BMC Women's Health

RESEARCH

Open Access

Depression and loss to follow-up among patients treated for premalignant cervical lesions at a tertiary hospital in Uganda: a cross-sectional study

Samuel Maling[1*], Frank Ssedyabane[2], Hope Mudondo[2], Rogers Kajabwangu[3], Nathan Kakongi[4], Eleanor Turyakira[5], Alexcer Namuli[3], Wilfred Arubaku[6], Martin Galiwango[7], Randall C Thomas[8] and Deusdedit Tusubira[4]

Abstract

Background Cervical cancer prevention relies on timely treatment and follow-up of premalignant cervical lesions, yet loss to follow-up (LTFU) remains common in many low-resource settings. Depression may be associated with poor engagement in care, but evidence among women treated for premalignant lesions in Uganda is limited. We assessed the prevalence of depression and its association with LTFU among women treated for premalignant cervical lesions at Mbarara Regional Referral Hospital in Uganda.

Methods This was a retrospective cross-sectional study at the Cervical Cancer Clinic of Mbarara Regional Referral Hospital in southwestern Uganda. Women treated for premalignant cervical lesions between January 2017 and December 2022 with complete records and active telephone contacts were enrolled ($n=112$). Follow-up status was defined by clinic attendance on the scheduled review date or within three months thereafter. Depressive symptoms were assessed during telephone interviews (May–June 2023) using the Patient Health Questionnaire-9 (PHQ-9), categorized as moderate/severe (≥ 10) versus no/mild (< 10). sociodemographic and treatment-related data were collected using a separate structured questionnaire/clinical record abstraction. Logistic regression was used to assess the association between depression and LTFU, adjusting for district of residence, marital status, education level, and employment status.

Results Of 112 participants, 75.0% (84/112) were LTFU. The mean age was 36.4 years (SD = 8.8). Moderate to severe depressive symptoms were present in 17.9% (20/112). Mean PHQ-9 scores were higher among participants who were LTFU than those retained in care (6.2 ± 5.2 vs. 0.7 ± 3.1; $p<0.001$). Depression was associated with increased odds of LTFU (AOR = 9.697; 95% CI: 1.087–86.536; $p=0.042$).

Conclusion Women treated for premalignant cervical lesions at Mbarara Regional Referral Hospital had high LTFU, and depressive symptoms were strongly associated with disengagement from follow-up care.

Keywords Depression, Premalignant cervical lesions, Cervical cancer, Loss to Follow-Up, Tertiary Hospital, Uganda

*Correspondence:
Samuel Maling
sammaling@must.ac.ug

Full list of author information is available at the end of the article

© The Author(s) 2026. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Background

Cervical cancer is the fourth most common cancer among women globally, with an age-standardised incidence of 13.3 cases per 100,000 [1, 2]. Sub-Saharan Africa accounts for 19.59% of total cases and 24.55% of deaths annually [3–5]. The cervical cancer incidence in East Africa is reported to be 43/100,000 [6]. Uganda has been reported to have an age-standardized incidence rate of 56.2 per 10,000 [7]. Different screening programs, like pap smear cytology, have decreased the prevalence of cervical cancer in developed countries. However, there has been no significant reduction in the prevalence of the disease among low- and middle-income countries [8].

Treatment for cervical lesions is a crucial intervention in the control, management, and monitoring of the disease. However, in low and middle-income countries, many patients are lost to follow-up during treatment [9]. This leads to high rates of recurrence, persistence, and progression of lesions. A multitude of factors are said to facilitate loss to follow up among patients undergoing treatment for chronic disease, including cervical cancer [9, 10]. Barriers include distance, cost, cultural beliefs, misinformation, lack of support, time constraints, fear, stigma, and unequal access to care [9–17].

Several studies have concluded that mental health conditions, including depression, are prevalent among patients with chronic diseases like cervical cancer and could be responsible for their poor quality of life [18–21]. It is further hypothesized that the adverse reactions and complications from the treatment modalities may have a direct impact on the development of depression among cervical cancer patients. The decreased physical and physiological function in cervical cancer patients further predisposes them to depression [18]. This puts depression among the many factors that could influence loss to follow up and result in undesired treatment outcomes. Given this context, this study aimed to assess the prevalence of depression and its association with loss to follow-up among women treated for pre-malignant cervical lesions at the cervical cancer clinic of Mbarara Regional Referral Hospital.

Materials and methods

Study setting

The study was conducted at the Cervical Cancer Clinic of Mbarara Regional Referral Hospital (MRRH). This tertiary hospital is located in Southwestern Uganda, with a catchment area of approximately four million people [22]. The clinic is run by three nurses, one resident, and one gynaecologist, all of whom are supervised by a gynaecologic oncologist: The clinic follows the national "screen-and-treat" approach for cervical cancer screening, guided by the Ministry of Health Uganda (MoH) [23] and aligned with World Health Organization (WHO) recommendations [24]. Women in the general population aged 30 to49years and women living with HIV (WLHIV) aged 25 to 49 years are screened using visual inspection with acetic acid (VIA) as the main screening test, followed by immediate ablative treatment (thermocoagulation) for those with VIA-positive lesions. WLHIV undergo HPV DNA testing as and when the testing kits are available. Following treatment, the patients are scheduled to return for a review visit at six weeks for assessment of possible complications and a follow-up visit after one year to assess for recurrence of disease. WLHIV and women in the general population who test VIA-negative are rescreened after one and three years respectively. Those with cancer are referred to the Uganda Cancer Institute for treatment. Following treatment, the patients are advised to return for a review visit at 6 weeks to assess possible complications and then after one year to assess for disease recurrence.

Study design and participant inclusion

This was a retrospective study, utilizing existing clinic registers to identify patients with active phone numbers who were subsequently contacted for interviews. All patients who had undergone treatment for any cervical lesion between January 2017 and December 2022 were eligible to participate. Only patients who had received treatment for cervical lesions and were scheduled for follow-up review were included. Patients with incomplete or inaccessible clinical records and those with inactive phone numbers were excluded.

Sample size

This study analysed existing data from the cervical cancer clinic at MRRH. The study did **not** perform an a priori sample size calculation. The study included women with complete records and valid telephone numbers during the study period, yielding a total sample of 112 participants. Because the available records fixed the sample size, the 112-sample size may not have been adequately powered to detect minor to moderate differences in loss to follow-up between groups.

Data collection

Patients who had undergone treatment for cervical lesions were identified using the clinic registers. The research extracted data from records of women managed for premalignant cervical lesions between January 2017 and December 2020. A total of 178 records were available in that period, of which 112 contained complete clinical and contact information and were included in the analysis. Phone interviews with 112 women were conducted between May and June 2023 to determine participants' follow-up status, collect additional psychosocial information, and assess depression. Depression was evaluated

by a practicing psychiatrist using a structured questionnaire that incorporated the PHQ-9, allowing for clinically informed probing and validation of responses to enhance the accuracy of the depression assessment. Their follow-up status was assessed based on whether they returned on the scheduled date or within three months thereafter. Loss to follow-up was defined as failure to return within this period. The nine-item Patient Health Questionnaire (PHQ-9) [2], previously validated and customized in REDCap [25], was used to assess depression. *sociodemographic and treatment-related data were collected using a separate structured questionnaire/clinical record abstraction.* Both patients who returned and those lost to follow-up were contacted using phone numbers recorded in the clinic registers.

Table 1 Socio-demographic characteristics of study participants

Variable	Category	Frequency (*N* = 112)	%
Mean age (SD)		36.4 (8.7)	
District of residence	Mbarara	66	58.9
	Others	46	41.1
Marital status	Single	22	19.6
	Married	71	63.4
	Divorced	19	17
Highest education	No formal education	1	0.9
	Primary	46	41.1
	Secondary	42	37.5
	Tertiary	23	20.5
Employment status	Not employed	63	57.8
	Formal employed	24	22
	Informal employment	22	20.2
Monthly income (USD)		3.3 (1.5)	
Transport cost (USD)		11.3 (6.5)	
Difficulty in functioning	Not difficult at all	68	63
	Somewhat difficult	35	32.4
	Very difficult	4	3.7
	Extremely difficult	1	0.9
Harmful alcohol use	No	94	83.9
	Yes	18	16.1
Dependent on someone	No	65	58
	Yes	47	42
Need spouse's permission for clinic visit	No	67	59.8
	Yes	45	40.2
Treatment from other sources	No	1	0.9
	Yes	111	99.1
Other chronic illnesses	No	55	49.1
	Yes	57	50.9
Lost to follow up	No	28	25
	Yes	84	75

Consenting procedure

The interviewer began by confirming the respondent's identity using first and last name, age bracket, and location to avoid mistaken identity. Verbal informed consent was then obtained from each participant before commencing the phone interview. The study purpose, expected duration of the interview, and the voluntary nature of participation were clearly explained. Consent was only recorded on the consent form after the participant verbally affirmed understanding and willingness to participate. The consent process was conducted by a practicing psychiatrist who followed a standardized script to ensure consistency and ethical compliance.

Depression assessment and interpretation

Using the PHQ-9, data on depression were collected on a continuous scale from 0 to 27. The PHQ-9 scores were categorised as 0 to 9 (No or Mild depression) and 10 to 27 (Moderate or Severe depression).

Data management and analysis

Data were imported from REDCAP into a Microsoft Excel spreadsheet (Microsoft Office Professional Plus 2013, version 15.0.4675.1003, Microsoft Inc., Redmond, Washington, USA) and then imported into STATA 17 (StataCorp LLC, College Station, Texas, United States) software for analysis. Demographic data were presented in frequencies and proportions. The proportion of depression among women who were lost to follow-up and those who returned for review was presented as a percentage of the total sample size (112). Associations between depression and loss to follow-up were determined using logistic regression analysis, and a p-value < 0.05 was considered statistically significant.

Results

Socio-demographic characteristics of study participants

A total of 112 participants were enrolled in the study, with a mean age of 36.4 years (SD = 8.8). The majority, 58.9% (66/112), resided in Mbarara City and 63.4% (71/112) were married. More than half, 57% (63/112), were not employed. The majority, 83.9% (94/112), reported abstaining from alcohol, while 49.1% (55/112) had other chronic illnesses. Three-quarters of the participants, (84/112), were lost to follow-up, as shown in Table 1 below.

Distribution of participant socio-demographics according to follow-up status

Of the 112 participants, 75%(84/112) were lost to follow-up, while 25%(28/112) remained in care. The mean age was 36.2 (+/-9.1) years for those lost to follow-up and 36.7 (+/-7.5) years for those retained in care. More than half of the participants lost to follow-up resided in

Mbarara City (62%, 52/84); the majority were married (61%, 51/84), and not employed (59%, 49/84). Participants lost to follow-up had a significantly higher mean PHQ-9 score (6.2 ± 5.2) than those retained in care (0.7 ± 3.1); $p < 0.001$. Additionally, 83% (70/84) of participants lost to follow-up reported no alcohol use, and 51% (43/84) had no other chronic diseases, as shown in Table 2.

Distribution of depression by participants' socio-demographic characteristics

Among the 112 participants, 17.9%(20/112) had moderate or severe depression, while 82.1%(92/112) had no or mild depression. Half (10/20) of participants with moderate or severe depression and 66% (61/92) of those with no or mild depression were married. A considerable proportion, 80% (16/20) of participants with severe depression and 85% (78/92) of participants with no or mild depression were non-alcohol users, details in Table 3 below.

Distribution of depression among participants in care and those lost to follow-up

A notably higher proportion of participants lost to follow-up had moderate or severe depression (22.6%) compared to those in care (3.6%), suggesting a strong association between depression and attrition from care. Among participants lost to follow-up, those with moderate or severe depression were less likely to be married (47%) compared to those with no or mild depression (65%). Functional impairment was more common among those lost to follow-up and depressed, with just 12% reporting no difficulty functioning, as opposed to 62% among participants with no or mild depression. Alcohol use appeared slightly more frequent among depressed

Table 2 Distribution of participant socio-demographics according to follow-up Status

Variable	Category	In care *N* = 28	Lost to follow up *N* = 84	Test	*p*-value
Mean age (SD)		36.79 (7.56)	36.27 (9.16)	Ind. t test	0.79
Home district	Mbarara	14 (50%)	52 (62%)	Chi-square	0.27
	Outside Mbarara	14 (50%)	32 (38%)		
Marital status	Single	5 (18%)	17 (20%)	Fisher's exact	0.54
	Married	20 (71%)	51 (61%)		
	Divorced	3 (11%)	16 (19%)		
Highest education	No formal education	0 (0%)	1 (1%)	Chi-square	0.52
	Primary	9 (32%)	37 (44%)		
	Secondary	11 (39%)	31 (37%)		
	Tertiary	8 (29%)	15 (18%)		
Employment status	Not employed	14 (54%)	49 (59%)	Chi-square	0.79
	Formal employed	7 (27%)	17 (20%)		
	Informal employment	5 (19%)	17 (20%)		
Monthly income (USD)		4 (1.35)	3 (1.54)	Ind. t test	0.005
Highest education	No formal education	0 (0%)	1 (1%)	Chi-square	0.52
	Primary	9 (32%)	37 (44%)		
	Secondary	11 (39%)	31 (37%)		
	Tertiary	8 (29%)	15 (18%)		
Transport (USD)		10 (6.99)	12 (6.27)	Ind. t test	0.19
Difficulty in functioning due to depression	Not difficult at all	27 (96%)	41 (51%)	Chi-square	< 0.001
	Somewhat difficult	0 (0%)	35 (44%)		
	Very difficult	0 (0%)	4 (5%)		
	Extremely difficult	1 (4%)	0 (0%)		
Harmful alcohol use	No	24 (86%)	70 (83%)	Fisher's exact	1
	Yes	4 (14%)	14 (17%)		
Dependent on someone	No	17 (61%)	48 (57%)	Fisher's exact	0.83
	Yes	11 (39%)	36 (43%)		
Need permission from spouse	No	17 (61%)	50 (60%)	Chi-square	0.91
	Yes	11 (39%)	34 (40%)		
Treatment from other sources	No	1 (4%)	0 (0%)	Fisher's exact	0.25
	Yes	27 (96%)	84 (100%)		
Other chronic illnesses	No	14 (50%)	41 (49%)	Chi-square	0.91
	Yes	14 (50%)	43 (51%)		
Mean PHQ-9 score		6.2 (+/-5.2)	0.7 (+/-3.1)	Ind. t test	< 0.001

Table 3 Distribution of depression by participants' socio-demographic characteristics

		No/mild depression *N* = 92	Moderate/severe depression *N* = 20	Test	*p*-value
District of residence	Mbarara	57 (62%)	9 (45%)	Chi-square	0.16
	Others	35 (38%)	11 (55%)		
Marital status	Single	19 (21%)	3 (15%)	Fisher's exact	0.08
	Married	61 (66%)	10 (50%)		
	Divorced	12 (13%)	7 (35%)		
Highest education	No formal education	1 (1%)	0 (0%)	Chi-square	0.17
	Primary	38 (41%)	8 (40%)		
	Secondary	31 (34%)	11 (55%)		
	Tertiary	22 (24%)	1 (5%)		
Employment status	Not employed	51 (57%)	12 (60%)	Chi-square	0.65
	Formal employed	21 (24%)	3 (15%)		
	Informal employment	17 (19%)	5 (25%)		
Monthly income in USD		3.38 (1.52)	2.75 (1.58)	Ind. t test	0.098
Highest education	No formal education	1 (1%)	0 (0%)	Chi-square	0.17
	Primary	38 (41%)	8 (40%)		
	Secondary	31 (34%)	11 (55%)		
	Tertiary	22 (24%)	1 (5%)		
Transport costs (USD)		11.28 (6.85)	11.65 (4.53)	Ind. t test	0.82
Difficulty in functioning due to depression	Not difficult at all	66 (73%)	2 (11%)	Chi-square	< 0.001
	Somewhat difficult	24 (27%)	11 (61%)		
	Very difficult	0 (0%)	4 (22%)		
	Extremely difficult	0 (0%)	1 (6%)		
Harmful alcohol use	No	78 (85%)	16 (80%)	Fisher's exact	0.74
	Yes	14 (15%)	4 (20%)		
Dependent on someone	No	53 (58%)	12 (60%)	Fisher's exact	1
	Yes	39 (42%)	8 (40%)		
Need spouse's permission	No	53 (58%)	14 (70%)	Chi-square	0.31
	Yes	39 (42%)	6 (30%)		
Other treatment sources	No	1 (1%)	0 (0%)	Fisher's exact	1
	Yes	91 (99%)	20 (100%)		
Other chronic illnesses	No	44 (48%)	11 (55%)	Chi-square	0.56
	Yes	48 (52%)	9 (45%)		

individuals lost to follow-up, with the observed difference approaching statistical significance ($p = 0.052$). See details in Table 4 below:

Association between depression and loss to follow-up

Loss to follow up was observed in 75%(84/112) of study participants, while 25%(28/112) remained in care. At bivariate analysis, depression was associated with seven times increase in the likelihood of loss to follow up among patients undergoing treatment for cervical lesions at MRRH (COR 7.892, P value 0.049, 95% CI, 1.006–61.944). At multivariate analysis, after controlling for district of residence, marital status, highest level of education, and employment status, depression was significantly associated with nine times increase in the likelihood of loss to follow up among patients undergoing treatment for cervical lesions at MRRH (AOR 9.697, P value 0.042, 95%CI, 1.087–86.536). See details in Table 5 below:

This was obtained after controlling for District of residence, Marital status, Highest level of education, and Employment status.

Discussion

This study observed a high loss-to-follow-up (LFTU) rate among women treated for premalignant cervical lesions and demonstrated a strong association between moderate to severe depressive symptoms and disengagement from scheduled follow up care. After adjusting for district of residence, marital status, highest level of education, and employment status, women with PHQ-9 scores ≥ 10 had substantially higher odds of LTFU compared to those with no or mild symptoms. Specifically, participants with moderate to severe depression were nearly nine times more likely to be lost to follow-up compared to those without depression. These findings highlight depression as an important psychosocial correlate of retention in "screen-and-treat" cervical precancer

Table 4 Distribution of depression among participants in care and those lost to follow-up

Variable	Category	Lost to follow-up (*n* = 84)				In care (*n* = 28)			
		No/mild depression (*n* = 65)	Moderate/severe depression (*n* = 19)	Test	*p*-value	No/mild depression (*n* = 27)	Moderate/severe depression (*n* = 1)	Test	*p*-value
Age		36.05 (9.68)	37.05 (7.27)	Ind. t test	0.68	36.89 (7.69)	34 (0.0)	Ind. t test	0.72
Marital status	Single	14 (22%)	3 (16%)	Fisher's exact	0.096	5 (19%)	0 (0%)	Fisher's exact	1
	Married	42 (65%)	9 (47%)			19 (70%)	1 (100%)		
	Divorced	9 (14%)	7 (37%)			3 (11%)	0(0%)		
Highest level of education	No formal education	1 (2%)	0 (0%)	Fisher's exact	0.25	9 (33%)	0(0%)	Fisher's exact	0.45
	Primary	29 (45%)	8 (42%)			10 (37%)	1 (100%)		
	Secondary	21 (32%)	10 (53%)			8 (30%)	0(0%)		
	Tertiary	14 (22%)	1 (5%)			0(0%)	0(0%)		
Employment status	Not employed	38 (59%)	11 (58%)	Fisher's exact	0.71	13 (52%)	1 (100%)	Fisher's exact	0.64
	Formal employed	14 (22%)	3 (16%)			7 (28%)	0(0%)		
	Informal employment	12 (19%)	5 (26%)			5 (20%)	0(0%)		
Transport (UGX)		11.862 (6.703)	11.632 (4.657)	Ind. t test	0.89	9.89 (7.11)	12 (0.00)	Ind. t test	0.77
Functioning	Not difficult at all	39 (62%)	2 (12%)	Fisher's exact	< 0.001	27 (100%)	0(0%)	Fisher's exact	< 0.001
	Somewhat difficult	24 (38%)	11 (65%)			0(0%)	0(0%)		
	Very difficult	0 (0%)	4 (24%)			0(0%)	1 (100%)		
	Extremely difficult					0(0%)	0(0%)		
Alcohol use	Never	55 (85%)	15 (79%)	Fisher's exact	0.052	23 (85%)	1 (100%)	Fisher's exact	0.68
	Monthly or less	9 (14%)	1 (5%)			4 (15%)	0(0%)		
	Two to four times a month	1 (2%)	2 (11%)			0 (0%)	0 (0%)		
	Four or more times a week	0 (0%)	1 (5%)			0 (0%)	0 (0%)		
Rely on someone	Yes	37 (57%)	11 (58%)	Fisher's exact	1	16 (59%)	1 (100%)	Fisher's exact	1
	No	28 (43%)	8 (42%)			11 (41%)	0(0%)		
Permission from spouse	Yes	37 (57%)	13 (68%)	Chi-square	0.37	16 (59%)	1 (100%)	Fisher's exact	0.41
	No	28 (43%)	6 (32%)			11 (41%)	0(0%)		
Treatment from other sources	Church	18 (28%)	5 (26%)	Fisher's exact	0.99	8 (30%)	1 (100%)	Fisher's exact	0.33
	Traditional healers	7 (11%)	2 (11%)			3 (11%)	0(0%)		
	Others	40 (62%)	12 (63%)			16 (59%)	0(0%)		
Other chronic illnesses	Yes	31 (48%)	10 (53%)	Chi-square	0.7	13 (48%)	1 (100%)	Fisher's exact	0.31
	No	34 (52%)	9 (47%)			14 (52%)	0(0%)		

Table 5 Multivariable logistic regression showing the relationship between depression and loss to follow-up

Variable	COR	*P* Value	95% CI	AOR	*P* Value	95% CI
Depression	7.892	0.049	1.006–61.944	9.697	0.042	1.087–86.536

programs in Uganda. Although much of the African literature has focused on mental health among women with invasive cervical cancer, growing evidence shows that abnormal screening results and premalignant cervical lesions are themselves associated with significant psychological distress [26, 27]. Studies from diverse African settings report elevated levels of anxiety and depression following abnormal cervical screening, colposcopy referral, and diagnosis or treatment of cervical intraepithelial neoplasia [28–31]. Several contributors to anxiety and depression in this population include the physical and psychological burden of treatment modalities such as cryotherapy, radiotherapy, and surgery; disruptions in reproductive functioning (e.g., surgical menopause); and distressing symptoms like malodorous vaginal discharge, chronic pelvic pain, and dyspareunia [32, 33].

Such emotional burdens may impair motivation, planning capacity, and perceived self-efficacy, reducing

women's ability to overcome structural barriers to care and increasing the risk of missed follow-up appointments [32, 34–36]. Such effects are also likely to impair patients' functional ability, and self-image [1]. This is likely to affect drug adherence and compliance further, thus leading to loss to follow-up among some of these patients [2, 3]. Low income emerged as a key factor contributing to both depression and loss to follow-up in our study. However, financial hardship may increase vulnerability to depression while simultaneously limiting the ability to afford transport or time away from income-generating activities. Our findings align with global literature that shows that financial insecurity increases vulnerability to mental health disorders. For example, a meta-analysis by Lorant et al. [37, 38] found that individuals in the lowest income brackets were 1.81 times more likely to experience depression. In cancer care contexts, insured patients with reduced out-of-pocket spending have demonstrated higher adherence and lower depression rates. Similarly, other studies describe a U-shaped association between personal income and depression, with depression risk decreasing as income increases [39]. Financial distress, particularly among patients responsible for their healthcare expenses, can create a feedback loop of emotional burden and disengagement from care. To emphasize the importance of income in keeping patients in care, a previous study among medically insured participants, they were neither depressed nor lost to follow up, since they were not removing any pennies out of their pockets to cater for their medication. They were not predisposed to low income as a factor for development of depression and thus, they adhered to their medication and hence they stayed in care [5].

The exceptionally high loss to follow-up rate observed in this study is a major public health concern for cervical cancer control efforts in low-resource settings such as Uganda. Follow-up after treatment of premalignant lesions is essential to detect persistence, recurrence, and complications and to ensure timely retreatment. High attrition rates have been widely documented in cervical screening and precancer treatment programs in low-resource settings, undermining the effectiveness of secondary prevention efforts [40, 41]. Several factors likely contribute to this pattern, including geographic inaccessibility, the cost of transportation, a lack of social support, and competing household responsibilities, especially among women with limited autonomy [41]. Moreover, systemic gaps such as poor appointment tracking, weak patient follow-up systems, and lack of community-based outreach further compound the problem [40, 42]. Evidence from similar settings highlights that strengthening patient navigation services, leveraging community health workers, and implementing mobile health reminders can help mitigate these losses and improve retention [43–46]. Our findings add a critical psychosocial dimension to these structural challenges in that depressive symptoms appear to cluster among women who disengage from follow-up, suggesting that mental health may interact with socioeconomic and health-system barriers to amplify attrition. Factors like distance from facility, alcohol use [47], level of education [48], and marital status are potential confounders or correlates that may be independently associated with both depression and follow-up attendance [4]. Married women in our study had lower depression rates and were more likely to remain in care, echoing earlier findings that marital support offers psychological and financial buffering, encourages earlier help-seeking, and improves adherence [49]. Conversely, divorced or single women were more likely to experience depression, consistent with studies showing that marital disruption is a significant predictor of poor mental health [50]. Moreover, married individuals are often diagnosed at earlier disease stages and receive more social support, contributing to better prognoses and reduced care discontinuation [48]. In another study, which used Pearson correlation analysis, depression among cervical cancer patients was negatively correlated with marital status [11]. Alcohol use patterns among participants in this study showed an association with depression and follow-up status. Participants who reported no alcohol use had lower levels of depression. Although some literature suggests that moderate alcohol use may temporarily alleviate negative emotion, chronic use is well established as a risk factor for depression and treatment non-adherence [51]. Patients who were distant from the health facility were at a greater risk of loss to follow-up compared to those residing near the facility. Traveling longer distances strains patients financially as they incur transport fees. This makes it harder for patients who are not economically stable to reach the health centres, and also makes it hard for them to keep medical appointments. In addition, the travel time of patients to the health facility may conflict with other priorities, thus patients may fail to attend medical care [17]. The cost of adherence to treatment among patients from distant places away from the health facility is a source of economic burden to patients [18], and it can lead to negative emotions, leading to depression and hence loss to follow up.

In our study, about one in two of the participants reported getting permission from their spouses to seek health services, and the majority of them were depressed. There is a documented suggestion that male partners exert significant influence on their women's decisions to access screening, treatment, and care for cervical cancer services [52]. Influence from male partners is closely linked to financial independence and the ability to utilize health services [53]. This gets complicated by longer

distances women travel to access health services, as well as unemployment, which could lead to depression [12].

Findings from our study cannot establish temporality and directionality of depression and loss to follow-up. Depression was assessed during phone interviews after treatment and after follow-up status had been determined from clinic attendance. Consequently, we cannot establish whether depressive symptoms preceded LTFU or whether being lost to follow-up and living with uncertainty about one's health status contributed to the development or worsening of depression. Longitudinal cohort designs that assess mental health at treatment and prospectively monitor follow-up behavior are needed to disentangle these pathways.

The role of HIV status warrants particular attention in this study. Women living with HIV are at increased risk of cervical precancer, are often scheduled for more intensive follow-up, and may face overlapping burdens of stigma, comorbidity, and clinic attendance demands [54–56]. HIV status was not consistently documented in the retrospective clinic registers used for this study and therefore could not be included in the regression analysis. We highlight HIV status as a key unmeasured confounder and potential effect modifier and recommend that future studies in similar settings prospectively collect and integrate HIV data to clarify its influence on depression and follow-up adherence.

Strengths, limitations and implications

A major strength of this study is its focus on an underexplored intersection between depression and LTFU in a low resource setting cervical precancer clinic. Limitations include potential selection bias due to reliance on records with active phone contacts; the possible misclassification of depressive symptoms through telephone-based assessment; the modest sample size; lack of temporality inherent in the cross-sectional design; and residual confounding from unmeasured variables, particularly HIV status. These factors should therefore be considered when interpreting the magnitude and generalizability of the observed association. Despite these limitations, our findings support the integration of brief, feasible depression screening tools such as the PHQ-9 into cervical precancer services, coupled with clear referral pathways for psychosocial support.

Conclusions

This study demonstrates a very high loss-to-follow-up rate among women treated for premalignant cervical lesions at Mbarara Regional Referral Hospital and identifies depressive symptoms as a strong correlate of disengagement from scheduled follow-up care. Women with moderate to severe depression had substantially higher odds of being lost to follow-up compared to those with no or mild symptoms, even after adjustment for key sociodemographic factors. Integrating depression screening into routine cervical cancer care will help detect depression early and prevent loss to follow-up.

Abbreviations

MRRH	Mbarara regional referral hospital
VIA	Visual inspection under acetic acid
PHQ-9	Patient Health Questionnaire

Acknowledgements

The research acknowledges the staff of Mbarara Regional Referral Hospital, especially those working at the cervical cancer screening and prevention clinic.

Authors' contributions

The corresponding author, SM, conceived the idea and developed the first draft of the protocol. Co-authors FS, MG, AN, NK, ET, HM, TCR, WA and DT participated in data collection, refined the protocol, provided overall guidance in the entire write up and approved the final version prior to submission. All authors are accountable to all aspects of this protocol.

Funding

The research was supported by a small research grant from the Government of Uganda, through the Directorate of Research and Graduate Training, Mbarara University of Science and Technology, grant number DRGT/SG/FY22-23/R1/T1P1.

Data availability

All data from which this article was generated is available from the corresponding author upon meaningful request.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical review and approval were obtained from the Mbarara University of Science and Technology Research Ethics Committee (MUST-2022-670). Administrative clearance was obtained from Mbarara Regional Referral Hospital. All participants provided informed consent before participation in the study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

[1]Department of Psychiatry, Mbarara University of Science and Technology, P.O. Box 1410, Mbarara, Uganda
[2]Department of Medical Laboratory Science, Mbarara University of Science and Technology, P.O. Box 1410, Mbarara, Uganda
[3]Department of Obstetrics & Gynecology, Mbarara Regional Referral Hospital, Mbarara, Uganda
[4]Department of Biochemistry, Mbarara University of Science and Technology, P.O. Box 1410, Mbarara, Uganda
[5]Department of Community Health, Mbarara University of Science and Technology, P.O. Box 1410, Mbarara, Uganda
[6]Department of Dental Surgery, Mbarara University of Science and Technology, P.O. Box 1410, Mbarara, Uganda
[7]Department of Electrical and Electronics Engineering, Faculty of Applied Sciences and Technology, Mbarara University of Science and Technology, P.O. Box 1410, Mbarara, Uganda
[8]Division of Gynecologic Oncology, Columbia University Medical Center, New York, USA

Received: 30 July 2025 / Accepted: 27 March 2026
Published online: 02 April 2026

References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. Cancer J Clin. 2021;71(3):209–49.
2. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. Cancer J Clin. 2024;74(3):229–63.
3. Denny L, Quinn M, Sankaranarayanan R. Screening for cervical cancer in developing countries. Vaccine. 2006;24:S71–7.
4. WHO. Assessing national capacity for the prevention and control of noncommunicable diseases: report of the 2019 global survey. World Health Organisation; 2020.
5. Singh D, Vignat J, Lorenzoni V, Eslahi M, Ginsburg O, Lauby-Secretan B, et al. Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. Lancet Global Health. 2023;11(2):e197–206.
6. Sankaranarayanan R. Screening for cancer in low-and middle-income countries. Annals global health. 2014;80(5):412–7.
7. WHO. World Health Organization - Cervical Cancer Country Profiles. 2021. https://www.who.int/publications/m/item/cervical-cancer-country-profiles.
8. Tsikouras P, Zervoudis S, Manav B, Tomara E, Iatrakis G, Romanidis C, et al. Cervical cancer: screening, diagnosis and staging. J buon. 2016;21(2):320–5.
9. Sapienza LG, Thomas JJ, Echeverria AE, Sharma S, Hamstra DA, Hall TR, et al. Predictors of follow-up non-compliance after definitive radiotherapy for locally advanced cervical cancer at a community cancer center. Gynecologic Oncol Rep. 2022;44:101091.
10. Subramaniyan S, Sindhuri R, Mohan R, Ganapathy K, Manivasakan J. Loss to follow-up of cervical cancer screening program beneficiaries at Rural Health Training Center in South India–An explanatory mixed method study. J Curr Res Sci Med. 2023;9(1):53–60.
11. Habinshuti P, Hagenimana M, Nguyen C, Park PH, Mpunga T, Shulman LN et al. Factors associated with loss to follow-up among cervical cancer patients in Rwanda. Annals Global Health. 2020;86(1):117.
12. Tsui J, Llanos AA, Doose M, Rotter D, Stroup A. Determinants of abnormal cervical cancer screening follow-up and invasive cervical cancer among uninsured and underinsured women in New Jersey. J Health Care Poor Underserved. 2019;30(2):680.
13. Kiptoo S, Otieno G, Tonui P, Mwangi A, Orango O, Itsura P, et al. Loss to follow-up in a cervical cancer screening and treatment program in western Kenya. American Society of Clinical Oncology; 2018.
14. Ezechi OC, Petterson KO, Gabajabiamila TA, Idigbe IE, Kuyoro O, Ujah IAO, et al. Predictors of default from follow-up care in a cervical cancer screening program using direct visual inspection in south-western Nigeria. BMC Health Serv Res. 2014;14:1–10.
15. Page CM, Ibrahim S, Park LP, Huchko MJ. Patient factors affecting successful linkage to treatment in a cervical cancer prevention program in Kenya: A prospective cohort study. PLoS ONE. 2019;14(9):e0222750.
16. Tchounzou R, Simo Wambo AG, Njamen TN, Ilick IO, Neng HT, Dadao F, et al. Patients lost to follow-up for cervical cancer in the Limbe Regional Hospital. J Global Oncol. 2019;4:1–5.
17. Goldhaber-Fiebert JD, Denny LE, De Souza M, Wright TC, Kuhn L, Goldie SJ. The costs of reducing loss to follow-up in South African cervical cancer screening. Cost Eff Resource Allocation. 2005;3:1–8.
18. Ding X, Zhang Y, Wang J, Huang A, Liu Y, Han Y, et al. The association of adverse reactions and depression in cervical cancer patients treated with radiotherapy and/or chemotherapy: moderated mediation models. Front Psychol. 2023;14:1207265.
19. Shyu I-L, Hu L-Y, Chen Y-J, Wang P-H, Huang B-S. Risk factors for developing depression in women with cervical cancer: a nationwide population-based study in Taiwan. Int J women's health. 2019;11:135–41.
20. Kim S, Nam J, Park S, Bae D, Park C, Cho C, et al. Study of anxiety and depression in cervical cancer survivors. J Clin Oncol. 2009;27(15suppl):e20644–e.
21. Zhao H, Zhao Z, Chen C. Prevalence, risk factors and prognostic value of anxiety and depression in cervical cancer patients underwent surgery. Translational Cancer Res. 2020;9(1):65.
22. Uganda Ministry of Health. Mbarara regional referral hospital. 2016.
23. Ministry of Health Uganda. The National Cervical Cancer Prevention and Control Strategic Plan. 2018.
24. World Health Organization. WHO guidelines for screening and treatment of precancerous lesions for cervical cancer prevention. 2021.
25. Nakku J, Rathod S, Kizza D, Breuer E, Mutyaba K, Baron E, et al. Validity and diagnostic accuracy of the Luganda version of the 9-item and 2-item Patient Health Questionnaire for detecting major depressive disorder in rural Uganda. Global Mental Health. 2016;3:e20.
26. Chona EZ, Gosse RA, Msengi EA, Aruldhas TP, Mkonongo L, Matle TM, et al. Life Experiences of Women Diagnosed With Cervical Cancer in Sub-Saharan Africa: A Systematic Review of Qualitative Studies. Psycho-Oncology. 2025;34(9):e70280.
27. Maree JE, Nkosi NG, Huiskamp AA. The psychosocial implications of cervical cancer in women living in sub-Saharan Africa. curationis. 2025;48(1):2618.
28. Nakie G, Melkam M, Takelle GM, Fentahun S, Rtbey G, Andualem F et al. Depression, anxiety and associated factors among cancer patients in Africa; a systematic review and meta-analysis study. BMC Psychiatry. 2024;24(939).
29. Paul R, Musa G, Chungu H. Prevalence of depression among cervical cancer patients seeking treatment at the cancer diseases hospital. IOSR J Dent Med Sci Ver XI. 2016;15(6):2279–861.
30. Ali HS. Prevalence and Correlates of Depression and Anxiety Among Patients With Cervical Cancer at Cancer Treatment Centre. Kenyatta National Hospital: UON; 2021.
31. Habimana S, Biracyaza E, Mpunga T, Nsabimana E, Kayitesi F, Nzamwita P, et al. Prevalence and associated factors of depression and anxiety among patients with cancer seeking treatment at the Butaro Cancer Center of Excellence in Rwanda. Front Public Health. 2023;11:972360.
32. Bae H, Park H. Sexual function, depression, and quality of life in patients with cervical cancer. Support Care Cancer. 2016;24(3):1277–83.
33. Beltrán Ponce SE, Abunike SA, Bikomeye JC, Sieracki R, Niyonzima N, Mulamira P, et al. Access to radiation therapy and related clinical outcomes in patients with cervical and breast cancer across sub-saharan africa: A systematic review. JCO Global Oncol. 2023;9:e2200218.
34. Amo-Antwi K, Agambire R, Konney TO, Nguah SB, Dassah ET, Nartey Y, et al. Health-related quality of life among cervical cancer survivors at a tertiary hospital in Ghana. PLoS ONE. 2022;17(6):e0268831.
35. Amoh R, Anie HNGA, Kyei KA, Nyantakyi AY, Daniels J. Impact of treatment on the quality of life of patients with cervical cancer at a tertiary facility in sub-Saharan Africa. I Radiother Pract. 2025;24:e10.
36. Ali RA, Isse SA, Hakizimana T, Hussein H, Hassan HH, Mohamud S et al. Quality of Life, its Associated Factors, and Correlation with Performance Status Among Cervical Cancer Patients: A Multicenter Cross-Sectional Study in Uganda. Available at SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5242647.
37. Lorant V, Deliège D, Eaton W, Robert A, Philippot P, Ansseau M. Socioeconomic inequalities in depression: a meta-analysis. Am J Epidemiol. 2003;157(2):98–112.
38. Singh GK, Azuine RE, Siahpush M. Global inequalities in cervical cancer incidence and mortality are linked to deprivation, low socioeconomic status, and human development. Int J MCH AIDS. 2012;1(1):17.
39. Wang M, Jin Y, Zheng ZJ. The association of cervical cancer screening and quality of care: A systematic analysis of the Global Burden of Disease Study 2019. J Glob Health. 2023;13:04090. Epub 2023/08/25.
40. Owokuhaisa J, Turyakira E, Ssedyabane F, Tusubira D, Kajabwangu R, Musinguzi P, et al. Barriers and facilitators of retention in care after cervical cancer screening: patients' and healthcare providers' perspectives. BMC Womens Health. 2024;24(1):516.
41. Habinshuti P, Hagenimana M, Nguyen C, Park PH, Mpunga T, Shulman LN, et al. Factors associated with loss to follow-up among cervical cancer patients in Rwanda. Annals Global Health. 2020;86(1):117.
42. Paul M, George PS, Mathew A. Patient and disease related factors associated with lost-to follow-up/drop-outs of cervical cancer patients: a study at a Major Cancer Hospital in South India. Asian Pac J Cancer Prev. 2010;11(6):1529–34.
43. O'Donovan J, O'Donovan C, Nagraj S. The role of community health workers in cervical cancer screening in low-income and middle-income countries: a systematic scoping review of the literature. BMJ global health. 2019;4(3).
44. Habila MA, Kimaru LJ, Mantina N, Valencia DY, McClelland DJ, Musa J, et al. Community-engaged approaches to cervical cancer prevention and control in sub-Saharan Africa: a scoping review. Front Global Women's Health. 2021;2:697607.
45. Obol JH, Lin S, Obwolo MJ, Harrison R, Richmond R. Provision of cervical cancer prevention services in Northern Uganda: a survey of health workers from rural health centres. BMC Health Serv Res. 2021;21(1):794.

46. Mutyaba T, Faxelid E, Mirembe F, Weiderpass E. Influences on uptake of reproductive health services in Nsangi community of Uganda and their implications for cervical cancer screening. Reproductive Health. 2007;4(1):4.
47. Jemal A, Bray F, Forman D, O'Brien M, Ferlay J, Center M, et al. Cancer burden in Africa and opportunities for prevention. Cancer. 2012;118(18):4372–84.
48. Dickson KS, Boateng EN, Acquah E, Ayebeng C, Addo IY. Screening for cervical cancer among women in five countries in sub-saharan Africa: analysis of the role played by distance to health facility and socio-demographic factors. BMC Health Serv Res. 2023;23(1):61.
49. Hanske J, Meyer CP, Sammon JD, Choueiri TK, Menon M, Lipsitz SR, et al. The influence of marital status on the use of breast, cervical, and colorectal cancer screening. Prev Med. 2016;89:140–5.
50. Griesel M, Seraphin TP, Mezger NC, Hämmerl L, Feuchtner J, Joko-Fru WY, et al. Cervical cancer in sub-Saharan Africa: a multinational population-based cohort study of care and guideline adherence. Oncologist. 2021;26(5):e807–16.
51. Di Lisa F, Villa A, Filomeno L, Arcuri T, Chiofalo B, Sanguineti G et al. Breast and cervical cancer in transgender men: literature review and a case report. Therapeutic Adv Med Oncol. 2024;16:17588359241259466.
52. Barchi F, Winter SC, Ketshogile FM, Ramogola-Masire D. Adherence to screening appointments in a cervical cancer clinic serving HIV-positive women in Botswana. BMC Public Health. 2019;19(1):1–13.
53. Chidyaonga-Maseko F, Chirwa ML, Muula AS. Underutilization of cervical cancer prevention services in low and middle income countries: a review of contributing factors. Pan Afr Med J. 2015;21(1):231.
54. Wan Z, Zhao J, Xu L, Sun P, Shuai P, Li K, et al. Global and regional estimates of cervical cancer burden associated with human immunodeficiency virus infection from 1990 to 2019. J Med Virol. 2023;95(6):e28891.
55. Ibrahim Khalil A, Mpunga T, Wei F, Baussano I, De Martel C, Bray F, et al. Age-specific burden of cervical cancer associated with HIV: a global analysis with a focus on sub-Saharan Africa. Int J Cancer. 2022;150(5):761–72.
56. Stelzle D, Tanaka LF, Lee KK, Khalil AI, Baussano I, Shah AS, et al. Estimates of the global burden of cervical cancer associated with HIV. lancet global health. 2021;9(2):e161–9.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.