

The association between female genital fistula symptoms and gender-based violence: A multicountry secondary analysis of household survey data

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Abstract

OBJECTIVE The Demographic and Health Surveys (DHS), which include standardised questions on female genital fistula symptoms, provide a unique opportunity to evaluate the epidemiology of fistula. This study sought to examine associations between self-reported fistula symptoms and experience of gender-based violence (GBV) among women interviewed in DHS surveys.

METHODS This study used data from thirteen DHS surveys with standardised fistula and domestic violence modules. Data from the most recent survey in each country were pooled, weighting each survey equally. Multivariable logistic regressions controlled for maternal and demographic factors.

RESULTS Prevalence of fistula symptoms in this sample of 95 625 women ranges from 0.3% to 1.8% by country. The majority of women reporting fistula symptoms (56%) have ever experienced physical violence, and more than one-quarter have ever experienced sexual violence (27%), compared with 38% and 13% among women with no symptoms, respectively. Similarly, 16% of women with fistula symptoms report recently experiencing sexual violence—twice the percentage among women not reporting symptoms (8%). Women whose first experience of sexual violence was from a non-partner have almost four times the odds of reporting fistula symptoms compared with women who never experienced sexual violence. These associations indicate a need to investigate temporal and causal relationships between violence and fistula.

CONCLUSIONS The increased risk of physical and sexual violence among women with fistula symptoms suggests that fistula programmes should incorporate GBV into provider training and services.

keywords obstetric fistula, gender-based violence, household surveys, sub-Saharan Africa

Introduction

A genital fistula is an abnormal opening in the upper or lower female genital tract that causes uncontrollable urinary and/or faecal incontinence. While most fistulas are obstetric, resulting from inadequately managed prolonged or obstructed labour, they can also be caused by traumatic injury or provider error [1, 2]. The condition has profound psychosocial consequences for affected women, who are often the poorest and most vulnerable [3, 4].

Improved information about the epidemiology of this condition, including comorbidities and associated demographic and psychosocial factors, is required to meet the comprehensive needs of women with fistula; however, assessing the epidemiology of fistula, including aetiology and risk factors, is complicated by its relative rarity. The range of sampling and case identification methods across

studies makes pooling samples for meta-analysis challenging. As a result, the literature on associations between fistula and other public health issues remains sparse.

A number of studies have used data from surgical repair programmes in countries where obstetric fistula occurs to describe patient characteristics and risk factors such as education, rural residence, age at marriage or pregnancy, stature and skilled care utilisation [5–7]. However, findings may be biased if there are important differences between women who reach treatment and those who do not.

A better understanding of fistula correlates is crucial for targeting of services in striving to achieve a ‘fistula-free generation’ by eradicating obstetric fistula and minimising all other causes [8, 9]. Issues that may have important ramifications for fistula prevention and treatment include experience with maternal health services,

female genital mutilation/cutting (FGM/C) and gender-based violence (GBV) [10, 11]. GBV can include a range of abuses, including emotional violence, verbal abuse, coercive or controlling behaviour, physical violence, sexual violence or violence during pregnancy. It can be perpetrated by closely related family or friends, intimate partners, authority figures or strangers.

Gender-based violence could potentially be associated with fistula in several ways (Figure 1). First, specific incidents of violence may be directly causal, e.g. if violent rape results in a fistula [1]. Second, GBV may be indirectly causal, if sexual or other violence triggers premature labour far from medical care, with obstructed labour resulting in fistula [12]; or, if experienced or threatened GBV prevents a woman from seeking medical care for labour and delivery. GBV, specifically forced sex, could also lead to pregnancy that would be at an increased risk of the chance of premature and/or prolonged labour resulting in fistula if it is inadequately spaced [13], occurring at young age [14], and/or with the presence of a sexually transmitted infection [15, 16]. Finally, fistula may make a woman more vulnerable to physical or sexual violence by a partner who perceives her as unable to fulfil her relationship role [17]. While there is no research evidence supporting this, it is possible that risk of violence from others also increases if a woman with fistula is

pushed out of her household and considered 'less protected' by community members.

While the possible relationships between fistula and GBV are complex, most fistula literature has treated violence, particularly sexual violence, exclusively as a potential cause of fistula [1, 11, 12, 18, 19]. Traumatic fistula cases have been documented in diverse settings, most frequently in the Democratic Republic of Congo (DRC); however, studies suggest that trauma directly accounts for a very small proportion of fistula cases [12, 20]. In their review of fistula attributed to sexual violence in DRC, Onsrud *et al.* [12] concluded, 'an indirect relationship between sexual assault and fistula is more common than a direct relationship'. In pooled analysis of risk factors for vaginal fistula symptoms in the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS), Maheu-Giroux *et al.* [20] found increased odds of fistula symptoms among women reporting intimate partner sexual violence. While the authors largely treated sexual violence as a fistula predictor in their analysis and recommendations for elimination of fistula, they also noted the possibility of reverse causation in their discussion of the association between fistula and violence. However, it appears that only one study has explicitly assessed GBV specifically as a consequence of

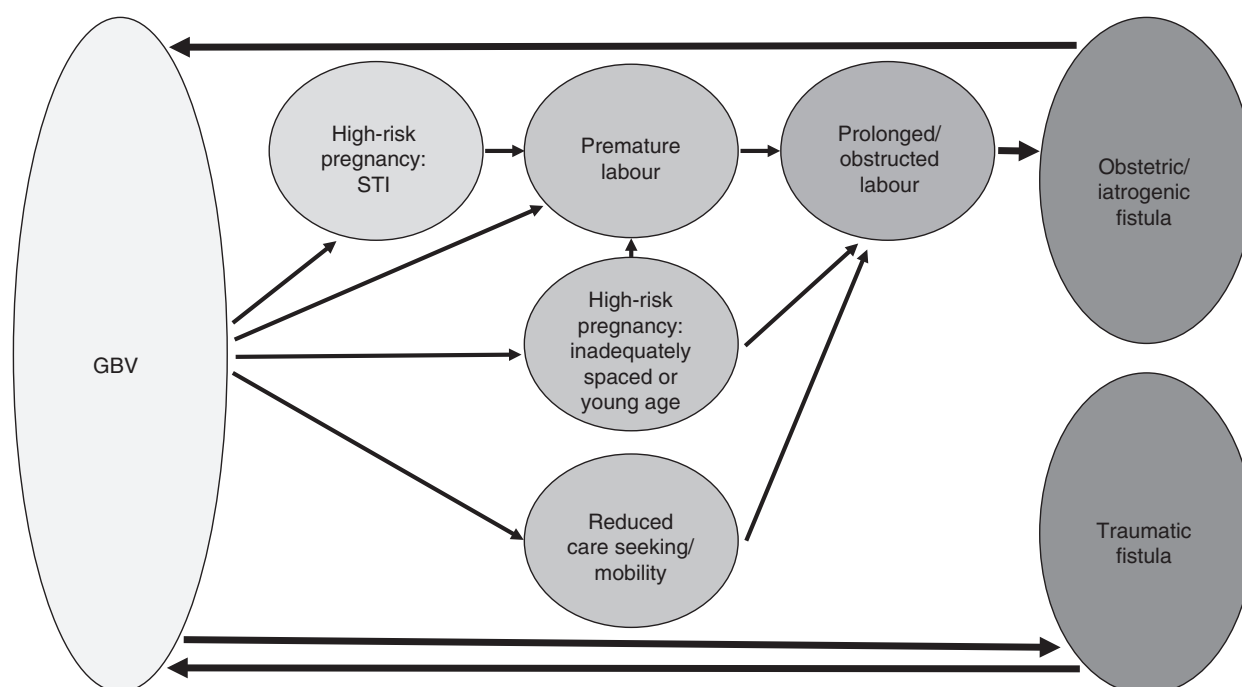


Figure 1 Gender-based violence and fistula: causal pathways.

chronic maternal morbidity in a qualitative investigation of fistula and pelvic organ prolapse in Bangladesh [17].

Due to their large, nationally representative samples and use of similar questions across surveys, the DHS surveys provide a unique set of multicountry data to examine fistula epidemiology. As of 31 August 2017, 34 surveys in 25 countries had included questions about fistula in their surveys, and most of these surveys also assessed the experience of GBV with the inclusion of the domestic violence (DV) module. The DHS surveys thus allow the opportunity to examine not just intimate partner sexual violence, but physical violence, recent physical and sexual violence, and the perpetrator of the first act of sexual violence, thereby deepening our understanding of the relationships discussed in Figure 1.

This study sought to evaluate the associations between self-reported fistula symptoms and experience of GBV among women interviewed in DHS surveys.

Methods

Data

Data for this analysis were limited to household-based DHS surveys including standardised sets of questions, or full modules, on both fistula and DV, with data publicly available by 31 August 2017. We selected the most recent survey for countries with multiple surveys that included both modules. Although fistula questions were included in many DHS surveys prior to the development of the module, the questions and question filters were not always consistent across surveys, resulting in non-comparable samples of women with fistula data. The criteria resulted in the inclusion of 13 surveys conducted between 2008 and 2016 in Cameroon, Comoros, Ethiopia, Haiti, Kenya, Malawi, Mali, Nigeria, Sierra Leone, Togo, Tanzania, Uganda and Zambia. We excluded data from recent surveys conducted in Afghanistan, Chad, and Yemen because the surveys included incomplete modules (Yemen), both fistula and DV modules were asked of different samples of women (Chad), or the sample included only ever-married women (Afghanistan) and the results would not be comparable. Table 1 shows survey characteristics and contextual information for each country.

The surveys employed stratified, multistage cluster sampling design to acquire nationally representative samples in each country [21]. The DHS fistula module includes 11 questions on lifetime experience of fistula symptoms and perceived causes, and treatment seeking [22]. The DV module includes 26 questions, covering the experience of physical and sexual violence and other forms of GBV. Because GBV is a broader concept than DV, the

latter term is only used in reference to the DHS module or related sample weights in this paper. Questions in the DV module are modified from the Conflict Tactics Scale [23] to fit the DHS context. Typically, only every other or every third household is selected to participate in the DV module, and no more than one woman per household is randomly selected to answer DV questions. Thus, our sample comprises 95 625 women who were selected for and completed the interview on DV in privacy.

To identify statistical associations between fistula symptoms and variables of interest, we pooled data from the 13 surveys to create one dataset. We weighted each survey equally using the DV weights, which, like individual-level weights, account for non-response and ensure that the DV sub-sample is nationally representative within each country. In the pooled sample, these weights were scaled up or scaled down so that the sum of the DV weights would be the same for each survey. Weighting the surveys equally has the effect of representing diversity across countries, rather than overemphasising the contexts that happened to have larger samples.

Measures

Fistula symptoms. The fistula module asks all women interviewed: 'Have you ever experienced a constant leakage of urine or stool from your vagina during the day and night?' We created the dependent variable for this analysis, ever experienced fistula symptoms, from this question. We excluded women who responded that they did not know if they had fistula symptoms (118 weighted cases) from the analysis.

Violence. Although GBV includes emotional, physical and sexual violence, as well as controlling behaviour, this analysis only includes measures of physical and sexual violence as only those two components of GBV are assessed in the DV module among all women, both never and ever-married. There are five violence variables used in this analysis, pertaining to ever and recent experience of physical and sexual violence, and the perpetrator of sexual violence (Box 1).

Control variables, as defined in Box 2, were chosen based on past evidence of associations with fistula [5–7, 10, 11]. Some potential control variables were excluded despite possible association with fistula and/or GBV. For example, non-use of a health facility for delivery or skilled birth attendance could be both a risk factor for fistula and a consequence of GBV, which could confound the relationship between fistula and GBV. Although facility delivery and skilled birth attendance (SBA) can help prevent fistula, questions on these topics are only asked

Table 1 Survey and country characteristics

	Cameroon	Comoros	Haiti	Ethiopia	Kenya	Malawi	Mali	Nigeria	Sierra Leone	Tanzania	Togo	Uganda	Zambia
Survey year	2011	2012	2012	2016	2014	2015–16	2012–13	2008	2013	2010	2013–14	2011	2013–14
Sample size of all women surveyed	15 426	5329	14 287	15 683	31 079	24 562	10 424	33 385	16 658	10 139	9480	8674	16 411
Domestic violence sample size	5043	3341	9367	5860	5657	6379	3459	23 752	5185	7047	6701	2056	11 778
Maternal mortality ratio	782	172	na	412	362	439	368	545	1165	454	401	438	398
Median age at first birth (aged 25–49)	19.5	23.0	22.3	19.2	20.3	19.0	19.6	20.4	19.4	19.5	20.9	18.7	19.1
% of births in the last 5 years delivered by a skilled birth attendant	63.6	82.2	37.3	27.7	61.8	89.8	58.6	38.9	59.6	47.6	83.0	58.0	64.2
% of births in the last 5 years delivered in a health facility	61.2	76.1	35.9	26.2	61.2	91.4	55.0	35.0	54.4	50.2	72.5	57.4	67.4
Ratio of literate women to men	0.95	0.96	1.02	0.61	0.95	0.87	0.61	0.78	0.81	0.93	0.80	0.98	0.91
Per-capita gross national income (GNI)*	1200	820	760	660	1260	340	670	1160	660	530	570	460	1680

Unless otherwise indicated, all values are taken from the Demographic and Health Surveys final report of each survey. Values are representative of the adults ages 15–49; na = not available. In Ethiopia, maternal mortality refers to pregnancy-related mortality ratio.

*World Bank, Atlas method, purchasing power parity.

Box 1 Definitions of violence variables used in this study

Lifetime experience of physical violence is a dichotomous variable of either no physical violence ever or if the woman has ever or recently experienced any one of a number of acts that induce physical harm, including harm during pregnancy. The violence could be perpetrated by either a current or former husband or partner, by anyone else in their life.

Physical violence in the last 12 months, also a dichotomous yes or no variable, is physical harm in the last 12 months by either a current or former husband or partner or any other person.

Lifetime experience of sexual violence is dichotomised as no sexual violence ever or ever having experienced forced sexual intercourse or other sexual acts by anyone, including current or former partner. This variable also includes whether or not the respondent's first sex was forced.

Sexual violence in the last 12 months is dichotomised as no sexual violence in the last 12 months or having been forced to have sex or engage in other sexual acts by a former or current husband or partner or anyone else.

Perpetrator of the first act of sexual violence was categorised as (0) experiencing no sexual violence ever, (1) sexual violence first committed by a partner or (2) sexual violence first committed by a non-partner. Partners included current or former husband or partner and current or former boyfriend. All other perpetrators were categorised as non-partner, including relatives or in-laws, friends, acquaintances, employers or co-workers, teachers, religious leaders, strangers, police or soldiers and other. This question was not included in the Haiti 2012 survey.

Box 2 Definitions of covariates used in this study

Parity: the number of live births a woman has had in three categories: zero, one to four and five or more.

Terminated pregnancy or stillbirth: ever having had a pregnancy that resulted in a miscarriage, induced abortion or stillbirth, rather than a live birth.

Age: categorised by sample distribution terciles: 15–23, 24–32, 33–49 years old.

Marital Status: never, currently or formerly married.

Residence: urban or rural.

Education: none, primary only, secondary or higher.

Wealth: grouped into quintiles of lowest, second, middle, fourth, highest.

of women with a live birth in the 5 years preceding the survey. However, whether for social or physiological reasons, many women who have suffered fistula may no longer be able to become pregnant and/or have a live birth [24, 25]. Restricting our data only to those with a recent live birth could introduce bias and severely limit sample size.

In selecting potential confounders of the primary covariates of interest, both facility delivery and permission for care were evaluated at the bivariate level for a relationship with fistula symptoms and experience of violence. Symptoms of fistula and violence were not significantly associated with facility delivery. Needing permission for care was not significantly associated with fistula symptoms, but there was a significant negative bivariate association with experience of violence. That is, those who ever experienced violence—sexual or physical—were less likely to view needing permission for health care as a barrier to access. However, women's report of

need for permission to seek health care as a barrier to obtaining health care was excluded from the analysis. This was not assessed in all surveys and would limit the sample size if included.

Other factors potentially associated with fistula, such as anaemia, being underweight and FGM/C, were not measured among all women across surveys and were also excluded.

Analysis

We calculated prevalence estimates of lifetime experience of fistula symptoms and self-reported cause of fistula among the DV sub-sample for each country using respective DV weights for each survey as well as in the pooled dataset. We conducted three multivariable logistic regression models in the pooled dataset, with adjustments for the stratified cluster sampling survey design, to examine associations with fistula symptoms. The robust standard

errors produced by the regressions with equal weights present the most conservative estimated parameters of the true odds. For each of the three models, the outcome was self-report of fistula symptoms. The first model tested the hypothesis that fistula symptoms are associated with lifetime experience of violence—either physical or sexual. These two distinct types of violence are included as separate covariates in the model.

Because the surveys collect no information on when symptoms of fistula or violence first occurred, it is not possible to study the true order of events. Nevertheless, studies show that women with fistula symptoms delay care seeking and may live with their condition for many years [26, 27]. The second model tested a second hypothesis of an association between fistula symptoms and recent violence (within 12 months preceding the survey). In this model, we replaced the two covariates for lifetime experience of violence with two covariates reflecting recent physical and sexual violence.

A third model tested the association between fistula symptoms and the perpetrator of a woman's first experience of sexual violence. Women who have never experienced sexual violence were the reference group in this model, against which type of perpetrator was compared. Therefore, the sample remains as all women, although women from Haiti were excluded because this question was not asked of them. We structured the variable in this manner to preserve the sample size to the extent possible.

The additional variables included in the final multivariable regressions are the same for each model and described in Box 2. Analyses included a fixed effect for each survey to capture unmeasured sources of variation between countries. We performed all analyses using Stata statistical software version 14.

Ethics approval and consent to participate

The DHS Program questionnaires and protocols, which include extensive informed consent processes, are approved by the ICF International Institutional Review Board (IRB) and often an IRB in each country, ensuring the protection of human subjects and that surveys do not violate host-country laws. Because analyses reported here used anonymised data for secondary analysis, additional ethical approval was not required.

Results

Prevalence

Lifetime prevalence of self-reported fistula symptoms in each country ranges from 0.3% in Cameroon (95%

Confidence Interval (CI): 0.2–0.6) to 1.8% in Uganda (95% CI: 1.1–2.9), as seen in Figure 2. When all surveys are appended and equal weights are applied, the prevalence is 0.8% (95% CI: 0.7–0.9).

Self-reported cause

Figure 3 shows the distribution of self-reported cause of fistula symptoms by country, where available as per DHS procedures. Delivery is cited as the most common cause, accounting for over 50% of fistula symptoms in most individual surveys as well as all surveys combined. Sexual assault is not frequently cited as a cause (traumatic fistula); however, over 10% of women in Comoros but no women in Malawi, Sierra Leone or Tanzania report sexual assault as causing fistula symptoms.

Report of fistula symptoms by violence

Figure 4 highlights the prevalence of fistula symptoms among women experiencing different types of violence. The prevalence is highest among women who first experienced sexual violence by a non-partner (2.5%, 95% CI: 1.2–5.0). It is lower among women who first experienced sexual violence by a boyfriend or husband (1.2%, 95% CI: 1.0–1.6) and women who never experienced any sexual violence (0.5%, 95% CI: 0.5–0.6).

Background characteristics

Table 2 shows the characteristics (per cent and confidence intervals) of the 753 (weighted) women reporting lifetime symptoms of fistula and the 94 754 women who do not report symptoms of fistula. The majority of women reporting fistula symptoms (55.6%) have ever experienced physical violence, and more than one-quarter have ever experienced sexual violence (26.9%) compared with 37.5% and 13.2% among women with no symptoms, respectively. Within the last 12 months, almost one-third (28.3%) of women with fistula symptoms experienced physical violence *vs.* one-fifth (19.2%) of women reporting no symptoms; 16% of women with fistula symptoms (15.8%) report recently experiencing sexual violence—almost twice the percentage among women not reporting symptoms (8.0%). Notably, 10.7% of women with fistula symptoms experienced sexual violence for the first time by a non-husband or partner, compared with only 3.4% of women without fistula symptoms. Because the confidence intervals for each type of GBV do not overlap when comparing women who have reported symptoms of fistula with those women who have not, we can infer that these differences are significant at the bivariate level.

Figure 2 Prevalence of self-reported symptoms of fistula. Note: Survey-level domestic violence weights applied for each country; pooled prevalence uses equal weights.

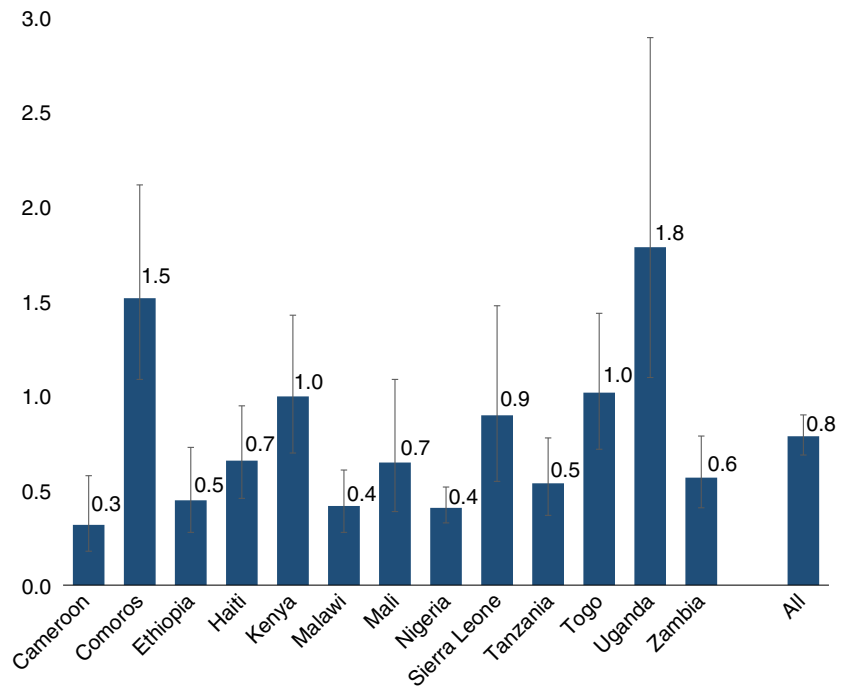
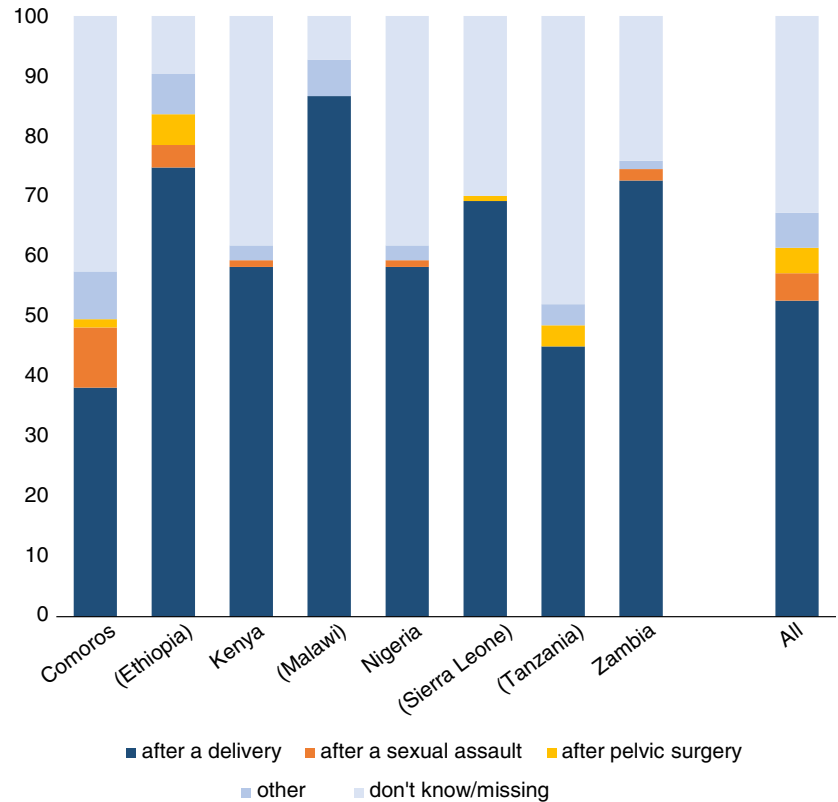


Figure 3 Country-level per cent distribution of self-reported causes of fistula symptoms by country. Note: Surveys in Haiti, Togo and Uganda did not include questions on cause of fistula symptoms. Results from Cameroon and Mali were suppressed as per standard Demographic and Health Surveys (DHS) procedure, as there were fewer than 25 (unweighted) cases of fistula symptoms in the domestic violence sub-sample. Countries in parentheses denote 25–49 (unweighted) cases of fistula symptoms in the domestic violence sub-sample. Results from these countries should be interpreted with caution. Survey-level domestic violence weights were applied for each country; pooled prevalence used equal weights.



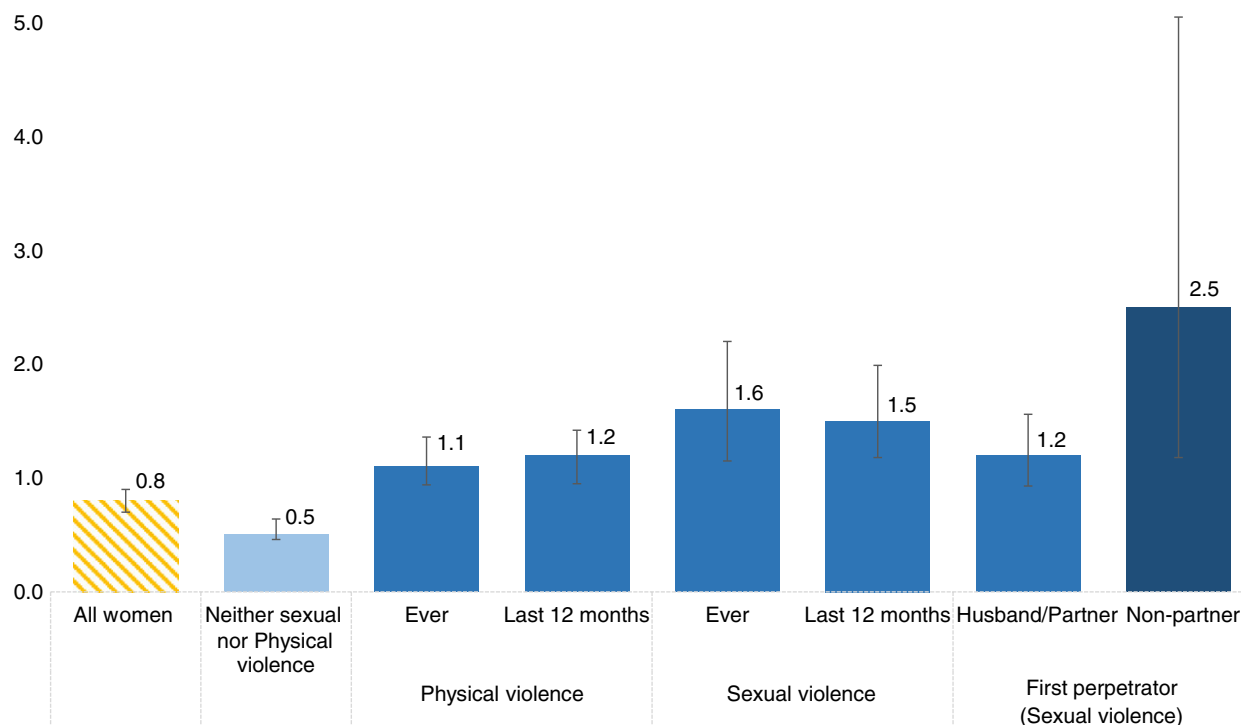


Figure 4 Percentage of women reporting symptoms of fistula by experience of violence.

Regression results

Table 3 depicts the results of the adjusted multivariable logistic regressions. The first model examined the association between ever experience of violence and lifetime fistula symptoms. Women who have ever experienced physical violence have 1.6 times the odds (95% CI: 1.2–2.0) of reporting fistula symptoms compared with women with no experience of physical violence, while women who have ever experienced sexual violence have 1.7 times the odds of reporting fistula symptoms (95% CI: 1.2–2.4).

The second model, which examined the associations between fistula symptoms and recent violence, demonstrated no significant association between recent physical violence and lifetime fistula symptoms. However, recent sexual violence is highly significantly associated ($P < 0.001$), and the odds ratio is similar to ever experience of sexual violence (OR 1.6, 95% CI: 1.1–2.2).

The final model examined sexual violence by the first perpetrator. Women who first experienced sexual violence by a non-partner have almost four times the odds (OR 3.8, 95% CI: 1.9–7.6) of reporting lifetime fistula symptoms as women who have never experienced sexual

violence. Women who first experienced sexual violence from a spouse or partner are also more likely to report fistula symptoms than those who never experienced sexual violence (OR 1.4, 95% CI: 1.0–1.9). As we can infer from the confidence intervals, the odds of reporting fistula are significantly higher for women whose first perpetrator of violence was a non-partner *vs.* a partner.

In all three models, residence and parity are significantly associated with symptoms of fistula. Women who live in urban areas are more likely to report symptoms of fistula. The odds of reporting fistula symptoms if a woman has either one to four or five or more children are over two times higher than for women with no children in each model. The odds of having fistula symptoms are one and half times higher for women who had a terminated pregnancy/stillbirth than for women who had never experienced a pregnancy loss, although the association only approaches significance ($P = 0.054$) in the first model. Terminated pregnancy/stillbirth is a composite variable including any pregnancy that resulted in a miscarriage, induced abortion or stillbirth. While stillbirth is the outcome of interest in relation to fistula, it is not possible to disaggregate this from other non-live birth outcomes.

Table 2 Background characteristics of women selected for the domestic violence module, aged 15–49, by experience of symptoms of fistula

Variable	Women who report symptoms of fistula		Women who do not report symptoms of fistula	
	%	95% CI	%	95% CI
Stated cause of fistula				
Delivery	52.6	45.6–59.5		
Sexual assault	4.6	2.5–8.1		
Pelvic surgery	4.2	2.0–8.9		
Other	5.8	3.6–9.4		
Don't know/missing	32.8	26.3–39.9		
Age				
15–23	19.4	15.4–24.0	36.4	35.9–37.0
24–32	35.3	29.5–41.4	31.1	30.6–31.5
33–49	45.4	38.9–52.0	32.5	32.0–33.0
Marital status				
Never married	9.6	7.0–13.0	25.6	25.0–26.2
Currently married	74.2	66.8–80.5	65.6	65.0–66.2
Separated, divorced or widowed	16.2	10.3–24.5	8.8	8.5–9.1
Residence				
Urban	36.7	30.6–43.3	34.5	33.2–35.8
Rural	63.3	56.7–69.4	65.5	64.2–66.8
Education‡				
No education	32.5	25.8–39.9	29.0	28.1–29.9
Primary only	42.2	36.1–48.6	37.2	36.4–37.9
Secondary or higher	25.3	20.6–30.7	33.8	33.0–34.7
Need permission for care†				
Needing permission for health care is not a problem	81.6	76.4–85.9	83.7	82.9–84.5
Needing permission for health care is a big problem	18.4	14.1–23.6	16.3	15.5–17.1
Parity				
0	9.6	7.1–12.9	27.7	27.1–28.3
1–4	55.5	48.8–62.0	47.0	46.4–47.6
5 or more	34.8	28.3–42.0	25.3	24.8–25.9
Wealth quintile				
Lowest	19.7	13.6–27.6	17.3	16.7–18.0
Second	20.0	15.8–25.0	18.2	17.6–18.8
Middle	17.5	13.4–22.7	19.1	18.6–19.7
Fourth	20.5	16.4–25.3	21.1	20.5–21.7
Highest	22.3	17.2–28.4	24.2	23.3–25.2
Terminated pregnancy or stillbirth‡				
Never had a terminated pregnancy or stillbirth	77.6	69.9–83.7	87.5	87.1–87.9
Had a terminated pregnancy or stillbirth	22.4	16.3–30.1	12.5	12.1–12.9
Physical violence, ever				
None	44.4	38.2–50.7	62.5	61.7–63.2
Any	55.6	49.3–61.8	37.5	36.8–38.3
Sexual violence, ever				
None	73.1	65.7–79.4	86.8	86.3–87.2
Any	26.9	20.6–34.3	13.2	12.8–13.7
Physical violence, last 12 months				
None	71.7	66.1–76.7	80.8	80.3–81.4
Any	28.3	23.3–33.9	19.2	18.6–19.7
Sexual violence, last 12 months				
None	84.2	79.9–87.8	92.0	91.6–92.3
Any	15.8	12.2–20.1	8.0	7.7–8.4

Table 2 (Continued)

Variable	Women who report symptoms of fistula		Women who do not report symptoms of fistula	
	%	95% CI	%	95% CI
First perpetrator of sexual violence‡				
No sexual violence	73.3	65.8–79.6	86.4	85.9–86.8
Husband/partner	16.0	12.5–20.3	10.3	9.9–10.7
Non-partner	10.7	5.3–20.2	3.4	3.1–3.6
Total (weighted)	753		94 754	

†Questions on access to care were not asked in the Cameroon DHS survey.

‡Missing cases not included in distribution.

Discussion

This study found a low prevalence of lifetime fistula symptoms (0.3–1.8% across countries) among the sub-sample of women who completed the DV interview, with delivery as the most cited cause. Women reporting fistula symptoms also report the experience of sexual and physical violence much more often than women without such symptoms. Controlling for demographic and maternal health variables, regression analyses show significant, independent associations between ever experience of physical and sexual violence and report of lifetime fistula symptoms. The association holds for recent experience of sexual violence. Additionally, women whose first experience of sexual violence was from a non-partner are most likely to report fistula symptoms. The findings of this study are consistent with earlier research reporting substantial positive associations between sexual violence and fistula [11, 20, 28], while documenting novel associations between fistula and physical violence.

Although this study cannot assess the temporality of the relationship between fistula and GBV because dates of the first occurrence of fistula symptoms or GBV are not ascertained, self-reports of treatment seeking in the analysis sample suggest that one-third to one-half of women who ever had fistula symptoms continued to have them at the time of the survey (results not shown). The literature also suggests that most women with fistula live with their symptoms for a considerable period [26, 27]. As this study finds a significant association between fistula symptoms and recent (past 12 months) violence, it is plausible that the risk of violence increases after the onset of fistula symptoms, as proposed in Figure 1. However, it is important to note that a woman reporting fistula symptoms could experience violence both before and after onset of symptoms.

Experience of violence is not positively associated with two proxy indicators of access to care: perceived barriers due to needing husband's permission to seek care and facility delivery for live births in the past 5 years. Therefore, the second indirect causal pathway described above and in Figure 1, with violence contributing to fistula due to reduced use of maternal health services, does not seem supported by the data. This finding is consistent with an earlier analysis of the relationship between GBV and care seeking and earlier research suggesting that women experiencing GBV may make *more* use of health services [11, 29, 30]. A more direct indicator of access, facility delivery for all births—live or stillbirth—specifically at the time of the onset of fistula symptoms—might show associations with fistula when evaluated.

Only 5% of women who were asked about the cause of their symptoms reported sexual violence as the cause of their fistula symptoms, suggesting that the first pathway proposed in Figure 1 is not very common. The low proportion of traumatic fistula cases, paired with the findings of this analysis, suggests that violence may potentially begin after or be aggravated by the onset of fistula. Again, this analysis cannot rule out that violence may occur both before and after onset of fistula symptoms. The gender norms or socio-economic disadvantages that render a woman more vulnerable to fistula may also be predictive of GBV.

Strengths and limitations

The study is the first pooled analysis of fistula data focusing on associations between fistula symptoms and multiple forms of GBV. While some prior studies have examined the association between sexual violence and fistula, this study also evaluates associations with physical violence and disaggregates associations by ever and recent experience of violence.

Table 3 Multivariable logistic regression of self-reported symptoms of fistula and experience of violence among women aged 15–49

Variable	Unadjusted (Models 1 and 2)		Model 1 Either physical or sexual violence, ever		Model 2 Either physical or sexual violence, last 12 months		Unadjusted (Model 3)		Model 3 First perpetrator†	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Marital status (ref = never married)										
Currently married	3.0***	2.2–4.2	1.2	0.7–2.0	1.2	0.7–2.1	3.0***	2.1–4.4	1.4	0.8–2.5
Separated, divorced, widowed	4.9***	2.7–9.0	1.6	0.8–3.0	1.8	0.9–3.6	5.1***	2.7–9.6	2.1*	1.0–4.1
Residence (ref = rural)										
Urban	1.1	0.8–1.4	1.4*	1.0–1.9	1.4*	1.0–1.9	1.1	0.9–1.5	1.4*	1.1–1.9
Education (ref = secondary or higher)										
No education	1.5*	1.0–2.1	1.1	0.8–1.6	1.1	0.7–1.5	1.5*	1.0–2.2	1.1	0.8–1.7
Primary only	1.5**	1.2–2.0	1.1	0.8–1.5	1.1	0.8–1.5	1.6**	1.2–2.1	1.2	0.9–1.6
Age (ref = 15–23)										
24–32	2.1***	1.6–2.9	1.3	0.9–1.8	1.3	0.9–1.8	2.2***	1.6–3.0	1.4	0.9–2.0
33–49	2.6***	1.9–3.6	1.5	1.0–2.1	1.5	1.0–2.2	2.6***	1.9–3.7	1.4	1.0–2.2
Parity (ref = 0)										
1–4	3.4***	2.4–4.7	2.1**	1.2–3.5	2.1**	1.2–3.6	3.5***	2.4–5.0	2.0**	1.2–3.4
5 or more	3.9***	2.6–5.9	2.0*	1.1–3.8	2.1*	1.1–4.1	4.0***	2.6–6.2	2.0*	1.1–3.9
Wealth quintile (ref = highest)										
Lowest	1.2	0.7–2.1	1.3	0.8–2.2	1.3	0.8–2.2	1.2	0.7–2.1	1.3	0.8–2.2
Second	1.2	0.8–1.7	1.3	0.8–2.1	1.3	0.8–2.1	1.2	0.8–1.8	1.3	0.8–2.1
Middle	1.0	0.7–1.5	1.1	0.7–1.6	1.1	0.7–1.6	1.0	0.7–1.6	1.1	0.7–1.7
Fourth	1.1	0.7–1.5	1.0	0.7–1.5	1.1	0.7–1.6	1.1	0.7–1.6	1.0	0.7–1.6
Terminated pregnancy or stillbirth	2.0***	1.4–3.0	1.5	1.0–2.1	1.5*	1.0–2.3	2.1***	1.4–3.2	1.6*	1.1–2.3
Physical violence, ever	2.1***	1.6–2.7	1.6***	1.2–2.0						
Sexual violence, ever	2.4***	1.7–3.4	1.7**	1.2–2.4						
Physical violence, last 12 months	1.7***	1.3–2.2			1.3	1.0–1.8				
Sexual violence, last 12 months	2.1***	1.6–2.9			1.6**	1.1–2.2				
First perpetrator of sexual violence (ref = no violence)										
Husband/partner							1.8***	1.3–2.4	1.4*	1.0–1.9
Non-partner							3.7***	1.7–8.0	3.8***	1.9–7.6
Pseudo R ²			0.02		0.02				0.02	
Total observations	95 507		95 439		95 439		88 153		87 882	

†Excludes women from Haiti where the Demographic and Health Surveys omitted the question on the perpetrator of first act of sexual violence.
P-values * <0.05 , ** <0.01 , *** <0.001 .

Standardised DHS questions on both symptoms of fistula and experience of violence enable pooled analysis across countries. Because fistula is a rare morbidity, pooling data allow for a larger sample with more power to detect associations than within-country analysis. This is especially useful when testing for associations with GBV, because the DV module is only administered to a sub-sample of women.

The study has some important limitations. DHS questions only document self-reported symptoms of fistula-like incontinence without clinical examination. Studies pairing similar interview-based screening with clinical examination of suspected cases suggest that a substantial proportion of women who report fistula symptoms have another type of incontinence or reproductive tract condition [31]. The associations reported in this study may be affected by such misclassification. However, analyses of the sensitivity, specificity and positive/negative predictive value of fistula screening questions have shown widely varying results [26, 31, 32]. These variations may be influenced by prevalence, translation issues or other setting-specific factors. Therefore, we did not feel that applying a single misclassification adjustment was a valid approach for the purposes of our analysis. Instead, we acknowledge that our findings can only be interpreted as associations with fistula symptoms, i.e. severe incontinence, not confirmed fistula cases.

Demographic and Health Surveys only include women of reproductive age (15–49) and those who live in households. Therefore, women with fistula who are older, younger or not living in a household are excluded. Such selection bias could affect the generalisability of associations reported here. Self-report of GBV is susceptible to underreporting due to social desirability or recall bias, potentially affecting the validity of findings. Pooling data diminishes the importance of country context, although this has been mitigated by including a country fixed effect in the analytic models.

Finally, the relatively small numbers of women reporting fistula symptoms in any particular country sample mean that inclusion/exclusion criteria or other decisions about analysis can affect findings, making comparison between studies challenging even when the same data sources are used. For example, the prevalence findings reported here differ slightly from other recent studies using the same surveys. This may be because this analysis draws from women in the DV sub-sample, but also because the analysis only includes women with yes or no responses to the question on the presence of fistula symptoms—women with missing or ‘don’t know’ responses were excluded from both numerator and denominator.

Programme and research implications

The study findings have important implications for fistula treatment programmes. Many post-repair support programmes focus on reintegration, with the aim of reuniting women with their families and communities. Currently, most fistula treatment programmes do not systematically address GBV as part of their services. If, as demonstrated by the study findings, women with fistula symptoms are at increased risk of sexual and physical violence, it is important that all those receiving fistula treatment also receive comprehensive GBV screening before discharge, accompanied by appropriate counselling and referral. This need remains whether violence occurs before and/or after the onset of fistula symptoms. This is consistent with World Health Organization guidance that ‘providers should ask about exposure to intimate-partner violence when assessing conditions that may be caused or complicated by IPV, to improve diagnosis/identification and subsequent care’ [33]. The need to strengthen the consideration of and response to GBV in the health sector extends beyond fistula programmes; GBV is often inadequately identified and managed within health systems.

The study findings also have research implications. Even comprehensive research efforts to date to understand fistula patients’ longer-term health and well-being trajectories have generally not examined the role of gender-based violence in these women’s lives [34, 35]. Future household surveys such as the DHS can refine assessment of the timing of both GBV and fistula, i.e. when violence first occurred and when fistula symptoms began. However, as fistula is a relatively rare condition, it may remain difficult to obtain sample sizes sufficient for analysis of temporal relationships with violence. Instead, case-control studies or qualitative investigation may provide additional understanding of these issues, including how the experience of GBV changes before and after fistula occurrence. Finally, a number of countries with a substantial fistula burden have adopted fistula indicators in their Health Management Information Systems (HMIS) [36], and there has been a discussion of treating fistula as a reportable condition, with stronger demographic or health system surveillance [37]. As HMIS or surveillance data become available, it may be more feasible to conduct larger-scale research evaluating temporal relationships between fistula and other issues of concern.

Conclusions

This study shows that women reporting lifetime fistula symptoms are much more likely to report the experience of physical and sexual violence than women without

fistula symptoms. This indicates a need to re-evaluate the causal pathways between violence and fistula. Violence may be caused or aggravated as a consequence of this condition, and/or the same women may share heightened vulnerability to both fistula and GBV. Programmes treating and supporting women with fistula must incorporate GBV issues into provider training, discharge planning and service provision or referral.

Acknowledgements

The study was funded by the United States Agency for International Development (USAID) under cooperative agreement GPO-A-00-03-00003-00 and associate cooperative agreement AID-OAA-A14-00013. The opinions expressed are those of the authors and do not necessarily reflect the views of USAID, or the United States Government. The authors thank Mary Ellen Stanton and Erin Mielke, Sunita Kishor, Kimberly Peven, Tom Pullum, Lauri Romanzi and Cynthia Stanton for their review of this manuscript.

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