribute and decentralize emergency obstetric care throughout the country, Tanzanian women often do not present to the facility closest to their home [20], instead they seek care from another clinic in hopes of receiving a higher level of obstetric care. This may contribute to high costs and difficult travel [21]. Substantial investment is needed to create mechanisms for providing emergency obstetric care at local facilities and improving access to ambulances and better methods of transferring patients, especially at night and during emergencies, as over half of the of patients presenting to a facility required transfer. Such efforts are underway in Tanzania and have led to improved outcomes in other countries in East Africa [22,24].

The group of women who presented to KCMC for fistula surgery demonstrates the importance of ongoing fistula outreach efforts, as about half of the women lived with fistula for over 10 years. Many of the women reported receiving a misdiagnosis from other care facilities, despite a clear clinical presentation of obstructed labor followed by incontinence

Interventions need to continue to focus on community outreach to health clinics and providers, families, and social and religious organizations, so that fistulas can be quickly identified and patients referred to treatment centers. Fortunately, free fistula care is offered at many hospitals and programs like “transport MY patient” run through the NGO Comprehensive Community Based Rehabilitation in Tanzania has been successful in helping patients existing services [25].

Despite a high success rate, especially for primary repairs (74.5%), not all surgeries in this cohort were successful, particularly for women undergoing a repeat repair. Previous data describes similar surgical outcomes with success rates in Tanzania, Uganda, and the DRC being 53.0%, 61.0%, and 71.4% of surgeries, respectively [3,26,27]. These data speak to the need of continuing to invest in capacity building and specialty fistula care centers, so women have the greatest chance of cure during primary repair. However, these data also demonstrate the importance of programs that can holistically support women who have a failed repair, including interventions that target their mental health needs [12,28–30]. Furthermore, hospitals may need to develop systems to track patients with unsuccessful repair, as some participants described disengaging from care after surgery and suffering for many additional years before returning for an additional surgery. In this small cohort, successful repairs were stable up to three months after discharge, but one in five had a change in their condition from discharge to follow-up. This demonstrates the importance of following fistula patients up after their repair and developing programs that increase accessibility of post-surgical care in addition to the surgery itself.

There are several limitations to this study. First, details related to the index labor may be very difficult to recall, especially for women who lived with an obstetric fistula for many years before receiving care at KCMC. Second, the delay data presented is based upon women recognizing for themselves when labor started; this likely led to variability in time estimates as women may not have accurately identified the start of labor. Third, the intervention sessions were not audio-recorded, so the nurse field notes may not perfectly capture women’s narratives and experiences during birth. Finally, and most importantly, the delays described represent the experiences of women who eventually reached care; delays experienced by women who have still not received medical care for a fistula may be different.

Women in Tanzania and other low-income countries often encounter hardship during labor and obstetric emergency, especially as they navigate the realities of receiving help from under-resourced systems. Access to care remains limited, because of both distance and cost, and the quality of obstetric care offered through the existing health care system further exacerbates the delays women experience during obstructed labor. Investment is needed at all levels of the health care system, to improve outcomes, trust, and care seeking behaviors. For women who do develop obstetric fistula, hope remains, as primary repairs are often successful. In addition to improving education about surgical treatment and access to fistula care centers, efforts to strengthen the services offered after repair will help ameliorate a longstanding tragedy in women’s health.

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References

- Adler AJ, Ronsmans C, Calvert C, Filippi V. Estimating the prevalence of obstetric fistula: a systematic review and meta-analysis. *BMC Pregnancy and Childbirth*. 2013 Dec 30;13(1):246.
- Stanton C, Holtz SA, Ahmed S. Challenges in measuring obstetric fistula. *International Journal of Gynecology and Obstetrics*. 2007 Aug 31;99:S4–S9. [PubMed: 17765240]
- Siddle K, Vieren L, Fiander A. Characterising women with obstetric fistula and urogenital tract injuries in Tanzania. *Int Urogynecol J*. 2013 Aug 1; 25(2):249–55. [PubMed: 23903820]
- National Bureau of Statistics of Tanzania, ICF Macro. Tanzania Demographic and Health Survey. Dar es Salaam, Tanzania NBC and ICF Macro. 2011 May. p. 1-482.
- Thaddeus S, Maine D. Too far to walk: maternal mortality in context. *Soc Sci Med*. 1994 Apr; 38(8):1091–110. [PubMed: 8042057]
- Wall LL. Overcoming phase 1 delays: the critical component of obstetric fistula prevention programs in resource-poor countries. *BMC Pregnancy and Childbirth* (2). 2012 Jul 18;12(1):68. [PubMed: 22809234]
- Cavallaro FL, Marchant TJ. Responsiveness of emergency obstetric care systems in low- and middle-income countries: a critical review of the “third delay”. *Acta Obstetrica et Gynecologica Scandinavica*. 2013 Feb 12; 92(5):496–507. [PubMed: 23278232]
- Ramos S. A comprehensive assessment of maternal deaths in Argentina: translating multicentre collaborative research into action. *Bull World Health Organ*. 2007 Aug 1; 85(8):615–22. [PubMed: 17768520]
- Say L, Raine R. A systematic review of inequalities in the use of maternal health care in developing countries: examining the scale of the problem and the importance of context. *Bull World Health Organ*. 2007 Oct; 85(10):812–9. [PubMed: 18038064]
- Gabrysch S, Campbell OM. Still too far to walk: Literature review of the determinants of delivery service use. *BMC Pregnancy and Childbirth*. 2009 Aug 11; 9(1):891–18.
- McNamee P, Ternent L, Hussein J. Barriers in accessing maternal healthcare: evidence from low- and middle-income countries. *Expert Review of Pharmacoeconomics & Outcomes Research*. 2014 Jan 9; 9(1):41–8.
- Watt MH, Wilson SM, Sikkema KJ, Velloza J, Mosha MV, Masenga GG, et al. Development of an intervention to improve mental health for obstetric fistula patients in Tanzania. *Evaluation and Program Planning* Elsevier Ltd. 2015 Jun 1;50:1–9.
- Bangser M, Mehta M, Singer J, Daly C, Kamugumya C, Mwangomale A. Childbirth experiences of women with obstetric fistula in Tanzania and Uganda and their implications for fistula program development. *Int Urogynecol J*. 2010 Aug 27; 22(1):91–8. [PubMed: 20798927]
- Arrowsmith S, Hamlin EC, Wall LL. Obstructed labor injury complex: obstetric fistula formation and the multifaceted morbidity of maternal birth trauma in the developing world. *Obstetrical & gynecological* 1996
- Kruk ME, Mbaruku G, Rockers PC, Galea S. User fee exemptions are not enough: out-of-pocket payments for “free” delivery services in rural Tanzania. *Trop Med Int Health*. 2008 Dec; 13(12): 1442–51. [PubMed: 18983268]

16. Forshaw J, Raybould S, Lewis E, Muyingo M, Weeks A, Reed K, et al. Exploring the third delay: an audit evaluating obstetric triage at Mulago National Referral Hospital. *BMC Pregnancy and Childbirth*. 2016 Oct 5.;1–8. [PubMed: 26728010]
17. Mselle LT, Kohi TW, Mvungi A, Evjen-Olsen B, Moland KM. Waiting for attention and care: birthing accounts of women in rural Tanzania who developed obstetric fistula as an outcome of labour. *BMC Pregnancy and Childbirth BioMed Central*. 2011 Oct 21.11(1):75.
18. Heemelaar S, Nelissen E, Mdoe P, Kidanto H, van Roosmalen J, Stekelenburg J. Criteria-based audit of caesarean section in a referral hospital in rural Tanzania. *Trop Med Int Health*. 2016 Mar 10; 21(4):1–10. [PubMed: 26781183]
19. MAALØE N, BYGBJERG IC, ONESMO R, SECHER NJ, SORENSEN BL. Disclosing doubtful indications for emergency cesarean sections in rural hospitals in Tanzania: a retrospective criterion-based audit. *Acta Obstetricia et Gynecologica Scandinavica Blackwell Publishing Ltd*. 2012 Jul 2; 91(9):1069–76.
20. Kanté AM, Exavery A, Phillips JF, Jackson EF. Why women bypass front-line health facility services in pursuit of obstetric care provided elsewhere: a case study in three rural districts of Tanzania. *Trop Med Int Health*. 2016 Mar 10; 21(4):1–11. [PubMed: 26781183]
21. Mselle LT, Kohi TW. Healthcare access and quality of birth care: narratives of women living with obstetric fistula in rural Tanzania. *Reprod Health. Reproductive Health*. 2016 Jun 28.;1–9.
22. Mkoka DA, Kiwara A, Goicolea I, Hurtig A-K. Governing the implementation of Emergency Obstetric Care: experiences of Rural District Health Managers, Tanzania. *BMC Health Services Research* (2). 2014 Aug 3; 14(1):1–12. [PubMed: 24382312]
23. Mucunguzi S, Wamani H, Lochoro P, Tylleskär T. Effects of improved access to transportation on emergency obstetric care outcomes in Uganda. *Afr J Reprod Health*. 2014 Sep; 18(3):87–94.
24. Tayler-Smith K, Zachariah R, Manzi M, Van den Boogaard W, Nyandwi G, Reid T, et al. An ambulance referral network improves access to emergency obstetric and neonatal care in a district of rural Burundi with high maternal mortality. *Trop Med Int Health*. 2013 May 18; 18(8):993–1001. [PubMed: 23682859]
25. Fiander A, Ndahani C, Mmuya K, Vanneste T. Results from 2011 for the transportMYpatient program for overcoming transport costs among women seeking treatment for obstetric fistula in Tanzania. *International Journal of Gynecology and Obstetrics International Federation of Gynecology and Obstetrics*. 2013 Mar 1; 120(3):292–5.
26. Kayondo M, Wasswa S, Kabakyenga J, Mukiibi N, Senkungu J, Stenson A, et al. Predictors and outcome of surgical repair of obstetric fistula at a regional referral hospital, Mbarara, western Uganda. *BMC Urol*. 2011 Dec 7.11(1):23. [PubMed: 22151960]
27. SJØVEIAN S, VANGEN S, MUKWEGE D, ONSRUD M. Surgical outcome of obstetric fistula: a retrospective analysis of 595 patients. *Acta Obstetricia et Gynecologica Scandinavica*. 2011 May 25; 90(7):753–60. [PubMed: 21542810]
28. Browning A, Fentahun W, Goh JTW. The impact of surgical treatment on the mental health of women with obstetric fistula. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2007 Nov; 114(11):1439–41. [PubMed: 17903234]
29. Weston K, Mutiso S, Mwangi JW, Qureshi Z, Beard J, Venkat P. Depression among women with obstetric fistula in Kenya. *International Journal of Gynecology and Obstetrics International Federation of Gynecology and Obstetrics*. 2011 Oct 1; 115(1):31–3.
30. Wilson, SM., Sikkema, KJ., Watt, MH., Masenga, GG. *IntJ Behav Med*. Vol. 22. Springer; US: 2015 Feb 11. Psychological Symptoms Among Obstetric Fistula Patients Compared to Gynecology Outpatients in Tanzania; p. 605-13.

Figure 1.

Delays occurring during development and treatment of obstetric fistula

Conceptual framework for understanding of important delays that occur during obstetric emergency and development of obstetric fistula, originally presented by Thaddeus and Maine [5]. Delay 1 – 3 take place during labor, and Delay 4 captures the amount of time between the development of the fistula and its repair.

Table 1

Participant characteristics (n=60)

	Median	IQR (Q1, Q3)
Age	39.5	(26.5, 54.5)
	n	%
Age categories		
18 – 24	12	20.0%
25 – 34	11	18.3%
35 – 44	13	21.7%
45 – 55	13	21.7%
56 – 80	11	18.3%
Relationship status		
Married	34	56.7%
Separated / divorced / widowed	18	30.0%
Never married	8	13.3%
Education		
Completed primary school or higher	31	51.7%
Income-earning activities		
Yes	37	61.7%

Table 2

Obstetric and gynecologic history (n = 60)

	n	%
Self-reported female circumcision		
Yes	35	58.3%
Other pregnancies resulting live birth		
None	20	33.3 %
At least one pregnancy before fistula	23	38.3%
At least one pregnancy after fistula	8	13.3%
Pregnancies both before and after fistula	9	15.0%
Age during incident pregnancy		
Median (IQR: Q1, Q3)	26.5 (21.8, 35)	
14 – 19	10	16.7%
20 – 25	19	31.7%
26 – 30	6	10.0%
31 – 35	13	21.7%
36 – 54	12	20.0%
Incident pregnancy result		
Still birth – vaginal delivery	28	46.7%
Still birth – C-section	21	35.0%
Living child – vaginal delivery	9	15.0%
Living child – C-section	2	3.3%
Type of fistula		
VVF	53	88.3%
Ureteric fistula	3	5.0%
RVF	3	5.0%
Mixed VVF and RVF	1	1.7%
Cause of fistula		
Obstructed labor	57	95.0%
Iatrogenic	3	5.0%
Number of prior fistula repairs		
0	47	78.3%
1	8	13.3%
2 or more	5	8.3%

Table 3

Delays during obstetric emergency and fistula treatment

DELAY 1: Deciding to seek care	#^a	%
Location of delivery (n = 60)		
Home	7	11.7%
Health care facility	53	88.3%
Time at home before seeking care (n = 52)		
Median (IQR: Q1, Q3)	12.4 hours (5, 45.8)	
	(Range: 0 – 163 hours)	
0 – 6 hours	16	30.8%
7 – 12 hours	10	19.2%
13 – 24 hours	8	15.4%
25 – 48 hours	8	15.4%
>48 hours	10	19.2%
DELAY 2: Identifying and reaching a medical facility	#^a	%
Time spent traveling (n = 50)		
Median (IQR: Q1, Q3)	1.25 hours (.5, 2)	
	(Range: 5 min – 7 hours)	
0 – ½ hour	16	32.0%
1 – 2 hours	22	44.0%
> 2 hours	12	24.0%
Mode of transportation (n = 52)		
Walked	19	36.5%
Private Car / Taxi	18	34.6%
Daladala / Bus	7	13.5%
Motorcycle	7	13.5%
Bicycle	1	1.9%
DELAY 3: Receiving adequate, appropriate treatment	#^a	%
Location of delivery (n = 53)		
Delivered at Facility 1	18	34.0%
Delivered at Facility 2	30	56.6%
Delivered at Facility 3	5	9.4%
Facility 1 - type of facility (n = 50)		
Local clinic (i.e. Dispensary or Health Center)	38	76.0%
Hospital	12	24.0%
Facility 1 - time from arrival to triage^b (n = 51)		
	(Range: 0 – 24 hours)	
0 – ½ hour	36	70.6%
1 – 2 hours	11	21.6%
3 – 6 hours	2	3.9%

DELAY 1: Deciding to seek care	#^a	%
12 – 24 hours	2	3.9%
Facility 1 - time from triage to delivery^b (n = 15)		
	(Range: 0 – 333 hours)	
0 – 24 hours	11	73.3%
> 24 hours	4	26.7%
Transfer - time from triage at Facility 1 to arrival at Facility 2^b (n = 32)		
Median (IQR: Q1, Q3)	12 hours (4.5, 25)	
	(Range: 0 – 58.9 hours)	
0 – 24 hours	24	75.0%
> 24 hours	8	25.0%
Facilities 2 & 3 - time from arrival at Facility 2 to delivery^b (n = 33)		
	(Range: 0 – 32 hours)	
On arrival	27	81.8%
6 – 12 hours	4	12.1%
>12 hours	2	6.1%
DELAY 4: Receiving surgical treatment for obstetric fistula	#^a	%
Time living with fistula (n = 60)		
Median (IQR: Q1, Q3)	10 years (.6, 18)	
	(Range: 0 – 44 years)	
0 – 1 year	18	30.0%
2 – 10 years	13	21.7%
10 – 20 years	17	28.3%
>20 years	12	20.0%

^aPresented as the number of positive responses out of the number of participants (n). The number of participants (n) is dependent upon how many were able to remember a specific delay during quantitative survey.

^bThere were no statically significant differences between the median times (Mann-Whitney U test), when comparing women who initially presented to care at a local clinic verses a hospital.

Table 4

Major themes and illustrative examples of delays in obstetric fistula

DELAY 1: Deciding to seek care.	
Major themes	
1	Coming from a community that prefers to deliver at home.
2	Perceived limited access to transportation and health care services, especially at night.
3	Failure to recognize labor and/or obstetric emergency.
4	Prior experiences with the health care system.
Example 1	
<ul style="list-style-type: none"> Total labor: 65 hours; Delay 1 = 50 hours; Delay 2 = 2 hours by motorcycle; Delay 3: 6 hours to triage, 7 hours after triage to transfer; Delay 4 = 6 years with fistula. <p>The health care workers told her she should deliver at the hospital because she was 17 years old. In the village, the people discouraged her from going, thinking she would deliver normally at home. Labor started on Friday and continued on Saturday... she was thinking she would give birth at home without problems... Sunday they realized there was no progress and took her to the hospital; the baby was already dead.</p>	
Example 2	
<ul style="list-style-type: none"> Total labor: 24 hours; Delay 1 = 12 hours; Delay 2: traveled by car; Delay 3: 1 hours to triage, 11 hours after triage to transfer; delivery on arrival at referral facility Delay 4 = 10 years with fistula. <p>For her first three pregnancies she delivered at home without complication. It was only during the index pregnancy when she had difficulties and decided to go to the hospital. After assessment she was referred to a hospital for C-section, but they found the baby dead during the surgery.</p>	
DELAY 2: Identifying and reaching a medical facility.	
Major themes:	
1	Lack of available transportation.
2	Long distance from home to facility.
Example 3	
<ul style="list-style-type: none"> Total labor: 48 hours; Delay 1 = 22 hours; Delay 2 = 24 hours searching; 2 hours by motorcycle; Delay 3: delivery on arrival; Delay 4 = 1 month with fistula. <p>Her labor pains started at midnight and lasted throughout the night. The following day her family had to look for transport to reach the nearby health center. The second day of labor, at 10:00 a.m., they got a motorcycle and it took her to the hospital.</p>	
DELAY 3: Receiving adequate and appropriate treatment.	
Major themes:	
1	Difficulty recognizing potential emergency.
2	Long labor times before deciding to escalate care.
3	Logistical challenges transferring patients between facilities.
Example 4	
<ul style="list-style-type: none"> Total labor: 48 hours; Delay 1 = 5 hours; Delay 2 = 5 minutes by foot; Delay 3: triaged on arrival, 43 hours after triage to delivery; Delay 4 = 19 years with fistula. <p>Labor started at night and she went to the local clinic in the morning. The nurse examined her and told her she was not ready to deliver. She went back home, still feeling labor pains. Later, it became serious and she could not walk. Relatives rushed to call the nurse, but the baby was dead. Soon after urine began coming without control.</p>	
Example 5	

DELAY 1: Deciding to seek care.

- **Total labor:** 50 hours; **Delay 1** = 12 hours; **Delay 2** = 1 hour by foot; **Delay 3:** 1 hour to triage, 24 hours after triage at Facility 1 to transfer to Facility 2; 12 hours after arrival at Facility 2 to arrival at Facility 3; delivered on arrival at Facility 3; **Delay 4** = 8 months with fistula.

Labor started in the evening, but she did not worry about the pain, as it was minor. At 6:00 a.m. she went to the health facility and then spent the whole day there. The next day at 7:00 a.m. she was told to go to a referral hospital, but after she arrived they did not provide any new care. Finally, at 7:00 p.m. she was rushed to a tertiary hospital, but the baby was dead.

Example 6

- **Total labor:** 33 hours; **Delay 1** = 5 hours; **Delay 2** = 4 hours of searching; 1.5 hours by multiple methods; **Delay 3:** triaged on arrival, 1.5 hours transportation to referral facility, 21 hours at referral facility before C-section; **Delay 4** = 15 years with fistula.

Labor started at 1:00 a.m. In the morning, they decided to find transportation to the hospital as her situation was becoming serious. At 10:00 a.m. they got a motorcycle to take them to the main road. The motorcycle left her to catch a bus to the local clinic. At 11:30 am she reached the clinic, but they told her it was a difficult labor and to go to a hospital. She was in a bad condition and the relatives took her to church on a bicycle. The Sisters and other people prayed for her. She started bleeding hemorrhaging. Luckily, there was a car passing by the church. She arrived at the hospital at 1:00 p.m. The following day, at 10:00 a.m., she was sent to the operating room.

DELAY 4: Receiving surgical treatment for obstetric fistula.

Major themes

- 1 Misinformation received or improper diagnosis after development of fistula.
- 2 Poor follow-up after failed repair.

Example 7

- **Total labor:** 48 hours; **Delay 1** = 5 hours; **Delay 2** = 1 hours by private care; **Delay 3:** triaged on arrival, 42 hours after triage to transfer, delivered on arrival at referral facility; **Delay 4** = 5 years with fistula.

When she became conscious, she found herself with a catheter, which was left in place for over a month. She was told the leaking would stop, but after one month they removed the catheter and discharged her, even though she was still leaking. She never went to the hospital to seek advice. She said the problem started in the hospital and they discharged her knowing she was leaking, so why should she go back?

Example 8

- **Delay 1 – 3:** Participant did not remember; **Delay 4:** 19 years

She stayed with the catheter for about a week before it was removed. After the removal of the catheter, urine began coming out without control. She told the nurses, but they told her it would stop; they thought she was leaking because of the removal of the catheter. She was discharged and returned after a month, still complaining of leaking. She was told it would stop on its own, so she went back home.

Example 9

- **Total labor:** 48 hours; **Delay 1** = 5 hours; **Delay 2** = 5 minutes by foot; **Delay 3:** triaged on arrival, 43 hours after triage to delivery; **Delay 4** = 19 years with fistula.

After she started leaking, she went to a health facility seeking a cure. She stayed there for two months, but her problem was not solved. She was sent to the district hospital where she stayed for three days and was told to go to the zonal hospital. She did not go there straight away; she went back home to find money. Five years later she went to the hospital and surgery was done, but without good results. She was discharged and told to come back for follow up but she did not return. She has been running from one traditional healer to another with no help.