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ORIGINAL RESEARCH

Three-Year Treatment Patterns and Follow-Up Challenges among Patients with Cervical Cancer at Tamale Teaching Hospital, Ghana

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Abstract

Introduction: Cervical cancer remains a major public health problem in sub-Saharan Africa, where late-stage presentation and limited access to comprehensive cancer treatment contribute to poor outcomes. This study evaluated three-year treatment outcomes and follow-up patterns among women with cervical cancer treated at Tamale Teaching Hospital (TTH), Ghana. **Methods:** This retrospective study included 630 women with histologically confirmed cervical cancer who were treated at TTH in 2020 and followed for three years through 2023. Clinical and treatment data were extracted from medical records. Qualitative information on barriers to treatment and follow-up was obtained through interviews with a subset of patients. **Results:** The median age at diagnosis was 51 years (range, 24–90 years). Most patients (84.6%) presented with stage II–III disease, and squamous cell carcinoma was the predominant histological type (91.6%). External beam radiotherapy was the most commonly documented treatment modality (83.7%), whereas only 8.7% received intracavitary radiotherapy and 4.6% received chemotherapy. At three years, 21.4% of patients were documented as alive and 18.1% as deceased, while 60.5% had been lost to follow-up. The proportion of patients attending follow-up visits declined substantially over time. Qualitative findings indicated that socioeconomic difficulties and barriers to accessing cancer care contributed to treatment interruption and loss to follow-up. **Conclusion:** Late-stage presentation, limited access to multimodal treatment, and substantial loss to follow-up were major challenges among women with cervical cancer treated at TTH. Strengthening early detection, improving access to comprehensive treatment, and establishing effective patient-tracking and follow-up systems may improve continuity of care and treatment outcomes.

Keywords: Cervical cancer, treatment outcomes, radiotherapy, follow-up, Ghana

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Introduction

Cervical cancer is a malignant disease arising predominantly from the transformation zone at the squamocolumnar junction of the uterine cervix. Although it is largely preventable through human papillomavirus (HPV) vaccination, screening, and timely treatment of precancerous lesions, cervical cancer remains an important global health problem, particularly in low- and middle-income countries. The burden is disproportionately high in sub-Saharan Africa, where limited screening coverage, delayed diagnosis, inadequate treatment capacity, and barriers to accessing healthcare contribute to high morbidity and mortality [1, 2].

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Cervical cancer is among the most common cancers affecting women worldwide, with a substantial proportion of cases and deaths occurring in low-resource settings. The disease frequently presents at an advanced stage in sub-Saharan Africa, limiting the effectiveness of curative treatment and contributing to poor clinical outcomes. In many countries in the region, deficiencies in cancer screening and diagnostic services, limited availability of radiotherapy and brachytherapy, treatment interruptions, and inadequate long-term follow-up remain major challenges [3].

Histologically, cervical cancer is predominantly classified as squamous cell carcinoma or adenocarcinoma, with squamous cell carcinoma accounting for the majority of cases in many populations. Clinical presentation may vary according to disease stage and can include abnormal vaginal bleeding, postcoital bleeding, and abnormal vaginal discharge. Advanced disease may be associated with pelvic pain, urinary or gastrointestinal symptoms, and other complications [1].

The prevention and control of cervical cancer depend on a comprehensive continuum of care encompassing HPV vaccination, screening, early diagnosis, appropriate staging, evidence-based treatment, and long-term follow-up [4, 5]. Although HPV vaccination and cervical cancer screening have substantially reduced disease incidence in settings where they are widely implemented, access to these preventive services remains limited in many low-resource countries.

In Ghana, cervical cancer continues to impose a considerable burden on women's health. Access to timely diagnosis and comprehensive treatment remains challenging, particularly for patients living in underserved areas. Tamale Teaching Hospital (TTH), a major referral center in northern Ghana, provides cancer diagnostic and treatment services to a large population. However, data on treatment patterns, longitudinal follow-up, and outcomes among cervical cancer patients treated at the institution remain limited.

Therefore, this study evaluated the three-year treatment outcomes and follow-up patterns of women with histologically confirmed cervical cancer treated at TTH in 2020. The study also explored barriers to treatment and follow-up to identify factors that may contribute to discontinuity of care and inform strategies for improving cervical cancer management in resource-constrained settings.

The standard treatment of locally advanced cervical cancer generally involves a combination of external beam radiotherapy, brachytherapy, and, when indicated, concurrent chemotherapy. At TTH, however, treatment has largely consisted of external beam radiotherapy, with relatively few patients receiving brachytherapy or combined chemoradiotherapy. Limited access to comprehensive treatment may contribute to suboptimal treatment outcomes. In Ghana, reliable population-based estimates of cervical cancer incidence remain limited, although cervical cancer is consistently reported among the leading malignancies affecting women [5, 6] The disease frequently presents at an advanced stage, at which point treatment options may be limited by disease extent, treatment availability, and patients' ability to access and complete therapy. Consequently, radiotherapy, chemotherapy, or palliative treatment may be required. Despite the substantial burden of cervical cancer in Ghana, data on treatment patterns, follow-up, and long-term outcomes remain limited [7].

Materials and Methods

Study Design

This study employed a retrospective observational design to evaluate the treatment patterns and three-year follow-up outcomes of women with histologically confirmed cervical cancer treated at Tamale Teaching Hospital (TTH) in 2020. Quantitative data were obtained from patients' medical records and followed through 2023. In addition, a qualitative component was conducted using semi-structured interviews with a purposively selected subset of patients to explore socioeconomic, psychological, and healthcare-access factors that may have influenced treatment and follow-up.

Study Setting

The study was conducted at Tamale Teaching Hospital (TTH), a major referral hospital serving the Tamale Metropolis and surrounding areas in the Northern Region of Ghana. The hospital provides specialist gynecological and oncology services and receives referrals from several health facilities within the region.

Study Population

The quantitative component included women with histologically confirmed cervical cancer who received treatment at TTH during 2020. Patients' demographic, clinical, treatment, and follow-up information was obtained from hospital records and assessed over a three-year period through 2023.

The qualitative component included a subset of patients identified from the hospital records who met the eligibility criteria and were available and willing to participate in an interview. This component was designed to provide contextual information regarding patients' experiences with treatment, healthcare access, and follow-up.

Inclusion Criteria

For the retrospective quantitative component, women with histologically confirmed cervical cancer who received treatment at TTH in 2020 and had available clinical and treatment records were eligible for inclusion.

For the qualitative component, participants were required to be women with a documented diagnosis of cervical cancer who met the study eligibility criteria, were clinically stable enough to participate in an interview, and provided informed consent.

Exclusion Criteria

Patients with insufficient medical records for assessment of the primary study variables were excluded from the retrospective analysis. For the qualitative

component, patients who were clinically unstable or unable to participate in an interview were excluded. Individuals who declined participation or were unable to provide informed consent were also excluded.

Sampling and Sample Size

For the retrospective component, all eligible women with histologically confirmed cervical cancer treated at TTH during 2020 were included, resulting in a total sample of 630 patients.

For the qualitative component, purposive sampling was used to recruit participants who could provide relevant information regarding their experiences with treatment and follow-up. The anticipated sample size was approximately 5–15 participants, with the final number determined by thematic saturation. Purposive sampling is appropriate for qualitative research because it enables the selection of participants with direct experience of the phenomenon under investigation [8].

Data Collection Instruments

For the retrospective component, a structured data-extraction form was used to obtain information from patients' medical records. Variables included demographic characteristics, histological diagnosis, disease stage, treatment modality, radiotherapy, brachytherapy, chemotherapy, and follow-up status.

For the qualitative component, a semi-structured interview guide was developed to explore participants' experiences of cervical cancer treatment and follow-up. The guide consisted of two sections. The first collected demographic information, including age, marital status, occupation, number of children, income, and educational level. The second explored psychological experiences, socioeconomic challenges, access to healthcare, treatment-related difficulties, and barriers to continued follow-up. Each interview lasted approximately 30–50 minutes.

Data Collection Procedure

Before data collection, an introductory letter from the Ghana College of Nurses and Midwives was submitted to the appropriate authorities at TTH to obtain permission to conduct the study. For the retrospective component, eligible medical records were identified and reviewed using the predefined data-extraction form.

For the qualitative component, eligible participants were approached and provided with information about the study in a language they could understand. The purpose and procedures of the study, potential benefits and risks, voluntary nature of participation, and confidentiality measures were explained. Written informed consent was obtained before each interview. Interviews were conducted in a private setting and lasted approximately 30–50 minutes.

Qualitative Data Analysis

With participants' permission, the interviews were audio-recorded and subsequently transcribed verbatim. Where interviews were conducted in a local language, the transcripts were translated into English before analysis. The transcripts were reviewed against the original audio recordings to ensure accuracy and completeness. The data were analysed manually using a qualitative content analysis approach. Codes were developed systematically from the interview data, with categories organized according to the major areas explored in the interview guide, including psychological experiences, socioeconomic challenges, treatment-related difficulties, and barriers to healthcare access. Relevant themes and categories were reviewed throughout the analysis to identify recurrent patterns and contextual factors influencing treatment and follow-up.

Selected quotations that were representative of the identified themes were used to support the qualitative findings and provide contextual insight into the quantitative results. Participants' identities were removed from the transcripts, and quotations were reported without personally identifying information.

Data Security and Confidentiality

Audio recordings, transcripts, and other study-related documents were securely stored in a locked location accessible only to the researcher and supervisor. Participant identifiers were removed from the analytical dataset to maintain confidentiality. Study data will be retained for five years in accordance with institutional requirements and will subsequently be securely destroyed.

Methodological Rigour

Several measures were undertaken to enhance the credibility and trustworthiness of the qualitative findings. Immediately after each interview, participants were given an opportunity to clarify or confirm information they had provided. The supervisor reviewed the interview process and relevant transcripts to support consistency in data collection and interpretation.

Rapport was established with participants before the interviews to facilitate open communication and encourage detailed responses. The researcher also received appropriate preparation and training to conduct the interviews and manage qualitative data. A detailed record of the study procedures, including participant recruitment, data collection, transcription, and analysis, was maintained to provide an audit trail.

Transferability was supported by providing a detailed description of the study setting, participant characteristics, recruitment procedures, and data-collection process. Interviews were conducted in a private and appropriate setting to protect participants' privacy. Participants were informed that participation was voluntary and that their information would be treated confidentially.

Ethical Considerations

Institutional approval was obtained from Tamale Teaching Hospital, and ethical clearance was granted by the Committee on Human Research and Publication Ethics. Written informed consent was obtained from participants before the interviews. Participants were informed about the purpose and procedures of the study, their right to decline participation or withdraw at any time,

and the measures implemented to protect confidentiality (Table 1).

Results

Demographic Characteristics

A total of 630 women with cervical cancer were included in the study. The age of the participants ranged from 24 to 60 years, with a median age of 51 years (SD, 12.7). The largest proportion of patients (40.8%) was aged 36–40 years. Most patients were married (65.2%), while 23.3% were widowed. Regarding occupation, 69.5% were classified as peasants, whereas 20.3% were housewives. More than half of the patients (61.3%) had no formal education, while 33.7% had completed primary education.

Clinical Characteristics

The clinical characteristics of the study population are presented in Table 2. Most patients presented with advanced-stage disease. Stage II disease was documented in 280 patients (44.4%), followed by stage III in 253 patients (40.2%). Stage I and stage IV disease were documented in 49 (7.8%) and 48 (7.6%) patients, respectively.

Squamous cell carcinoma was the predominant histological type, accounting for 577 cases (91.6%), followed by adenocarcinoma in 48 cases (7.6%). Adenosquamous carcinoma and other histological types accounted for 2 (0.3%) and 3 (0.5%) cases, respectively.

External beam radiotherapy (EBRT) alone was the most frequently documented treatment modality, administered to 527 patients (83.7%). A combination of EBRT and intracavitary radiotherapy was documented in 55 patients (8.7%), while 29 patients (4.6%) received EBRT combined with chemotherapy. Four patients (0.6%) received EBRT, intracavitary radiotherapy, and chemotherapy. Surgery combined with EBRT was documented in 9 patients (1.4%), and 5 patients (0.8%) received surgery, EBRT, and chemotherapy. One patient (0.2%) received intracavitary radiotherapy alone.

Regarding treatment-related symptom status, 76 patients (12.1%) were documented as having recurrent symptoms, 318 (50.5%) had no documented recurrence, and 95 (15.1%) had persistent symptoms. Symptom status was not documented for 141 patients (22.4%).

Three-Year Patient Status

Table 3 summarizes patient status immediately after treatment and at three years of follow-up. Immediately after treatment, 15 patients (2.4%) were documented as deceased, 609 (96.6%) were alive, and the status of 6 patients (1.0%) was not documented. At three years, 114 patients (18.1%) were documented as deceased and 135 (21.4%) as alive, while the status of 381 patients (60.5%) was not documented.

Table 1. Socio-Demographic Characteristics of Women with Cervical Cancer (N = 630)

Characteristic	Category	Frequency, n	Percentage, %
Age group (years)	21–35	50	7.9
	36–40	257	40.8
	41–49	223	35.4
	≥50	100	15.9
Marital status	Married	411	65.2
	Single	17	2.7
	Divorced/Separated	51	8.1
	Widowed	147	23.3
	Unknown	4	0.6
Occupation	Peasant	438	69.5
	Business	32	5.1
	Employed	16	2.6
	Student	1	0.2
	Housewife	128	20.3
	Unknown	15	2.4
Educational level	No formal education	386	61.3
	Primary school	212	33.7
	Secondary education	13	2.1
	University education	1	0.2
	Unknown	18	2.9
Religion	Christian	342	54.3
	Muslim	287	45.6
	Unknown	1	0.2

Unknown: information was not documented in the medical record.

Table 2. Clinical Characteristics of Patients with Cervical Cancer (N = 630)

Clinical characteristic	Frequency, n	Percentage, %
Stage of disease		
Stage I	49	7.8
Stage II	280	44.4
Stage III	253	40.2
Stage IV	48	7.6
Histological type		
Squamous cell carcinoma	577	91.6
Adenocarcinoma	48	7.6
Adenosquamous carcinoma	2	0.3
Other	3	0.5
Documented treatment modality		
EBRT alone	527	83.7
EBRT + intracavitary radiotherapy	55	8.7
EBRT + chemotherapy	29	4.6
EBRT + intracavitary radiotherapy + chemotherapy	4	0.6
Surgery + EBRT	9	1.4
Surgery + EBRT + chemotherapy	5	0.8
Intracavitary radiotherapy alone	1	0.2
Symptom status		
Recurrent symptoms	76	12.1
No recurrence documented	318	50.5
Persistent symptoms	95	15.1
Unknown/not documented	141	22.4

EBRT, external beam radiotherapy.

Table 3. Patient Status Immediately after Treatment and at Three Years of Follow-up (N = 630)

Patient status	Immediately after treatment, n (%)	At 3 years, n (%)
Dead	15 (2.4)	114 (18.1)
Alive	609 (96.6)	135 (21.4)
Unknown/not documented	6 (1.0)	381 (60.5)
Total	630 (100.0)	630 (100.0)

Unknown/not documented: vital status was not documented in the available records.

Table 4. Number of Documented Follow-up Visits during the First Three Years after Treatment (N = 630)

Number of follow-up visits	First year, n (%)	Second year, n (%)	Third year, n (%)
None	293 (46.5)	389 (61.7)	492 (78.1)
1	217 (34.4)	144 (22.9)	106 (16.8)
2	136 (21.6)	70 (11.1)	23 (3.7)
3	33 (5.2)	16 (2.5)	4 (0.6)
>3	31 (4.9)	11 (1.7)	5 (0.8)
Total	630 (100.0)	630 (100.0)	630 (100.0)

Among the 249 patients with a documented status at three years, 114 (45.8%) were deceased and 135 (54.2%) were alive. Because the vital status of 60.5% of the cohort was not documented, these figures should not be interpreted as a three-year mortality or survival rate for the entire study population.

Follow-Up Attendance

Table 4 presents the number of documented follow-up visits during the first, second, and third years after treatment. The proportion of patients with no documented follow-up visit increased progressively from 46.5% in the first year to 61.7% in the second year and 78.1% in the third year. Conversely, the proportion of patients attending one or more follow-up visits declined over time.

In the first year, 217 patients (34.4%) attended one follow-up visit, 136 (21.6%) attended two visits, 33 (5.2%) attended three visits, and 31 (4.9%) attended more than three visits. During the second year, these proportions declined to 22.9%, 11.1%, 2.5%, and 1.7%, respectively. By the third year, only 16.8% of patients had one documented visit, 3.7% had two visits, 0.6% had three visits, and 0.8% had more than three visits.

Overall, the findings demonstrate a progressive decline in documented follow-up attendance during the three-year observation period, accompanied by an increasing proportion of patients with no recorded follow-up visits.

Discussion

This study evaluated the treatment patterns and three-year follow-up status of 630 women with histologically confirmed cervical cancer treated at Tamale Teaching Hospital (TTH) in 2020. The relatively large number of patients managed at the institution highlights the important role of TTH as a referral center for cervical cancer care in northern Ghana. Of the 826 patients reportedly treated for cervical cancer during the study period, 630 had histologically confirmed disease and sufficiently accessible records for inclusion. Cervical cancer accounted for approximately 32% of all malignancies treated at TTH and 45% of malignancies among female patients during the study period. These figures indicate a substantial institutional burden of cervical cancer and underscore the importance of strengthening diagnostic, treatment, and follow-up services.

TTH serves as an important regional referral center for radiotherapy and receives patients from several regions beyond the Northern Region. The observed distribution of patients from the Eastern corridor and neighboring Bono, Bono East, and Ahafo regions may reflect the referral pathways and geographic accessibility of TTH. Patients may undergo initial diagnostic evaluation at regional hospitals and subsequently be referred to TTH for specialized cancer treatment. Although the present study was not designed to evaluate referral patterns systematically, the geographic distribution of patients suggests that accessibility and referral networks are important considerations when planning cervical cancer services in northern Ghana.

The median age of the study population was 51 years, with patients ranging from 24 to 90 years. The predominance of cervical cancer among women in the middle-age groups is broadly consistent with findings from other African settings, including previous studies from Kenya [9]. The occurrence of cervical cancer during economically productive years has implications not only for affected women and their families but also for household income and broader social and economic well-being. However, the economic consequences of cervical cancer were not directly assessed in this study and should therefore be investigated in future research.

A major finding was the high proportion of women presenting with advanced-stage disease. More than 80% of patients had stage II or III disease, while an additional 7.6% had stage IV disease. Thus, only a small proportion of patients presented with stage I disease. This pattern is consistent with reports from other sub-Saharan African settings, where delayed presentation

remains a major challenge in cervical cancer control. Studies from Tanzania, including reports from Muhimbili, have similarly documented a high proportion of patients presenting with advanced disease [10-12].

Several factors may contribute to advanced-stage presentation. These include limited awareness of cervical cancer and its early symptoms, inadequate access to screening and diagnostic services, socioeconomic barriers, geographic distance from specialist centers, and delays in referral and treatment initiation. In the present study, a substantial proportion of women had no formal education, which may indicate underlying social and educational disadvantages. However, because knowledge of cervical cancer symptoms and screening practices was not quantitatively assessed, a direct causal relationship between educational status and delayed presentation cannot be established from the present data.

The predominance of advanced-stage disease has important implications for treatment. Patients diagnosed at later stages are more likely to require multimodal treatment, including external beam radiotherapy, brachytherapy, and concurrent chemotherapy, and may have fewer opportunities for curative treatment when comprehensive services are unavailable or treatment cannot be completed. Therefore, improving early detection and strengthening referral pathways are likely to be important components of cervical cancer control in this setting.

Histological Characteristics and Treatment Patterns

Squamous cell carcinoma was the predominant histological subtype in this study, accounting for 91.6% of cases, while adenocarcinoma accounted for 7.6%. Adenosquamous carcinoma and other histological types were uncommon. This distribution is broadly consistent with the reported histological pattern of cervical cancer, in which squamous cell carcinoma constitutes the majority of cases [13-15]. The predominance of squamous cell carcinoma in the present cohort is therefore consistent with observations from other populations and supports the established epidemiological pattern of cervical cancer histology.

Although histological subtype may have prognostic implications, the present study did not examine the association between histological type and treatment response or survival. Therefore, conclusions regarding differences in radiotherapy response or prognostic significance between squamous cell carcinoma and adenocarcinoma cannot be drawn from the current data.

External beam radiotherapy (EBRT) was the most frequently documented treatment modality, accounting for 83.7% of the treatment patterns recorded in this study. Only 8.7% of patients received EBRT combined with intracavitary brachytherapy, while 4.6% received EBRT combined with chemotherapy and only 0.6% received the combination of EBRT, intracavitary brachytherapy, and chemotherapy. These findings suggest that relatively few patients received the combination of treatment modalities generally required for comprehensive management of locally advanced cervical cancer.

The limited use of intracavitary brachytherapy appears to have been influenced by treatment capacity at TTH. According to the study records, equipment malfunction, treatment backlogs, prolonged treatment times, and reliance on a single brachytherapy machine were important operational challenges during the study period. These constraints may have reduced the number of patients able to receive brachytherapy in addition to EBRT. Because these factors were reported from the institutional setting rather than quantitatively evaluated as determinants of treatment completion, they should be interpreted as potential explanations rather than established causal factors.

The use of concurrent chemotherapy was also limited. Only 4.6% of patients received EBRT with chemotherapy, and 0.6% received EBRT, intracavitary brachytherapy, and chemotherapy. Thus, fewer than 6% of patients received a treatment regimen incorporating chemotherapy in the documented treatment categories. In settings where concurrent chemoradiotherapy is indicated, limited access to chemotherapy may represent an additional barrier to comprehensive treatment. Potential explanations reported in the study include limited drug availability and competing demands for chemotherapy services. However, these factors were not systematically quantified and therefore require cautious interpretation.

The limited use of combined treatment in this cohort is clinically relevant because treatment of locally advanced cervical cancer generally requires coordinated use of external beam radiotherapy and brachytherapy, with concurrent chemotherapy where clinically appropriate. Previous studies have reported improved outcomes with appropriate integration of EBRT and brachytherapy, with outcomes also influenced by disease stage and treatment completion [9, 16, 17]. The present findings therefore highlight potential gaps in treatment availability and completion at the institutional level.

Three-Year Follow-Up and Patient Status

A major finding of this study was the substantial proportion of patients whose vital status could not be established at three years. At the end of the follow-up period, 114 patients (18.1%) were documented as deceased, 135 (21.4%) were documented as alive, and 381 (60.5%) had no documented vital status. Among the 249 patients with a documented outcome, 45.8% were deceased and 54.2% were alive. However, the high proportion of patients with undocumented status substantially limits interpretation of these findings.

The proportion of patients attending follow-up also declined progressively over the three-year observation period. The percentage with no documented follow-up increased from 46.5% in the first year to 61.7% in the second year and 78.1% in the third year. This pattern indicates substantial attrition from institutional follow-up and represents an important challenge for long-term cervical cancer care.

Previous research has similarly reported difficulties in establishing long-term outcomes among patients with cervical cancer in resource-constrained settings. One study

reported that after a longer follow-up period, a substantial proportion of patients had an unknown outcome [18]. Studies conducted in settings with more established cancer registration and patient-tracking systems have reported lower proportions of patients lost to follow-up [19, 20]. Differences in cancer registration systems, linkage with vital-registration databases, geographical accessibility, and mechanisms for patient tracing may contribute to variation in the ascertainment of long-term outcomes between settings.

Importantly, the present study cannot assume that patients with undocumented status were deceased. Although unrecorded deaths may contribute to the high proportion of patients with unknown outcomes, other explanations include migration, treatment at another facility, inability to return to TTH, changes in contact information, financial barriers, and discontinuation of institutional follow-up. Without systematic tracing or linkage with a national death-registration or cancer-registry database, the vital status of these patients cannot be reliably determined.

Consequently, the documented mortality of 18.1% should not be interpreted as the three-year mortality rate of the entire cohort, nor should the documented survival of 21.4% be interpreted as a three-year survival rate. The findings instead demonstrate substantial difficulty in establishing long-term outcomes and maintaining continuity of follow-up in this patient population. Strengthening patient-tracking mechanisms, referral communication, community-based follow-up, and cancer registration could improve outcome ascertainment and continuity of care.

Follow-Up and Cancer Registration

Previous research from Kenya reported a five-year mortality of approximately 28% among patients with cervical cancer treated at Kenyatta Hospital [9]. However, because that estimate was derived from a hospital-based study, direct comparison with the present findings should be made cautiously. Differences in study design, patient characteristics, treatment availability, follow-up duration, and outcome ascertainment may substantially influence reported mortality estimates.

Reliable cancer registration and systematic patient-tracking systems are particularly important in settings where long-term follow-up is difficult. Cancer registries provide essential information for estimating disease burden, monitoring trends, evaluating outcomes, and supporting the planning and evaluation of cancer prevention and treatment programs. Strengthening cancer registration and linkage with vital-registration systems in Ghana could therefore improve the ascertainment of cervical cancer outcomes and provide more reliable population-level evidence for cancer control planning.

In the present study, more than half of the patients had at least one documented follow-up visit during the first year after treatment, but follow-up attendance declined substantially over time. By the third year, only a small proportion of patients had documented follow-up visits. Similar reductions in follow-up attendance over time have been reported in other settings, including Iran [21, 22]. The reasons for declining attendance are likely multifactorial. The geographic distance between patients' homes and TTH, transportation costs, financial constraints, treatment-related morbidity, and limited awareness of the importance of long-term follow-up may all contribute to discontinuity of care. However, these factors were not quantitatively assessed in the retrospective component of the present study.

The qualitative findings provide additional contextual information regarding socioeconomic and healthcare-access barriers to continued follow-up. These findings suggest that improving long-term follow-up may require interventions beyond the hospital setting, including improved patient-tracking systems, reminder mechanisms, strengthened referral networks, community-based follow-up, and measures to reduce the financial and geographic burden of repeated hospital visits.

Although delayed presentation and advanced-stage disease may contribute to unfavorable outcomes, the present study cannot determine the extent to which individual factors contributed to mortality because vital status was unavailable for 60.5% of the cohort. In addition, patients with undocumented outcomes may have continued care elsewhere, moved to another geographic area, or died without the event being recorded in the hospital. Therefore, undocumented status should not be equated with death.

In conclusion, this study demonstrates a substantial burden of advanced-stage cervical cancer among women treated at Tamale Teaching Hospital. Most patients presented with stage II–IV disease, and external beam radiotherapy was the predominant documented treatment modality, whereas relatively few patients received brachytherapy or treatment regimens incorporating chemotherapy. These findings highlight important challenges in providing comprehensive cervical cancer treatment in a resource-constrained setting.

The study also identified substantial attrition from institutional follow-up. Although 18.1% of patients were documented as deceased at three years, the vital status of 60.5% was not documented. Consequently, a three-year mortality or survival rate for the entire cohort cannot be reliably estimated from the available data. Improving cervical cancer outcomes in this setting requires a comprehensive approach that includes earlier detection and diagnosis, timely referral, access to appropriate multimodal treatment, adequate radiotherapy and brachytherapy capacity, and effective long-term patient-tracking systems. Strengthening cancer registration and linkage with vital-status information would also improve the assessment of treatment outcomes. Future prospective studies should evaluate survival using standardized outcome definitions and systematic patient follow-up to provide more reliable estimates of long-term cervical cancer outcomes in Ghana.

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Conflict of Interest

Author declares no conflict of interest.

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