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Longitudinal study on quality of life following cervical cancer treatment in Botswana

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ABSTRACT

Purpose This study longitudinally assessed the quality of life (QoL) in patients who completed chemoradiation (CRT) for cervical cancer in Botswana and compared the QoL for those living with and without HIV infection.

Methods Patients with cervical cancer recommended for curative CRT were enrolled from August 2016 to February 2020. The European Organisation for Research and Treatment of Cancer Core Quality-of-Life (QLQ-C30) and cervical cancer-specific (QLQ-Cx24) questionnaires, translated into Setswana, were used to assess the QoL of patients prior to treatment (baseline), at the end of treatment (EOT) and in 3 month intervals post-treatment for 2 years, and statistical analyses were performed.

Results A total of 294 women (median age: 46 years) were enrolled and followed up for an average of 16.4 months. Of women with recorded staging, most had FIGO stage III/IV disease (64.4%). Women living with HIV (WLWH; 74.1%) presented at earlier ages than those without HIV (44.8 years vs 54.7 years, p<0.001). The QoL for all domains did not differ by HIV status at baseline, EOT or 24 month follow-up. Per QLQ-C30, the mean global health status score (72.21 vs 78.37; p<0.01) and the symptom (12.70 vs 7.63; p=0.04) and functional scales (88.34 vs 91.85; p<0.01) improved significantly from the EOT to the 24 month follow-up for all patients; however, using the QLQ-Cx24 survey, no significant differences in the symptom burden (12.53 vs 13.67; p=0.6) or functional status (91.23 vs 89.90; p=0.53) were found between these two time points.

Conclusion The QoL increased significantly for all patients undergoing CRT, underscoring the value of pursuing curative CRT, regardless of the HIV status.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Cervical cancer survivors in low- and middle-income countries (LMICs), particularly in sub-Saharan Africa, face significant QoL challenges due to late-stage presentation and concurrent HIV infection, with limited data on outcomes following curative treatment.

WHAT THIS STUDY ADDS

⇒ This study shows that women in Botswana experience significant and durable improvements in overall QoL after chemoradiation therapy, regardless of HIV status, although sexual health remains a persistent challenge.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These findings underscore the need for targeted interventions to improve sexual well-being, highlight the importance of multidisciplinary care and demonstrate the value of curative treatment in achieving favourable outcomes. This evidence can guide future research, enhance supportive care strategies and inform policy to better address the unique needs of cervical cancer survivors in LMICs.

INTRODUCTION

Botswana, a middle-income country in sub-Saharan Africa, faces one of the greatest burdens of HIV infection in the world, particularly in women.[1] Since the implementation of a universal antiretroviral therapy programme in Botswana, women living with HIV (WLWH) in this country are living longer.[2] The most critical risk factor for the development of cervical cancer is the presence of high-risk human papillomavirus (HPV) infections.[3] Concurrent HIV and HPV infection further increases the risk of developing this disease.[4] Thus, as WLWH are living longer, they are at an increased risk of suffering or dying from cervical cancer.[5] Approximately 90% of deaths caused by cervical cancer are in low- and middle-income countries (LMICs), with sub-Saharan Africa having the highest burden.[6]

Definitive chemoradiation (CRT) followed by brachytherapy is a curative treatment for locally advanced cervical cancer. As the survival rates for cervical cancer continue to improve in Botswana with an increase in access to treatment, the focus of care has shifted towards enhancing the quality of life (QoL) for long-term survivors. QoL encompasses various aspects, including physical, psychological, social and functional well-being, and its assessment is vital for understanding the overall impact of cervical cancer treatment on patients' lives.[7] Evaluating QoL longitudinally and considering the influence of HIV status are particularly important, given the dynamic health landscape in Botswana and the potential for its impact on QoL outcomes.

The European Organisation for Research and Treatment of Cancer Core Quality-of-Life Questionnaire (QLQ-C30) and the cervical cancer-specific module (QLQ-Cx24) have emerged as validated tools for assessing QoL in cervical cancer patients. The QLQ-C30 is a questionnaire consisting of 30 items to investigate multiple domains of a cancer patient's QoL, while the QLQ-Cx24 was developed to support the QLQ-C30 and to provide a cervical cancer-specific module.[8–10] These questionnaires capture various domains of QoL, providing a comprehensive understanding of the impact of the disease and its treatment on patients' well-being. However, the majority of QoL assessments done so far have been completed in developed nations. Although they have shown that the QoL of patients improves following treatment, there is significant disability, particularly with respect to sexual health, as well as limited data from LMICs.

It is crucial to understand the long-term impact of curative cervical cancer treatment on the QoL of patients in Botswana, where a high HIV burden and a middle-income status with significant socioeconomic inequalities exist. This knowledge will help guide treatment decisions and develop supportive care interventions tailored to the specific needs of this population.

To address this research gap, we conducted a prospective longitudinal study to assess the impact of CRT on the QoL of cervical cancer patients in Botswana, considering the influence of the HIV status. By using the QLQ-C30 and QLQ-Cx24 questionnaires, we aimed to comprehensively evaluate the multidimensional aspects of QoL among both WLWH and those living without HIV. This study contributes to the existing literature on the QoL of cervical cancer patients in Botswana, shedding light on the long-term effects of CRT and the potential differences in QoL outcomes based on HIV status. Importantly, it adds to the limited literature of QoL following cervical cancer treatments in LMICs.

PATIENTS AND METHODS

Patients and public involvement

The study was designed from the onset with patients in mind. Informal discussions with survivors in the multidisciplinary clinic, as well as focus groups with survivors, were performed to understand patient perception of QoL and survivorship; this was used as a foundation for the study protocol. The study was also presented to the Community Advisory Board before IRB approval to help inform the protocol. Once data were collected, the Community Advisory Board also provided input on the results.

Patients diagnosed with pathologically confirmed cervical cancer and recommended for CRT at the MDT clinic from August 2016 to February 2020 were approached by study nurses for study discussion and informed consent in their preferred language (Setswana or English). During this time, 294 women who were eligible consented and were enrolled. Surveys were completed prior to treatment (baseline), at the end of treatment (EOT) and at 3 month intervals post-treatment for 2 years. We used the QLQ-C30 and QLQ-Cx24 questionnaires, translated into Setswana. We initially translated from English to Setswana with two translators with resolution of discrepancies, and then a subsequent back translation into English was performed for confirmation. The scales are scored from 0 to 100. For QoL, functional status and global health status, a higher score indicated a better status. These were evaluated on a continuous scale, without a threshold value. For model development, raw scores on each of the surveys were transformed into a score of 0–100 using the European Organisation for Research and Treatment of Cancer scoring manual. A higher score indicated a higher 'response' to that question. For functional questions, this meant higher QoL, whereas for symptom burden questions, these represented higher dysfunction. To correct this, we reversed the scales for symptoms in order to analyse all metrics appropriately.

Study participants

The questionnaires were administered to women undergoing CRT treatment, and a prospective cohort design was adopted in our investigation. The patients were recruited into the study either during the consultation or treatment planning stage. The study participants were then categorised into two cohorts (HIV positive and HIV negative), and the demographic and clinical measurements were observed at baseline. Additionally, the QoL measurements were observed at baseline, during treatment and every 3 months after treatment.

Statistical analysis

The patient characteristics collected were age, marital status, height, weight, CD4 count, treatment type, viral load and laboratory measurements (creatinine, haemoglobin, albumin and white blood cell count). Marital status was categorised into single or married, while divorced patients and those who are widowed were combined into one group (widowed/divorced). Chemotherapy was also grouped by the number of chemotherapy cycles (0, 1–4 or 5–6). Analysis of continuous and categorical patient characteristics by HIV status was carried out using the Student's t-test and Pearson's X^2 test for association, respectively. However, for an association between the treatment response and the HIV status, Fisher's test was adopted, since it is an appropriate statistical tool for small counts.[11] The descriptive statistics for health-related QoL

Table 1 Demographic characteristics of the patients by HIV status

Characteristic	HIV-positive n=218 (74.1%)	HIV-negative n=76 (25.9%)	P value
Age, years, mean (SD)	44.8 (8.8)	54.7 (11.3)	<0.001*
median (IQR)	44.0 (39.0–49.0)	55.5 (47.0–64.5)	
Height, m, mean (SD)	1.62 (0.08)	1.62 (0.07)	0.910*
median (IQR)	1.62 (1.57–1.66)	1.62 (1.55–1.67)	
Weight, kg, mean (SD)	66.7 (16.3)	77.6 (17.8)	<0.001*
median (IQR)	63.4 (54.3–76.1)	77.6 (63.0–90.6)	
Body mass index, mean (SD) Median (IQR)	25.4 (5.97)	29.4 (5.95)	<0.001*
Median (IQR)	24.4 (21.4–29.0)	29.8 (24.4–34.1)	
Marital status, no. (%)			0.001
Married	47 (21.6)	23 (30.3)	
Single	159 (72.9)	40 (52.6)	
Widowed/divorced	12 (5.5)	13 (17.1)	

*The two-sided t-test was used.
IQR, interquartile range; SD, standard deviation.

variables were summarised at each timepoint, and associations between these variables and HIV status were assessed using the Student's t-test. The sexual enjoyment score measured by QLQ-Cx24 was reversed to maintain consistency in terms of the direction of scores with the other variables. The preliminary and cross-sectional analyses were carried out using STATA (version 17) and the R package (version 4.2.1).

RESULTS

Patient demographics and clinical characteristics

A total of 294 women were enrolled in this study, with 218 (74.1%) being WLWH and 76 (25.9%) living without HIV (table 1).

The median age at presentation was significantly younger for WLWH compared with women without HIV (44.0 years vs 55.5 years, p<0.001). In addition, there was a statistically significant difference in the body mass index (BMI) between the two groups, with WLWH having a lower median BMI compared with women without HIV (24.3 vs 29.8 *p*<0.001). Moreover, a larger percentage of WLWH was found to be single/unmarried compared with women without HIV (72.9% vs 52.6%, p=0.001).

In total, 64.4% of the patients presented at an advanced stage (stage III–IV), with no significant difference in the stage at presentation between WLWH and women living without HIV (p=0.581; table 2).

The mean follow-up time for the patients was 11.2 months. With the exception of albumin (p=0.035), the baseline laboratory values, including the white blood cell count, were not significantly different between the two groups. Similarly, the treatment characteristics, such as the median equivalent dose in 2 Gy fractions (p=0.060), number of chemotherapy cycles (p=0.068) and complete treatment response (p=0.371), were not significantly different between the two groups. Meanwhile, 13.9% of WLWH had a history of prior tuberculosis compared with 1.3% of women without HIV (p=0.002).

Impact on the overall QoL and global health status

The mean QoL functional scale, symptom scale and health status scores improved significantly between the initial visit and the 24 month follow-up for all patients (figure 1). Subdomains of each of the questionnaires can be found in figure 2. The global health status score increased from 67.95 at the initial visit to 78.37 at 24 months post-treatment (p<0.01; figure 1(e)), with the overall QoL score improving from 67.94 to 78.85 (p<0.01) and the overall health status score improving from 67.91 to 77.84 (p<0.01). There was no significant difference in the QoL between WLWH and women without HIV at baseline, EOT or the 24 month follow-up.

Functional status

The functional status, assessed using the QLQ-C30 and QLQ-Cx24 questionnaires, showed significant improvements between baseline and the EOT (figure 1a, c). The QLQ-C30 scale demonstrated an increase in functional status from 87.14 to 91.85 (p<0.01; figure 1a, while the QLQ-Cx24 scale showed an increase from 84.08 to 89.90 (p<0.01; figure 1c. Although the QLQ-C30 scale showed a significant improvement between the EOT and the 24 month follow-up (p=0.04), this was not observed with the QLQ-Cx24 scale (p=0.53). Comparing the functional status change between the EOT and the 3 month follow-up, the QLQ-C30 scale showed no significant difference (effect of −0.14, p=0.92), while the QLQ-Cx24 scale showed a significant decrease (effect of −13.39, p<0.01). However, comparing the 3 month and 24 month

Table 2 Clinical and treatment characteristics of the patients by HIV status

Characteristic	HIV-positive	HIV-negative	P value
Disease stage, no. (%)			0.581
I–II	72 (34.6)	29 (38.2)	
III–IV	136 (65.4)	47 (61.8)	
Baseline laboratory values, median (IQR)			
Creatinine, µmol/L	64.7 (40.1)	62.3 (18.9)	0.640
Haemoglobin, g/dL	11.9 (8.1)	13.0 (10.5)	0.405
Albumin, g/dL	39.8 (6.6)	41.8 (3.2)	0.035
White blood cell count	6.4 (2.8)	6.7 (2.2)	0.457
Total chemotherapy cycles, no. (%)			0.247*
0	4 (5.4)	24 (11.3)	
1	1 (1.4)	5 (2.4)	
2	3 (4.1)	13 (6.1)	
3	14 (18.9)	32 (15.1)	
4	21 (28.4)	77 (36.3)	
5	29 (39.2)	59 (27.8)	
6	2 (2.7)	2 (0.9)	
Treatment profile			
External beam radiation therapy dose, cGy, mean (SD)	4582.7 (520.2)	4708 (181.4)	0.042
Brachytherapy dose, cGy, mean (SD)	2453.2 (614.5)	2473.9 (682.6)	0.592
Equivalent dose in 2 Gy fractions	76.8 (15.5)	80.5 (10.4)	0.060†
Treatment response, no. (%)			0.371*
Complete response	115 (54.5)	39 (54.2)	
Partial response	78 (37.0)	32 (44.4)	
No response/stable disease	6 (2.8)	0 (0.0)	
Progression of disease	2 (1.0)	0 (0.0)	
Not recorded	10 (4.7)	1 (1.4)	
Diabetes, no. (%)			0.239
Yes	6 (2.8)	4 (5.3)	
No	211 (97.2)	72 (94.7)	
Prior tuberculosis, no. (%)			0.001
Yes	30 (13.9)	1 (1.3)	
No	186 (86.1)	75 (98.7)	

*Fisher's exact test was used. Unless otherwise noted, the X^2 test was used.
†The two-sided t-test was used.

follow-up results using the QLQ-Cx24 scale, an increase in the functional status was observed from 77.84 to 89.90.

Further analysis of the components of the QLQ-C30 functional scale revealed that social functioning improved from 86.60 at the initial visit to 96.63 at the 24 month follow-up. While there was a marginal decrease in role functioning, from 85.21 to 84.84, between the initial visit and the EOT, by the 24 month follow-up, role functioning status increased to 89.65; physical functioning also showed a slight increase from 87.20 to 90.67 from initial visit and 24 month follow-up. Meanwhile, emotional functioning significantly improved from the initial visit to the EOT (89.70 to 94.13) and stayed similar from the EOT to the 24 month follow-up (94.39).

In comparison, the QLQ-Cx24 questionnaire showed that only the body image improved between the initial visit and the 24 month follow-up, from 83.24 to 96.62. However, sexual enjoyment decreased from 63.01 to 22.22, and sexual activity and sexual/vaginal function also decreased from 86.48 to 78.39 and 93.01 to 91.07, respectively. No significant difference was observed between WLWH and women without HIV at baseline,

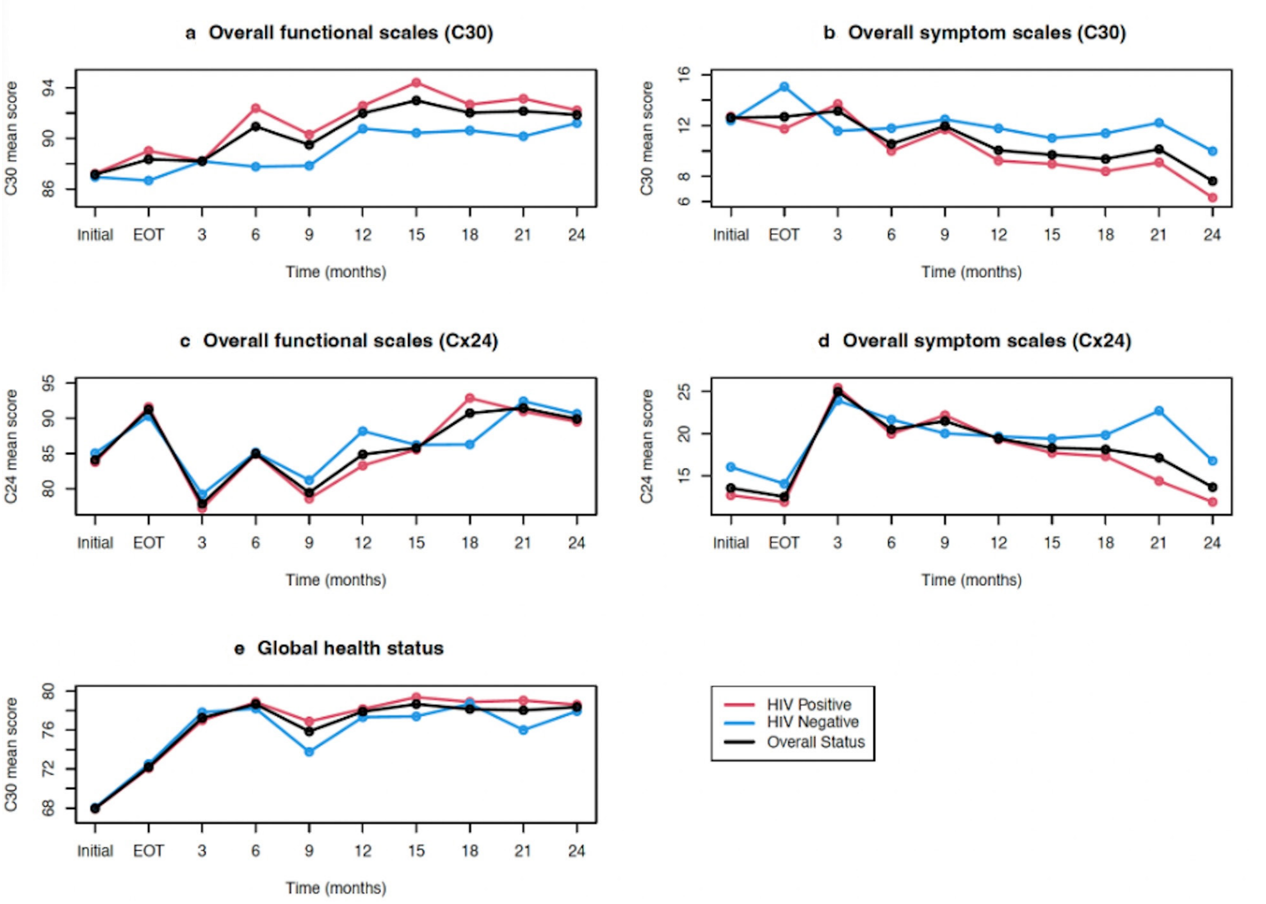

Figure 1 The quality-of-life functional scale, symptom scale and health status scores before treatment (initial), at the end of treatment and every 3 months thereafter for 24 months for HIV-positive cervical cancer patients (red), HIV-negative cervical cancer patients (blue) and the total study population (black). (a) The overall functional scale scores using the European Organisation for Research and Treatment of Cancer Core Quality-of-Life Questionnaire (QLQ-C30); (b) the overall symptom scale scores using QLQ-C30; (c) the overall functional scale scores using the cervical cancer-specific module (QLQ-Cx24); (d) the overall symptom scale scores using QLQ-Cx24; and (e) the global health status scores using QLQ-C30.

EOT or the 24 month follow-up in any of the functional status components.

Symptom scale

The overall symptom burden, as measured by the QLQ-C30 questionnaire, significantly decreased from baseline to the 24 month follow-up ($p<0.01$; figure 1b). However, the QLQ-Cx24 symptom scale did not show a significant improvement between baseline and the 24 month follow-up ($p=0.96$) or between the EOT and the 24 month follow-up ($p=0.60$; figure 1d). There was a significant difference between the EOT and the 3 month follow-up, with the symptom burden decreasing from 12.53 to 24.98 ($p<0.01$) and then further decreasing to 13.67 at the 24 month follow-up.

Specific symptoms assessed by the QLQ-C30 scale showed improvements over time. Financial difficulties decreased from 19.19 at the EOT to 3.23 at the 24 month follow-up, while diarrhoea worsened from baseline to the EOT (2.90 to 9.5) but then improved to 3.86 at the 24 month follow-up. Appetite loss (17.63 to 27.00) and nausea/vomiting (4.35 to 7.92) also worsened from baseline to the EOT, but both improved by the 3 month and 24 month follow-ups (5.99 and 4.91 for nausea/vomiting and 8.84 and 6.32 for appetite loss).

The QLQ-C30 scale showed that the overall symptom experience decreased from 12.94 to 7.4 between the initial visit and 24 month follow-up (figure 1b). However, peripheral neuropathy and menopausal symptoms increased from the EOT to the 3 month follow-up (peripheral neuropathy from 12.56 to 37.20 and menopausal symptoms from 14.91 to 26.83. These two symptoms decreased between the 3 month and 24 month follow-ups, with peripheral neuropathy decreasing from 37.20 to 25.96, and menopausal symptoms decreasing from 36.83 to 21.05. Sexual worry decreased from 21.21 to 6.23 from the initial visit to the 24 month follow-up. Similar to the rest of the data, there was no significant difference between WLWH and women without HIV.

DISCUSSION

This is the first study assessing longitudinal QoL and its components among cervical cancer survivors in Botswana. Compared with developed nations that have robust screening programmes, women in Botswana are

EORTC QLQ C-30	EORTC QLQ CX-24
Functional	
Physical	Body Image
Role	Sexual Enjoyment
Cognitive	Sexual/Vaginal Functioning
Emotional	
Social	
Symptoms	
Pain	Symptoms experience
Fatigue	Lymphedema
Nausea	Peripheral neuropathy
Vomiting	Menopausal symptoms
Dyspnea	Sexual worry
Insomnia	
Appetite loss	
Constipation	
Diarrhea	
Financial Impact	
Global Health Status	

Figure 2 Sub-domains of European Organisation for Research and Treatment of Cancer questionnaires.

more likely to present with disease at younger ages and later stages.[12] Therefore, cervical cancer survivors from Botswana and other LMICs with a high HIV burden experience more years living with the short- and long-term effects of oncologic therapy. Prior research has demonstrated worse sexual function for women undergoing CRT for locally advanced disease compared with patients undergoing radical hysterectomies, which is recommended for earlier-stage disease.[13] Thus, it is imperative to evaluate the QoL in patients following curative CRT treatment, especially in LMICs where the burden of disease is high.[14–16]

Reporting changes in QoL is an important first step but challenging to interpret without comparison to other contexts—and over time. While data are limited from other countries in Sub-Saharan Africa on QoL following cancer treatment, a study from Ethiopia indicated a notably lower global health status (48.3 vs 78.37) and higher financial strain (68.89 vs 3.86).[17] While a study from Ghana similarly had a similar global health status

(79.6 vs 78.37) and a much higher financial strain (36.2 vs 3.86).[18] The financial burden due to healthcare costs is a well-established strain on patients' mental health and well-being. Prior studies from Ghana investigating breast cancer patients have shown that financial strain is a significant barrier to care in Ghana and contributes to delayed presentations.[19]

Outside of Sub-Saharan Africa, a single-centre study by Lee *et al* from South Korea on the QoL of patients following curative treatment had a patient sample including 77.9% of patients with stage I disease; their findings demonstrated that the cervical cancer survivors had a global health status of 64.5 at a median interval of 45 months from diagnosis to survey completion (compared with 78.37 at the 24 month follow-up in our study).[20] Similarly, a multicentre study primarily based in developed nations had a lower global health status of 64.1 at median follow-up time of 2.5 years.[21] Meanwhile, another multicentre study, known as the EMBRACE trial and primarily based in developed nations, only looked at patients who received CRT, and their findings showed a comparable global health status to ours of 74.17 at a median follow-up of 21 months.[22] Thus, our results are promising that the QOL in Botswana is similar to those living in higher-income countries, but more research is needed to understand overall differences in the quality of treatment and survivorship care and to monitor patient needs to identify opportunities for intervention.

The comparable, if not better, QoL status of patients in our study can be explained by differences in methodology. While the aforementioned studies used the same scales, all but the EMBRACE trial did not stratify patients based on the time following EOT. Thus, the QoL status was confounded by the time since treatment. The comparatively high QoL status can also be explained by factors such as the utilisation of a multidisciplinary gynaecologic oncology clinic, which has been shown to allow for focused care coordination with persistent patient follow-up.[12] Another potential hypothesis is that Botswana's public payer system, which subsidises cancer treatment, may mitigate the financial burden of a cancer diagnosis. These are avenues for further research.

Unique Botswanan cultural factors may also contribute to the study population's significant improvements in role functioning, functional status and overall health. In a study by Poku *et al* investigating stigma towards WLWH motherhood and caring for children, the concept of respect for womanhood was found to be essential in Botswana.[23] Women who receive curative CRT with improved symptom management may be better able to fulfil a role of motherhood, leading to an improved sense of self and overall well-being.[24] Further research regarding the underlying attitudes or feelings of women before, during and after curative treatment is needed to understand the mechanisms of these improvements.

This study also builds on research describing the impact of cervical cancer treatment on sexual health, demonstrating that patients who receive CRT suffer from vaginal atrophy, vaginal dryness and menopausal symptoms. Botswana has a mean age of menopause of 48.9 years.[25] With the comparatively early age of cervical cancer diagnosis, particularly in WLWH, the average woman in Botswana may be more likely to experience more years of living with induced menopause as well as the sexual side effects associated with CRT compared with women in developed nations. This is one hypothesis that could explain the low sexual enjoyment in Botswana compared with nations with lower HIV infection rates in sub-Saharan Africa as well as developed nations where the average age of diagnosis is later. Nevertheless, this provides a valuable pathway to work on improving patient QoL.

In a study in Botswana by Nsingo *et al* looking at vaginal dilator usage following cervical cancer treatment, there was high utilisation and improvement in symptoms when the patients were provided with the tool and its instructions.[26] Further research is required to investigate how sexual side effects can be mitigated and the current scale of such efforts. Intrinsic to the discussion of sexual side effects is the limitation of the status being reported by patients due to shame and embarrassment.[27] While survey data are limited in analysing the motivation behind these feelings, further qualitative studies can focus on exploring these nuances.

The information obtained in this study indicates that in addition to working towards improving patient QoL, women should be encouraged to seek care. Fear of treatments and side effects from oncological care is a well-documented delay to accessing care.[28 29] A study from South Africa found that fear of treatments led women diagnosed with cervical cancer to delay treatment and to seek out shaman doctors, consequently presenting to medical professionals later.[30] Thus, these data can be an empirical way of demonstrating to women the value and efficacy of pursuing curative treatment. Furthermore, culturally informed knowledge of patients' priorities can have a profound impact on them receiving care.

The current study is also notable for the lack of difference found between WLWH and women living without HIV in terms of the QoL metrics. This adds to the collection of literature suggesting that in a community with well-controlled HIV infection, HIV does not impact outcomes of care.[31 32] WLWH tended to be diagnosed at an earlier age and were statistically less likely to be married. The marital status in other studies has been positively associated with an improved QoL; for example, a study of cervical cancer survivors in Thailand by Prasongvej *et al* has indicated that improved social support was responsible for this finding.[33] The fact that WLWH did not have lower QoL metrics despite being unmarried could be due to their younger age of diagnosis, as older patients have been shown to experience more treatment-related toxicities.[34]

This study had multiple strengths. For instance, it was prospective in nature, which is largely unique in QoL analyses. Furthermore, the single cancer centre ensured that the patients experienced consistent diagnostic, management and treatment protocols. Finally, the sample size and follow-up period guaranteed appropriate statistical power. Nevertheless, this study has some limitations that must be addressed. There was no psychometric study on the validity of the translated surveys. However, the consistency of the data and a suitable answer rate indicate that the surveys were appropriate. Furthermore, the oncologic treatment landscape in Botswana has evolved since the conclusion of the study. In 2022, Gaborone Private Hospital adopted volumetric modulated arc therapy, which has been shown to reduce skin, haematological, gastrointestinal and genitourinary complications compared with 3D-CRT. While further research is needed to assess how these changes may affect QoL, the socioeconomic and HIV status of patients in Botswana and other sub-Saharan African countries have largely remained unchanged. This stability, coupled with the slowdown in treatment progress following COVID-19, suggests that our findings remain relevant today. Future research should investigate the impact of the patients' socioeconomic status on their QoL.

In summary, curative CRT leads to improvements in QoL in multiple domains, regardless of the HIV status of the patients. QoL increased significantly and durably for all patients undergoing CRT, underscoring the value of pursuing curative CRT regardless of HIV status. Future work should explore how to improve patients' sexual well-being following treatment as well as further investigate the mechanisms of various QoL metrics.

Research in Context

- Patients who receive curative chemoradiation for a diagnosis of cervical cancer have been shown to have overall improvements in quality of life; however, there is limited data on quality of life in patients from low-and-middle income countries, particularly in populations that have a high HIV-prevalence.
- Utilizing a validated survey tool, we evaluated patient-reported quality of life from diagnosis to up to two years after chemoradiation treatment for cervical cancer. We found that there is no significant difference in quality of life following treatment between women living with HIV and women living without HIV. Sexual health metrics decreased between baseline visit and 2 year follow up, and should be prioritized for patients going forward.
- Our results provide valuable data for both patients and clinicians to describe expectations of treatment and survivorship. It also suggests that patients living with HIV should expect similar quality of life. Further work should focus on improving patients' psychosexual outcomes across their treatment journey

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Contributors Drafting manuscript: SG, RB, SK, PT and KA-R. Concept, planning and design: SG, SV, MP, NT, NZ, LL-L, ER, MB-N, KC, DR-M and KA-R. Final review and approval: SG, RB, SK, PT, LG, SC, DB, SV, MP, NT, NZ, LL-L, ER, MB-N, KC, DR-M and KA-R. SG is the guarantor.

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Competing interests SG has received consulting fees from Lumonus and from Sustainable Dialogue on Peaceful Uses and CRDF and also has stock or stock options in Harbinger Health. KC has received grants or contracts from the Australian Centre for Prevention of Cervical Cancer (ACPCC), Roche Molecular Diagnostics, Australian Government¬, Minderoo Foundation, Cepheid Inc, Commonwealth Department of Health, Australia. KC also receives support for a range of other Australian and international government projects including support from philanthropic organisations, WHO and government agencies related to cervical cancer control. KC also has been a chair or member of several meetings convened by the WHO or philanthropic organisations such as Bill and Melinda Gates Foundation (BMGF). KC has had leadership roles as chair on the Expert Advisory Group to the Elimination Response for the Australian Government and the chair of the Cancer Screening and Immunization Committee (CSI) for the Cancer Council Australia. KAR received grants from Pfizer/Lung Cancer Research Foundation, and AstraZeneca/NCCN which were paid to her institution. She has received consulting fees from Merck, as well as honoraria and travel fees from MJH Life Sciences to present at conference. No other disclosures to report.

Patient and public involvement Patients and/or the public were involved in the design, conduct, reporting or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Penn: 822863HRDC: 6/14/1UB: UBR/RES/IRB/1584. Participants gave informed consent to participate in the study before taking part.

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Data availability statement Data are available upon reasonable request. Research data are stored in an institutional repository and will be shared upon request to the corresponding author.

Author note The study addresses local research priorities as the early phases of the study included informal discussions with survivors in a gynaecologic multidisciplinary clinic, as well as focus groups with survivors of cervical cancer. Local researchers including nurses were involved in the study administration, recruitment of patients and interpretation of results. PT, LG, MB-N, SC and DB are all local to Botswana and have been involved in either the conceptualisation of the study, the administration of the questionnaires, the treatment of patients or the interpretation of the results. Early career researchers including RB, SK and PT have been involved in the data analysis and interpretation of results. All study procedures were reviewed and approved by local hospital and research institutional review board, and all participants gave informed consent, delivered in their preferred language, before enrolling in the study

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