


# BMJ Open Factors associated with marital status of women with genital fistula after childbirth: a retrospective review in nine African countries

Carrie J Ngongo <sup>1</sup>, Thomas J I P Raassen,<sup>2</sup> Marietta Mahendeka,<sup>3</sup> Donal Bisanzio,<sup>1</sup> Ladeisha Lombard,<sup>4</sup> Carla Bann<sup>5</sup>

**To cite:** Ngongo CJ, Raassen TJP, Mahendeka M, *et al*. Factors associated with marital status of women with genital fistula after childbirth: a retrospective review in nine African countries. *BMJ Open* 2022;**12**:e055961. doi:10.1136/bmjopen-2021-055961

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-055961>).

Received 28 July 2021

Accepted 27 April 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

<sup>1</sup>Global Health Division, RTI International, Research Triangle Park, North Carolina, USA

<sup>2</sup>Independent Consultant, Nairobi, Kenya

<sup>3</sup>Obstetrics/Gynecology, Bugando Medical Centre, Mwanza, United Republic of Tanzania

<sup>4</sup>Independent Consultant, Cape Town, South Africa

<sup>5</sup>Division for Statistical and Data Sciences, RTI International, Research Triangle Park, North Carolina, USA

## Correspondence to

Carrie J Ngongo;  
cngongo@gmail.com

## ABSTRACT

**Objective** To examine characteristics associated with remaining married with fistula.

**Design** Retrospective record review and logistic regression.

**Setting** Tanzania, Uganda, Kenya, Malawi, Zambia, Rwanda, Ethiopia, Somalia and South Sudan.

**Participants** Women who developed fistula during childbirth (1975–2017) and sought treatment (1994–2017).

**Outcome measure** Self-reported status of living with original husband at time of presentation for fistula repair.

**Results** Over half of the women lived with their husbands at the time of fistula treatment (57.2%, 3375/5903).

The strongest predictor of remaining married with fistula was either parity at fistula development (adjusted odds ratio [AOR] 1.4–4.4) or living kids at fistula repair (among women who had not given birth between fistula development and repair) (AOR 1.7–4.9). Predicted probability of remaining married declined sharply over the first 2 years of incontinence, levelling out thereafter. Predicted probability of remaining married was lower for women with both urinary and faecal incontinence (AOR 0.68) as compared with women with urinary incontinence alone. Probability of remaining married with fistula declined over time (AOR 1.03–0.57). The woman's education was not a statistically significant predictor, but the odds of remaining married were 26% higher if the husband had any formal schooling.

**Conclusion** Most husbands do not abandon wives with fistula following childbirth. Treatment, counselling, social support and rehabilitation must consider the circumstances of each woman, engaging men as partners where appropriate. Communities and facilities offering fistula repair services should stress the importance of early intervention.

## INTRODUCTION

Genital fistula following childbirth results from prolonged, obstructed labour, injuries during caesarean section and limited access to quality emergency obstetric care. Twentieth-century improvements in obstetric care mostly eliminated obstetric fistula in well-resourced settings. Proper monitoring

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Size and geographic breadth of data set.
- ⇒ Detail of collected information.
- ⇒ Retrospective observational nature of the study design.
- ⇒ Reliance on self-reported data at the time of fistula repair without subsequent follow-up.
- ⇒ Data not collected on explicit reasons for marriage or separation. Many possibilities are beyond the available variables.

of labour with timely intervention in low-resource settings could similarly eliminate fistula worldwide.<sup>1</sup> At present, however, fistula following childbirth remains a devastating maternal morbidity affecting women.

Genital fistula is characterised by continuous urinary and/or faecal incontinence. The chronic morbidity of fistula following childbirth is associated with long-term physical, medical, emotional, psychological, social and economic consequences.<sup>2–3</sup> Associated injuries from obstructed labour may include vaginal stenosis, bladder calculi and neurological damage. Some women with fistula develop infection and amenorrhea. The leaking of urine produces painful rashes and a bad smell.

Fistula exacerbates the vulnerability of women living in remote areas of sub-Saharan Africa. Women with fistula commonly will have lost a baby during prolonged, obstructed labour.<sup>4</sup> The shame, smell and physical challenges of fistula-related incontinence constrain their daily lives. Some women with fistula may avoid public gatherings and social events.<sup>5–6</sup> Stigma may prevent them from cooking food, performing household chores, participating in religious rituals or engaging in income-generating activities.<sup>7–8</sup> Depression is not uncommon.<sup>9</sup>

Some women with fistula express concern about marital discord.<sup>10</sup> Women with fistula may experience infertility or pain in sexual intercourse.<sup>6 11</sup> Women with fistula are more likely to have experienced domestic violence (56%) than women without fistula (38%).<sup>12</sup> Recent sexual violence is two times as common among women with fistula (16%, compared with 8% among women without fistula symptoms).<sup>12</sup>

Specialised surgery can restore women's anatomy and dignity. Over 95 000 obstetric fistula repairs took place globally between 2010 and 2018, for an annual average of more than 10 500 fistula repair surgeries.<sup>13</sup> This figure is greater than the estimated incidence of 6000 new cases per year, but there is an estimated backlog of one million women who have fistulas in sub-Saharan Africa and South Asia.<sup>14</sup> A meta-analysis of national household surveys suggested that approximately 1 per 1000 women of reproductive age in sub-Saharan Africa have fistula symptoms and need access to surgery in order to regain their health and well-being.<sup>15</sup>

A dominant narrative is that stigmatised, incontinent women are abandoned by their husbands. Often, support for this narrative comes from interviews with women themselves<sup>7 16</sup> and from international organisations conveying the gravity of fistula following childbirth.<sup>17</sup> In contrast, a 2007 meta-analysis found that 36% (95% CI 27% to 46%) of women with fistula were divorced or separated, with substantial heterogeneity across geographies and authors.<sup>8</sup> A report from Nigeria found that 66% of women with fistula were married to their original husbands at the time that they presented for fistula repair, while 18% were divorced, separated or remarried.<sup>18</sup> A review of nearly 15 000 women with fistula in Ethiopia found that 44.6% of primiparous women with fistula were separated or divorced at admission, in contrast to 24.1% of multiparous women with fistula.<sup>19</sup>

Our objective with this study was to examine the factors that affect the likelihood that women remain married after developing fistula in order to inform policies and practices for fistula treatment and rehabilitation.

## METHODS

### Data

This cross-sectional retrospective record review considers women seeking fistula repair surgery at 83 facilities between June 1994 and December 2017 in Tanzania, Uganda, Kenya, Malawi, Zambia, Rwanda, Ethiopia, Somalia and South Sudan. Women consented to fistula repair surgery in their respective hospitals, following each hospital's counselling and informed consent process. Data were collected by the second and third authors (TJIPR and MM) and colleagues between June 1994 and December 2017. Included women developed fistula during childbirth between 1975 and 2017. We excluded women with perineal tears from fast delivery.

Each woman was interviewed by one of the surgeons who performed her fistula repair. Surgeons recorded the

women's demographic information and obstetric history on a standard form,<sup>20</sup> including age, country, year and mode of delivery, fetal outcome, kind and duration of incontinence, parity at fistula development, subsequent delivery (between fistula development and fistula repair), living children at fistula repair, previous fistula repair surgeries, education and husband's education.

Each woman reported whether she was living with her husband, living with family, living alone, living in a rehabilitation centre, remarried, never married or widowed. We excluded 452 women who had never married and 20 records with missing data on relationship status. Women were grouped according to whether they were living with their original husbands at the time of fistula repair. Due to our focus on the issue of abandonment, widows were counted as 'living with husband' if they were together at the time of the husband's death.

Data were entered into an Excel database, with names changed to unique identification numbers to protect patient privacy. Data were analysed using Stata V.16.

### Statistical analysis

Data exploration included descriptive statistics and bivariate comparisons using  $\chi^2$  tests. To determine the most parsimonious logistic regression model, we collapsed predictor variables into different categories, relying on the Akaike information criteria to focus on the variables that would best predict the outcome of remaining married with fistula. We tested possible interactions between duration and age at fistula development, duration and types of fistula and repair attempts and types of fistula. We reviewed variance inflation factor scores to assess possible correlations between covariates. The threshold for statistical significance was  $p < 0.05$ .

Our dichotomous outcome was whether women with fistula were living with their original husbands at the time that they presented for fistula repair, which is used synonymously with 'remaining married.' The logistic regression model included dichotomous variables for the woman's education level (any formal schooling compared with none), fetal outcome at the delivery leading to fistula (alive compared with stillbirth), mode of delivery (caesarean compared with vaginal). We included several categorical variables: age at fistula development (compared with age 11–19), parity at fistula development (compared with para 1), duration of incontinence due to fistula (compared with 0–3 months), previous repair attempts (compared with none), incontinence (compared with urinary alone) and date of fistula development (compared with 1975–1989). We preferred a categorical approach to the date of fistula development to facilitate interpretation and avoid assuming that the rate of change was consistent over time. We applied factor-variable operators to the country as a categorical variable without a base.

Logistic regression of the subgroup of women whose records included information about their husband's education included all of the above variables and a

dichotomous variable for husband's education (any formal schooling compared with none).

Our initial analysis included parity at fistula development, as parity is routinely collected and is an indicator unaffected by the births that occur between fistula development and fistula repair. Recognising that living children at fistula repair could also be a predictor of interest, we conducted a subgroup analysis using 'living children at fistula repair' in place of 'parity at fistula development'. This regression excludes the 673 women who gave birth between fistula development and fistula repair, as we hypothesised that women who remained with their husbands would be more likely to give birth with fistula.

We used the Stata *marginsplot* command to graph statistics from our model, with a specific focus on the predicted probabilities associated with parity, year, duration of incontinence and previous repair attempts.

### Patient and public involvement

This retrospective record review relied on deidentified data collected over 23 years of fistula repair surgeries. Patients were not involved in the design and conduct of the study or the choice of outcome measures.

### Role of the funding source

RTI International provided support to cover labour of the first author (CN) on this analysis and writing. RTI International was not involved in the collection or interpretation of the data.

## RESULTS

More than half of the 5903 women with fistula following childbirth were living with their husbands at the time they sought treatment (57.2%, 3375/5903), with statistically significant geographic variation (table 1). Separated women included 1202 who were living with family at the time of repair (20.4%), 1161 who were living alone (19.7%) and 165 who remarried (2.8%).

Women who developed fistula at higher parities were likely to remain with their husbands. Just over 80% of women with parity of six or more at fistula development remained married with fistula (80.1%, 732/909), compared with 43.9% of women who developed fistula at their first pregnancy (1271/2894). The modelled adjusted odds of remaining married with fistula rose 45% at para 2 (95% CI 1.21 to 1.74), 118% at para 3–5 (95% CI 1.80 to 2.65) and 336% at para 6 or more (95% CI 3.28 to 5.79, table 2, figure 1). The modelled adjusted odds of remaining married with fistula were 41% higher for women who gave birth to a live baby at the time of fistula development as compared with those who had a stillbirth (95% CI 1.20 to 1.65).

Giving birth between fistula development and fistula repair was not uncommon: 12.1% (407/3,375) of women living with husbands reported a subsequent birth, and 10.5% (266/2,528) of separated women reported a subsequent birth (online supplemental table S1). A subgroup

analysis excluding these women revealed that the number of living children at the time of presentation for fistula repair predicted the likelihood of remaining married with fistula even more strongly than parity (online supplemental table S2 and figure S1).

Duration of incontinence strongly predicted whether a woman would remain married with fistula (table 2). We found a sharp decline in women with fistula living with their husbands over the first 2 years of incontinence. As shown in figure 2, the predicted probability of remaining married with fistula declined by >20 percentage points within 3 months. It declined by another ~20 percentage points by the end of the first year and a further ~10 percentage points by the second year after fistula development. The predicted probability of remaining married with fistula levelled out thereafter, such that roughly half of women remained married with fistula, irrespective of how much longer than 2 years they had been incontinent.

Previous unsuccessful repair attempts decreased the adjusted odds of remaining married with fistula as follows: by 31% for the first attempt (95% CI 0.60 to 0.81), by 38% for the second attempt (95% CI 0.48 to 0.81) and by 52% for three or more repair attempts (95% CI 0.34 to 0.67, figure 3). In comparison to urinary incontinence alone, the modelled adjusted odds of remaining married with fistula were 32% lower for women incontinent of both urine and faeces (95% CI 0.55 to 0.84).

Women who developed fistula in their 20s or early 30s were more likely to remain married than those who developed fistula as adolescents (age 11–19) (adjusted odds ratio [AOR] 1.32–1.43, 95% CI 1.07 to 1.87), although age at fistula development was not as strongly predictive as other variables. The modelled adjusted odds of remaining married with fistula declined over the study period, particularly after the year 2000 (figure 4).

The modelled adjusted odds of remaining married with fistula were marginally higher for women who had given birth by caesarean section (as compared with vaginal birth) and for women with faecal incontinence only (as compared with urinary incontinence), but these findings were not statistically significant (table 2). However, the adjusted odds for caesarean section did achieve statistical significance in the alternate model using living children at the time of fistula repair (online supplemental table S2).

Women's education levels were low: 41.4% of the women had never attended school, while 57.7% had attended at least some primary school (table 1). We did not find a relationship between any formal schooling and remaining married with fistula. Although it proved not to be statistically significant, we kept the woman's education variable in the model because it helps to explain the variance in the data.

A subgroup analysis of the 4800 women whose records included information about their husband's education level revealed that, in contrast to the statistically non-significant effect of the woman's education level, a husband's experience of any formal schooling increased

**Table 1** Comparison of fistula patient characteristics by marriage status

Characteristic	Separated group (n=2528)		Married group (n=3375)		Total (n=5903)	
Age at fistula development (n=5865)						
11–19	1201	47.8%	910	27.2%	2111	36.0%
20–24	671	26.7%	848	25.3%	1519	25.9%
25–29	317	12.6%	637	19.0%	954	16.3%
30–34	162	6.4%	476	14.2%	638	10.9%
35+	164	6.5%	478	14.3%	642	10.9%
Parity at fistula development (n=5903)						
1	1623	64.2%	1271	37.7%	2894	49.0%
2	325	12.9%	452	13.4%	777	13.2%
3–5	403	15.9%	920	27.3%	1323	22.4%
6+	177	7.0%	732	21.7%	909	15.4%
Mode of delivery (n=5903)						
Vaginal	1353	53.5%	1471	43.6%	2824	47.8%
Caesarean	1175	46.5%	1904	56.4%	3079	52.2%
Foetal outcome at delivery leading to fistula (n=5896)						
Stillbirth	2212	87.6%	2667	79.1%	4879	82.8%
Alive	312	12.4%	705	20.9%	1017	17.2%
Living children at time of presentation for repair (n=5897)						
0	1633	64.7%	1148	34.0%	2781	47.2%
1	391	15.5%	607	18.0%	998	16.9%
2	206	8.2%	461	13.7%	667	11.3%
3	117	4.6%	358	10.6%	475	8.1%
4+	178	7.0%	798	23.7%	976	16.6%
Duration of incontinence (n=5865)						
0–3 months	131	5.2%	533	15.9%	664	11.3%
4–6 months	262	10.4%	630	18.8%	892	15.2%
7–12 months	370	14.7%	516	15.4%	886	15.1%
1–2 years	382	15.2%	385	11.5%	767	13.1%
3–5 years	459	18.3%	422	12.6%	881	15.0%
6–10 years	439	17.5%	416	12.4%	855	14.6%
>10 years	472	18.8%	448	13.4%	920	15.7%
Fistula repair attempts prior to presentation (n=5899)						
0	1641	65.0%	2704	80.1%	4345	73.7%
1	564	22.3%	483	14.3%	1047	17.7%
2	190	7.5%	126	3.7%	316	5.4%
3+	130	5.1%	61	1.8%	191	3.2%
Incontinence (n=5903)						
Urine	2239	88.6%	3163	93.7%	5402	91.6%
Faeces	10	0.8%	24	1.0%	34	0.9%
Urine and faeces	279	11.0%	188	5.6%	467	7.9%
Woman's education (n=5849)						
None	1069	42.7%	1376	41.2%	2445	41.4%
Any school attendance	1437	57.3%	1967	58.8%	3404	57.7%
Husband's education (n=4800)						
None	673	34.0%	793	28.1%	1466	24.9%

Continued

**Table 1** Continued

Characteristic	Separated group (n=2528)		Married group (n=3375)		Total (n=5903)	
Any school attendance	1308	66.0%	2026	71.9%	3334	56.5%
Country (n=5903)						
Tanzania	820	32.4%	1120	33.2%	1940	32.9%
Uganda	630	24.9%	739	21.9%	1369	23.2%
Kenya	322	12.7%	512	15.2%	834	14.1%
Malawi	235	9.3%	384	11.4%	619	10.5%
Zambia	48	1.9%	105	3.1%	153	2.6%
Rwanda	186	7.4%	205	6.1%	391	6.6%
Ethiopia	46	1.8%	51	1.5%	97	1.6%
Somalia	143	5.7%	144	4.3%	287	4.9%
South Sudan	98	3.9%	115	3.4%	213	3.6%
Date of fistula development (n=5897)						
1975–1989	220	8.7%	209	6.2%	429	7.3%
1990–1994	262	10.4%	267	7.9%	529	9.0%
1995–1999	488	19.3%	649	19.3%	1137	19.3%
2000–2004	721	28.5%	984	29.2%	1705	28.9%
2005–2009	505	20.0%	690	20.5%	1195	20.3%
2010–2014	286	11.3%	490	14.5%	776	13.2%
2015–2017	46	1.8%	80	2.4%	126	2.1%

the adjusted odds of continued marriage despite fistula (by 26%, 95% CI 1.08 to 1.47; online supplemental table S3).

## DISCUSSION

Fistula rightly inspires advocacy: it is alarming that women continue to endure prolonged labours and childbirth injuries in situations that were essentially eliminated in well-resourced settings more than a century ago. To capture this inequality, advocates may be tempted to focus on the most dramatic patient stories.<sup>21</sup> Vivid examples of abandonment create generalisations about women with fistula, masking the variability of women's experiences. There is a danger of telling a single story about the abandonment of women with fistula after childbirth.<sup>22</sup> The true picture is more nuanced.

At times, the single story about abandonment reflects a lack of scientific evidence, which has long been an issue.<sup>23</sup> But the allure may also persist in the face of contrary data. One meta-analysis of 14 publications between 1985 and 2005 reported that 36% (95% CI 27% to 46%) of women with fistula were divorced or separated, yet it concluded that women with fistula 'are usually deserted by their husbands'.<sup>8</sup>

While some husbands separate from wives with fistula after childbirth, they are not the majority in our data set. Consistent with other reports,<sup>18 19</sup> this large and geographically varied data set presents an opportunity to explore the diversity of women's experiences.

Parity and living children most strongly predict whether a woman will remain married with fistula. Health providers may use parity as a proxy to identify those at particular risk. Parity at fistula development can overestimate the number of living children, however, given stillbirths and child deaths. Our analysis demonstrates that the number of living children may be a better indicator. Despite documented challenges with amenorrhea, dyspareunia and infertility in women with fistula,<sup>6 10 11</sup> over 10% of women with fistula in our data set gave birth between fistula development and presentation for fistula repair, irrespective of whether they were living with their husbands. The group that remained married had a greater likelihood of subsequent birth than those who separated, but with only marginal statistical significance. To avoid skewing the analysis, we excluded women with subsequent births from our models when we substituted the number of living children for parity.

Childlessness has been identified as an important factor in marital breakdown, including among women with fistula.<sup>18 24</sup> It is a particular challenge in contexts where women are valued for their reproductive ability. Counsellors and religious leaders should acknowledge the pressures. Access to fistula repair surgery can restore reproductive function to most women with fistula. Adoption can be an option for others. Girls and women who develop fistula with their first pregnancy and birth may be particularly in need of counselling and social support.

**Table 2** Logistic regression of remaining married with fistula

	OR	95% CI
Age at fistula development		
11–19	(Ref)	(Ref)
20–24	1.30	1.12 to 1.51
25–29	1.32	1.07 to 1.62
30–34	1.43	1.09 to 1.87
35+	1.06	0.79 to 1.43
Parity		
1	(Ref)	(Ref)
2	1.45	1.21 to 1.74
3–5	2.18	1.80 to 2.65
6+	4.36	3.28 to 5.79
Mode of delivery		
Vaginal	(Ref)	(Ref)
Caesarean	1.04	0.93 to 1.18
Fetal outcome at delivery leading to fistula		
Stillbirth	(Ref)	(Ref)
Alive	1.41	1.20 to 1.65
Duration of incontinence		
0–3 months	(Ref)	(Ref)
4–6 months	0.63	0.49 to 0.81
7–12 months	0.39	0.30 to 0.50
1–2 years	0.29	0.22 to 0.37
3–5 years	0.25	0.19 to 0.32
6–10 years	0.25	0.19 to 0.33
>10 years	0.23	0.17 to 0.32
Fistula repair attempts prior to presentation		
0	(Ref)	(Ref)
1	0.69	0.60 to 0.81
2	0.62	0.48 to 0.81
3+	0.48	0.34 to 0.67
Incontinence		
Urine	(Ref)	(Ref)
Faeces	1.90	0.87 to 4.15
Urine and faeces	0.68	0.55 to 0.84
Education		
None	(Ref)	(Ref)
Any school attendance	1.07	0.95 to 1.21
Country		
Tanzania	2.61	1.77 to 3.85
Uganda	2.15	1.45 to 3.19
Kenya	2.89	1.95 to 4.29
Malawi	4.08	2.56 to 6.51
Zambia	5.20	2.96 to 9.15
Rwanda	2.95	1.83 to 4.75

Continued

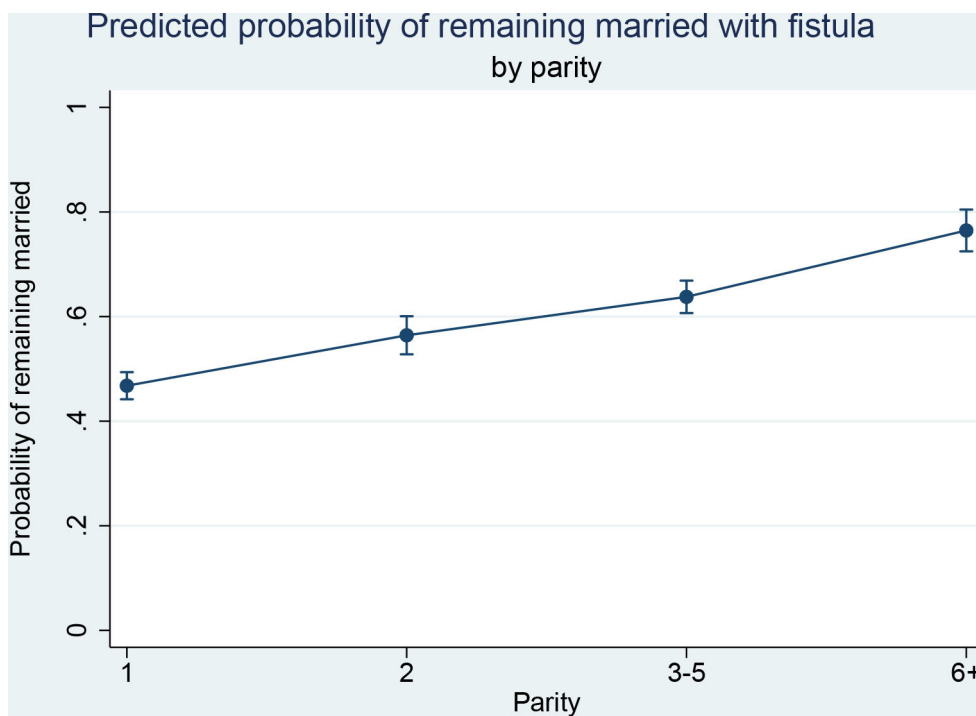
**Table 2** Continued

	OR	95% CI
Ethiopia	3.66	2.01 to 6.66
Somalia	2.49	1.57 to 3.96
South Sudan	3.51	2.15 to 5.73
Date of fistula development		
1975–1989	(Ref)	(Ref)
1990–1994	1.03	0.76 to 1.39
1995–1999	0.98	0.73 to 1.32
2000–2004	0.81	0.59 to 1.10
2005–2009	0.64	0.46 to 0.89
2010–2014	0.60	0.41 to 0.86
2015–2017	0.57	0.34 to 0.97
Observations used in regression=5803.		

Women with fistula following childbirth are less likely to have their husband's support as time goes on, but the association is not a simple straight line. If abandonment is to happen, in this data set it typically occurred in a woman's first 2 years with fistula. The connection between marital separation and duration of incontinence was first documented in the early 1980s in northern Nigeria, where the share of women with fistula who remained with their husbands was 42% of new fistula patients and 11% of women with long-term fistula (>2 years).<sup>24</sup> Our modelling indicates that husbands who stay with their wives through 2 years of incontinence are likely to remain married.

Historically, obstetric fistula surgeons were advised to wait 3 months for tissues to recover before surgery.<sup>25</sup> This often-repeated position has been challenged by the success of immediate catheterisation and surgical repair of fresh fistulas.<sup>26</sup> Beyond clinical considerations, early intervention clearly helps women to avoid the social consequences of living with fistula, including stigma and marital separation. Communities and facilities that offer fistula repair services should stress the importance of early intervention.

Women's educational attainment is often celebrated for its positive associations with nutrition, healthcare access, delayed marriage and contraceptive use.<sup>27</sup> Women's education was found to be protective of marriage among women with fistula in Nigeria.<sup>18</sup> Yet the better educated women in this study did not have statistically significantly better odds of remaining married with obstetric fistula. Rather, it was the husband's exposure to any formal schooling that was positively associated with remaining married through the ordeal of fistula following childbirth. The school experience may not have included tacit instruction about the curability of obstetric fistula, but perhaps it enhanced men's compassion for others, familiarity with gender issues and ability to understand fistula and its effects, thereby leading to a greater ability



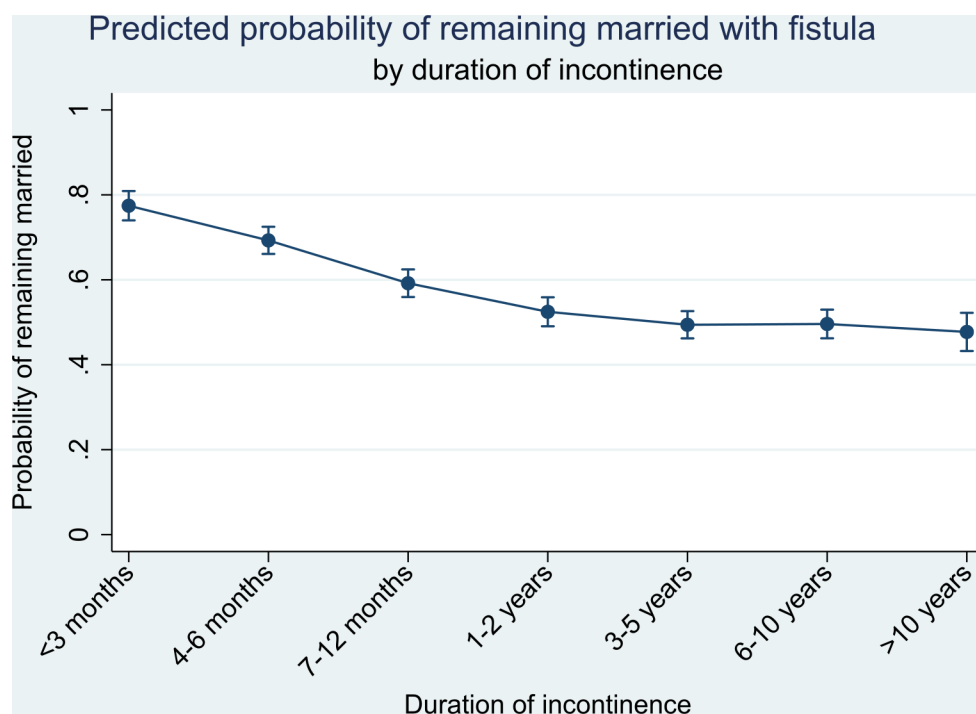
**Figure 1** Predicted probability of remaining married with fistula, by parity.

to navigate challenges and stand against negative cultural pressures.

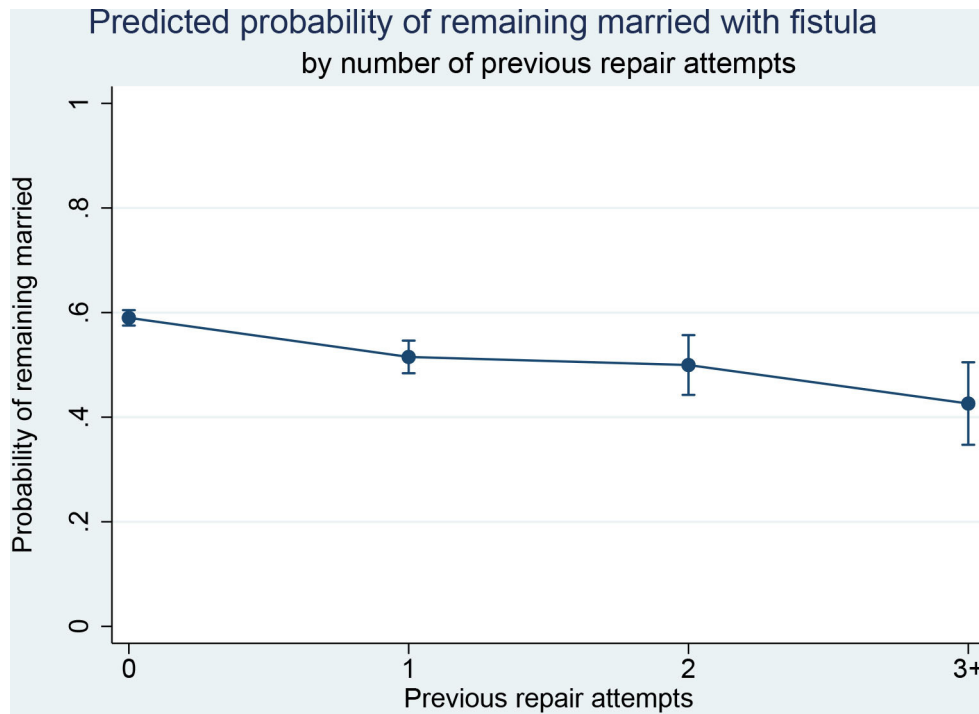
The predictive value of women's age at fistula development reflects complicated interplay among multiple factors. Adolescents are more likely than older women to develop severe, complicated fistula and incontinence of both urine and faeces, whether due to an underdeveloped pelvis or to the unique challenges of prolonged, obstructed labour at first pregnancy. Surgery for complex

fistulas is difficult, and poorer surgical outcomes translate to a higher need for repeat repair attempts. These factors may help explain the situation seen among adolescents as compared with women in their 20s.

This data set includes only women with fistula following childbirth, unlike those who combine fistulas of diverse aetiologies.<sup>18</sup> Fistula attributable to surgical error accounts for a share of fistulas following childbirth, and such iatrogenic fistulas are more common at higher



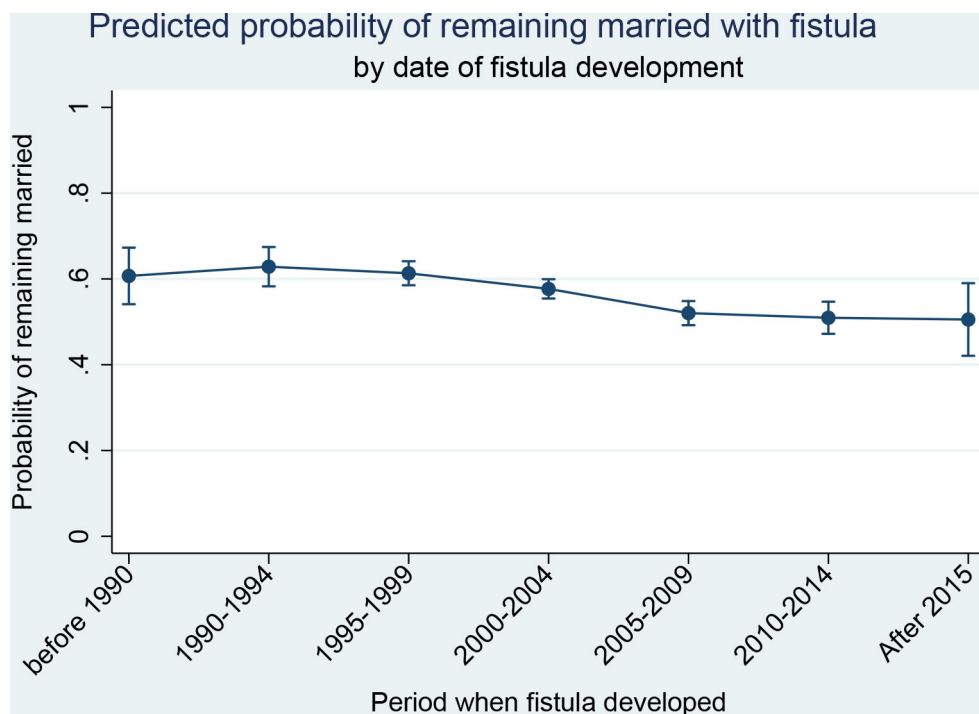
**Figure 2** Predicted probability of remaining married with fistula, by duration of incontinence.



**Figure 3** Predicted probability of remaining married with fistula, by number of previous repair attempts.

parities.<sup>20</sup> Although women with iatrogenic fistula may have earlier access to treatment, their greater likelihood of remaining married does not make up for the overall observed decline in remaining married over age 35. It is possible that men's perceived value for women declines with women's age, particularly for childless women whose remaining reproductive years are numbered.

In this data set, separation has become more common over time, particularly since 2000. It is possible that this trend reflects increasing acceptability of separation and divorce at population level, although others have estimated that divorce rates across sub-Saharan Africa have remained stable over the past 20 years.<sup>28</sup> It is difficult to judge in the absence of reliable data from civil registration



**Figure 4** Predicted probability of remaining married with fistula, by date of fistula development.



systems. It would seem, however, that marriage rates for women with fistula have declined despite increases in public awareness about fistula. We recognise significant geographical variation when holding all other variables constant (online supplemental figure S2).

This large, multicountry retrospective review has limitations. People remain married for a host of diverse reasons, many of them unknowable. It is likely that some women separated from their husbands for reasons unrelated to their fistulas. We did not collect explicit data on why couples were together or apart.

Women provided self-reported data on their living situations. We did not document their partners' perspectives. In many cases, years passed between when women gave birth and when they presented for fistula repair surgery. Women's recollections of childbirth may differ from how providers diagnose obstetric problems.<sup>29</sup> Some fistulas following childbirth can be attributed to surgical error rather than prolonged, obstructed labour. Access to treatment may be more prompt in such cases,<sup>20</sup> which may inflate the proportion of women remaining married with fistula.

The validity of self-reported data on marital separation is unknown. We cannot comment on whether women would have had a different comfort level disclosing personal information about their living situation to non-surgeon interviewers. Even when accurately reported, marital status may not be an accurate reflection of women's experience, particularly in polygamous unions.<sup>23</sup> Our modelling did not include information about whether husbands had or married additional wives after the women developed fistula.

Inherent selection bias is possible, as the sample includes only women who sought fistula treatment. Evidence is not available to determine whether the included women are representative of all women seeking fistula treatment in the nine countries. Country sample size varies by where the second and third author and colleagues conducted repairs. We did not follow-up with the women after the time of their fistula repairs. Finally, retrospective reviews cannot determine causation in their documentation of variable relationships. Future prospective studies could help to confirm the identified correlations.

## Conclusion

Counselling and social support significantly improve the physical and mental health of women who develop fistula.<sup>8</sup> Rehabilitation services must consider the unique circumstances of each woman with fistula. Psychological assessments and targeted support help to identify and respond appropriately to each woman's needs. Counselling from health professionals can also provide valuable support to significant others who may be feeling vulnerable, including husbands.<sup>30</sup> Information about the availability of fistula treatment must target men as well as women. Where appropriate, facilities offering fistula repair should seek to engage men as partners, enabling

women's rehabilitation and reintegration after fistula surgery.

Policymakers and communities play an important role in ensuring that women with fistula have the social support that they need. Awareness of the factors that affect the separation of women with fistula can inform context-specific tailoring of psychosocial approaches. When fistulas develop, health providers must refer women for treatment as soon as possible, encouraging husbands to support their wives on the journey back to health.

**Twitter** Carrie J Ngongo @cngongo

**Acknowledgements** The African Medical and Research Foundation (AMREF), EngenderHealth, the Fistula Foundation, the Freedom from Fistula Foundation, Gesellschaft für Technische Zusammenarbeit (GTZ; now GIZ), Johnson & Johnson, the Royal Netherlands Embassy of Tanzania, SOS East Africa, United Nations Population Fund (UNFPA), and Women and Health Alliance International (WAHA) generously supported the second author's travels to the many hospitals. We are grateful to the Fistula Foundation and the International Federation of Gynecology and Obstetrics (FIGO) for paying the BMJ Open article processing charge. Millicent Oundo entered some of the data through the support of the US Agency for International Development through EngenderHealth's Fistula Care project. We appreciate RTI International for the professional development award support. Bahati Ngongo, Rob Mitchell, and Grayce Mitchell provided thoughtful insights and support. Erin Newton provided editorial insights. We thank the specialists and staff in the hospitals. Finally, we thank the women whose unforgettable experiences inform our conclusions.

**Contributors** CN and TJIPR formulated the study and wrote the paper. CN and TJIPR are guarantors, accepting full responsibility for the finished work. TJIPR and MM collected the data. LL entered the data, with verification from TJIPR and curation by CN. CN analysed the data with statistical advice from DB and CB. LL, MM, DB and CB reviewed and edited the paper.

**Funding** This work was supported by RTI International professional development award 0291013.201.102.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants and was approved by African Medical and Research Foundation Ethics and Scientific Review Committee (AMREF-ESRC P88/2013). Women consented to fistula repair, following each hospital's counselling and informed consent process.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data generated and analysed during the current study are not publicly available during a period of analysis and dissemination but will be available from the corresponding author on reasonable request.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

**ORCID iD**

Carrie J Ngongo <http://orcid.org/0000-0002-6501-5532>



## REFERENCES

- 1 Zheng AX, Anderson FWJ. Obstetric fistula in low-income countries. *Int J Gynaecol Obstet* 2009;104:85–9.
- 2 Hardee K, Gay J, Blanc AK. Maternal morbidity: neglected dimension of safe motherhood in the developing world. *Glob Public Health* 2012;7:603–17.
- 3 Khisa AM, Nyamongo IK. Still living with fistula: an exploratory study of the experience of women with obstetric fistula following corrective surgery in West Pokot, Kenya. *Reprod Health Matters* 2012;20:59–66.
- 4 Ngongo CJ, Raassen T, Lombard L, et al. Delivery mode for prolonged, obstructed labour resulting in obstetric fistula: a retrospective review of 4396 women in East and Central Africa. *BJOG* 2020;127:702–7.
- 5 Changole J, Thorsen VC, Kafulafula U. 'I am a person but I am not a person': experiences of women living with obstetric fistula in the central region of Malawi. *BMC Preg Child* 2017;17:433.
- 6 Browning A, Menber B. Women with obstetric fistula in Ethiopia: a 6-month follow up after surgical treatment. *BJOG* 2008;115:1564–9.
- 7 Bangser M, Mehta M, Singer J, et al. Childbirth experiences of women with obstetric fistula in Tanzania and Uganda and their implications for fistula program development. *Int Urogynecol J* 2011;22:91–8.
- 8 Ahmed S, Holtz SA. Social and economic consequences of obstetric fistula: life changed forever? *Int J Gynaecol Obstet* 2007;99:S10–15.
- 9 Stokes MJ, Wilkinson JP, Ganesh P, et al. Persistent depression after obstetric fistula repair. *Int J Gynaecol Obstet* 2019;147:206–11.
- 10 Drew LB, Wilkinson JP, Nundwe W, et al. Long-term outcomes for women after obstetric fistula repair in Lilongwe, Malawi: a qualitative study. *BMC Pregnancy Childbirth* 2016;16:2.
- 11 Wilson AL, Chipeta E, Kalilani-Phiri L, et al. Fertility and pregnancy outcomes among women with obstetric fistula in rural Malawi. *Int J Gynaecol Obstet* 2011;113:196–8.
- 12 Mallick L, Tripathi V. The association between female genital fistula symptoms and gender-based violence: a multicountry secondary analysis of household survey data. *Trop Med Int Health* 2018;23:106–19.
- 13 Hub GF. 2018. Available: <https://www.directrelief.org/product/fistula-map/> [Accessed 11 Jun 2021].
- 14 Adler AJ, Ronsmans C, Calvert C, et al. Estimating the prevalence of obstetric fistula: a systematic review and meta-analysis. *BMC Pregnancy Childbirth* 2013;13:246.
- 15 Maheu-Giroux M, Filippi V, Samadoulougou S, et al. Prevalence of symptoms of vaginal fistula in 19 sub-Saharan Africa countries: a meta-analysis of national household survey data. *Lancet Glob Health* 2015;3:e271–8.
- 16 Mohamed AA, Ilesanmi AO, Dairo MD. The experience of women with obstetric fistula following corrective surgery: a qualitative study in Benadir and Mudug regions, Somalia. *Obstet Gynecol Int* 2018;2018:5250843
- 17 Ending obstetric fistula: devastating and preventable childbirth injury continues to haunt women. Available: <https://www.unfpa.org/news/ending-obstetric-fistula-devastating-and-preventable-childbirth-injury-continues-haunt-women> [Accessed 6 Jan 2021].
- 18 Shephard SN, Mamven OV, Lee E, et al. Marital disruption among women with genital fistula in Nigeria: who is at greatest risk? *Int Urogynecol J* 2019;30:307–12.
- 19 Muleta M, Rasmussen S, Kiserud T. Obstetric fistula in 14,928 Ethiopian women. *Acta Obstet Gynecol Scand* 2010;89:945–51.
- 20 Raassen TJIP, Ngongo CJ, Mahendeka MM. Iatrogenic genitourinary fistula: an 18-year retrospective review of 805 injuries. *Int Urogynecol J* 2014;25:1699–706.
- 21 Rosling H, Rosling O, Ronnlund AR. *Factfulness: ten reasons we're wrong about the world – and why things are better than you think*. Flatiron Books, 2018.
- 22 Adichie CN. The danger of a single story. Available: [https://www.ted.com/talks/chimamanda\\_ngozi\\_adichie\\_the\\_danger\\_of\\_a\\_single\\_story/transcript?language=en](https://www.ted.com/talks/chimamanda_ngozi_adichie_the_danger_of_a_single_story/transcript?language=en) [Accessed 11 Jun 2021].
- 23 Roush KM. Social implications of obstetric fistula: an integrative review. *J Midwifery Womens Health* 2009;54:e21–33.
- 24 Murphy M. Social consequences of vesico-vaginal fistula in northern Nigeria. *J Biosoc Sci* 1981;13:139–50.
- 25 Kelly J. Repair of obstetric fistulae: review from an overseas perspective. *Obstet Gynaecol* 2002;4:205–11.
- 26 Waaldijk K. The immediate management of fresh obstetric fistulas. *Am J Obstet Gynecol* 2004;191:795–9.
- 27 Girls' education. Available: <https://www.worldbank.org/en/topic/girlseducation> [Accessed 10 Jun 2021].
- 28 Clark S, Brauner-Otto S. Divorce in sub-Saharan Africa: are unions becoming less stable? *Popul Dev Rev* 2015;41:583–605.
- 29 Stanton CK, Rawlins B, Drake M, et al. Measuring coverage in MNCH: testing the validity of women's self-report of key maternal and newborn health interventions during the Peripartum period in Mozambique. *PLoS One* 2013;8:e60694.
- 30 Khisa W, Wakasiaka S, McGowan L, et al. Understanding the lived experience of women before and after fistula repair: a qualitative study in Kenya. *BJOG* 2017;124:503–10.

Table S1. Association between marital status and subsequent birth between fistula development and repair

	Separated	Married	Total
No subsequent birth between fistula development and repair	2,262 89.5%	2,698 86.9%	4,960 88.1%
Subsequent birth between fistula development and repair	266 10.5%	407 13.1%	673 11.9%
Total	2,528	3,105	5,633

Table S2. Logistic regression of remaining married with fistula: subgroup analysis including living children at time of repair

	Odds ratio	95% confidence interval	
<b>Age at fistula development</b>			
11-19	(Ref)	(Ref)	
20-24	1.38	1.17	1.62
25-29	1.42	1.14	1.77
30-34	1.56	1.18	2.06
35+	1.17	0.86	1.59
<b>Living children at time of fistula repair</b>			
0	(Ref)	(Ref)	
1	1.70	1.41	2.05
2	2.63	2.05	3.38
3	3.49	2.57	4.73
4+	4.86	3.64	6.49
<b>Mode of delivery</b>			
Vaginal	(Ref)	(Ref)	
Cesarean	1.18	1.04	1.35
<b>Fetal outcome at delivery leading to fistula</b>			
Stillbirth	(Ref)	(Ref)	
Alive	1.16	0.97	1.38
<b>Duration of leaking</b>			
0-3 months	(Ref)	(Ref)	
4-6 months	0.64	0.50	0.83
7-12 months	0.39	0.31	0.50
1-2 years	0.27	0.21	0.36
3-5 years	0.22	0.17	0.29
6-10 years	0.21	0.15	0.28
>10 years	0.17	0.12	0.25
<b>Fistula repair attempts prior to presentation</b>			
0	(Ref)	(Ref)	
1	0.72	0.61	0.86
2	0.65	0.48	0.86
3+	0.46	0.31	0.68
<b>Incontinence</b>			
Urine	(Ref)	(Ref)	
Feces	1.12	0.46	2.74
Urine and feces	0.76	0.60	0.94
<b>Education</b>			
None	(Ref)	(Ref)	
Any school attendance	1.03	0.90	1.17

Country			
Tanzania	2.16	1.39	3.37
Uganda	1.76	1.12	2.76
Kenya	2.42	1.55	3.78
Malawi	3.39	2.00	5.74
Zambia	4.92	2.57	9.43
Rwanda	2.44	1.41	4.23
Ethiopia	2.95	1.53	5.68
Somalia	2.18	1.30	3.66
South Sudan	2.98	1.72	5.15
Date of fistula development			
1975-1989	(Ref)	(Ref)	
1990-1994	1.14	0.79	1.63
1995-1999	1.06	0.74	1.52
2000-2004	0.88	0.61	1.28
2005-2009	0.65	0.44	0.97
2010-2014	0.62	0.40	0.94
2015-2017	0.61	0.34	1.09

Observations used in regression = 5,143

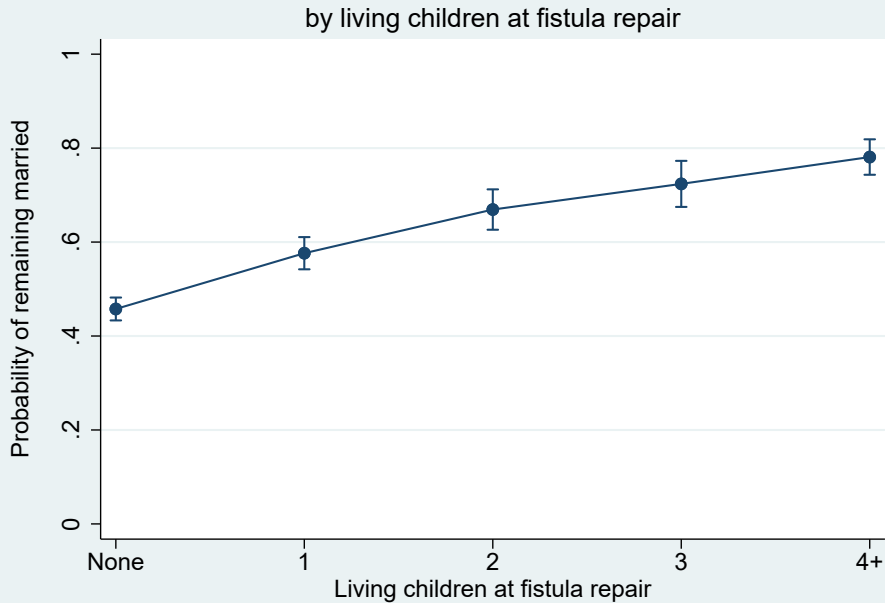


Table S3. Logistic regression of remaining married with fistula: subgroup analysis including husband's education level

	Odds ratio	95% confidence interval	
Age at fistula development			
11-19	(Ref)	(Ref)	
20-24	1.28	1.09	1.52
25-29	1.33	1.06	1.68
30-34	1.35	1.01	1.83
35+	1.13	0.81	1.57
Parity			
1	(Ref)	(Ref)	
2	1.49	1.22	1.82
3-5	2.27	1.83	2.80
6+	4.33	3.17	5.90
Mode of delivery			
Vaginal	(Ref)	(Ref)	
Cesarean	1.05	0.92	1.20
Fetal outcome at delivery leading to fistula			
Stillbirth	(Ref)	(Ref)	
Alive	1.39	1.17	1.66
Duration of leaking			
0-3 months	(Ref)	(Ref)	
4-6 months	0.60	0.45	0.79
7-12 months	0.41	0.31	0.54
1-2 years	0.29	0.22	0.39
3-5 years	0.26	0.19	0.35
6-10 years	0.25	0.18	0.33
>10 years	0.26	0.18	0.38
Fistula repair attempts prior to presentation			
0	(Ref)	(Ref)	
1	0.65	0.55	0.78
2	0.59	0.45	0.78
3+	0.49	0.34	0.69
Incontinence			
Urine	(Ref)	(Ref)	
Feces	1.94	0.78	4.82
Urine and feces	0.62	0.49	0.79
Education			
None	(Ref)	(Ref)	
Any school attendance	1.02	0.89	1.18

Husband's education			
None	(Ref)	(Ref)	
Any school attendance	1.26	1.08	1.47
Country			
Tanzania	2.14	1.35	3.38
Uganda	1.87	1.17	2.99
Kenya	2.39	1.47	3.86
Malawi	3.28	1.90	5.64
Zambia	4.33	2.29	8.19
Rwanda	2.50	1.45	4.30
Ethiopia	3.33	1.71	6.47
Somalia	2.26	1.32	3.87
South Sudan	2.61	1.47	4.62
Date of fistula development			
1975-1989	(Ref)	(Ref)	
1990-1994	1.08	0.76	1.52
1995-1999	1.05	0.74	1.48
2000-2004	0.93	0.65	1.34
2005-2009	0.73	0.49	1.08
2010-2014	0.68	0.45	1.05
2015-2017	0.61	0.34	1.10

Observations used in regression = 4,758



