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Clinicopathological Characteristics of Women with Cervical Cancer at Chandaria Cancer Centre, Moi Teaching and Referral Hospital, Kenya

Priscah Chelangat[1*], Tracy Irura[2], George Muthui[1]

[1]Department of Clinical Medicine, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya
[2]Department of Oncology, Kenyatta University Teaching Referral and Research Hospital, Nairobi, Kenya
Email: *cpriscah@jkuat.ac.ke

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Abstract

Background: Cervical cancer is a global health burden, particularly in developing countries such as Kenya, where it stands as the leading cause of cancer-related deaths among women. In Kenya, patients often present with late-stage disease, resulting in poor treatment outcomes. Patient and tumor characteristics at presentation shape the care needed and the outcomes that can be expected, but local data from Kenyan referral centers remain limited. **Objective:** To describe the sociodemographic, patient-specific and pathological characteristics of women with cervical cancer attending Chandaria Cancer Centre, Moi Teaching and Referral Hospital (MTRH). **Methods:** A retrospective descriptive medical-record review of 290 patient records of patients diagnosed with cervical cancer between January 2015 and December 2019 at Chandaria Cancer Centre, Moi Teaching and Referral Hospital was conducted. A structured tool was used to abstract sociodemographic, patient-specific and pathological data. Data were analyzed descriptively using SPSS version 27 and were presented as means, standard deviations, frequencies and valid percentages. **Results:** The mean age was 52.1 years (SD 13.4; range 18 - 90). Most patients were unemployed (63.4%), married (68.2%) and lived in rural areas (90.2%), and 50.2% were uninsured. Over half (61.0%) had more than four children, 22.8% were HIV positive, and prior cervical cancer screening was documented in only 1.0%. Squamous cell carcinoma accounted for 92.7% of tumors, 51.4% of patients presented with FIGO Stage III - IV disease, and 56.1% of tumors were moderately differentiated. **Conclusions:** Women with cervical cancer at this center were predominantly older, living in rural areas, unemployed and of high parity, with a substantial burden of HIV, very low documented prior

screening and late-stage presentation in just over half. Expanded screening and early detection, support for uninsured and rural patients, and more complete documentation are needed.

Keywords

Cervical Cancer, Sociodemographic Characteristics, Clinicopathological Characteristics, Squamous Cell Carcinoma, FIGO Stage, Kenya

1. Introduction

Cervical cancer is a malignant neoplasm that arises from the cervix. Persistent human papillomavirus infection causes more than 99% of all cervical cancers [1]. It presents with two primary histological variants: adenocarcinoma, which arises from the glandular cells lining the endocervix and squamous cell carcinoma, which arises from the squamous cells lining the ectocervix. Squamous cell carcinoma is more common, accounting for approximately 70% of cases. The interface between these cell types, termed the transformation zone, is a focal point for tumor development, with most malignancies originating there [2].

Cervical cancer remains a leading cause of cancer morbidity and mortality among women worldwide, with the greatest burden borne by low- and middle-income countries where organized screening and access to timely treatment are limited [3]. In 2024, approximately 19.9 million new cancer cases were diagnosed, with 9.7 million associated deaths reported worldwide (excluding nonmelanoma skin cancer), highlighting lung and breast cancers as the most prevalent. Cancer incidence and mortality also varied significantly by Human Development Index (HDI) across countries. Cervical cancer was the ninth most common cancer during the same year, with approximately 604,196 new cases [4].

In 2022, nearly 94% of global cervical cancer deaths, claiming nearly 350,000 lives, occurred in low- and middle-income countries [5]. In Africa, cervical cancer ranked as the leading cause of cancer-related deaths in women and was among the top three cancers affecting women below 45 years in 2018 [6]. During that same year, out of the total cases of cervical cancer globally, 21% are in Africa, with 26% of deaths globally associated with cervical cancer [7].

In Kenya, most women present with advanced disease. Mwaliko *et al.* [8] reported late-stage presentation in 68.5% of patients at a Kenyan facility, which limits curative treatment options. Patient and tumor characteristics at presentation are central to care planning. Sociodemographic factors such as low income, rural residence and lack of health insurance influence whether women can reach and afford treatment [9] [10]. Reproductive and infection-related factors, including high parity and HIV infection, are linked to cervical cancer risk, with women living with HIV at a six- to eight-fold higher risk [11]. Tumor characteristics, including histological type, stage, grade and nodal status, determine appropriate treatment and the prognosis [2].

Chandaria Cancer Centre at Moi Teaching and Referral Hospital is a major referral center for oncology services in western Kenya. A clear picture of this profile is needed to guide screening outreach, patient support and the documentation practices that underpin future research. This paper therefore describes the socio-demographic, patient-specific and pathological characteristics of women with cervical cancer attending Chandaria Cancer Centre, MTRH.

2. Materials and Methods

2.1. Study Design

This study employed a retrospective descriptive medical-record review.

2.2. Study Population

The study population comprised patients with pathologically confirmed cervical cancer diagnosed between 1st January 2015 and 31st December 2019 at Moi Teaching and Referral Hospital. Systematic sampling was used to select the files for review, and 290 files were included in the analysis.

2.3. Inclusion and Exclusion Criteria

2.3.1. Inclusion Criteria

The study included all files of patients with histologically confirmed cervical cancer who were managed at Moi Teaching and Referral Hospital during the study period. Only patients with a primary cancer of the cervix were included.

2.3.2. Exclusion Criteria

Files of patients with missing or illegible essential records (missing more than 50% of key variables) were excluded.

2.4. Sampling Technique

Systematic sampling was used to select the required sample of 290. Google Sheets was utilized to ensure randomness. The sampling frame comprised all eligible cervical cancer patient records at the Chandaria Cancer Centre, Moi Teaching and Referral Hospital. A complete list of all eligible patient records for the period 1st January 2015 to 31st December 2019 was extracted from the hospital registry and entered into a Google Sheet in the same chronological order as they appear in the filing system. In Google Sheets, the patient file list was entered in column A. To ensure a random starting point for selection, random numbers were generated for each file in column B using the formula = RAND(). This randomization step helped to prevent selection bias.

To identify every third file, the formula = IF(MOD(ROW(), 3) = 0, "Select") was applied in column C, marking every third file with "Select." The list was then sorted based on the random numbers in column B to further randomize the order. Subsequently, a filter was applied to column C to display only rows marked with "Select".

Once the sample was identified, the physical records were retrieved. During retrieval, if a selected file was missing or did not meet the inclusion criteria, the next file in the systematic sequence (*i.e.*, the next 3rd file in the list) was used. Files that were excluded according to the predefined exclusion criteria were documented in a log.

2.5. Data Collection

Data were abstracted from patient files using a structured data collection tool in three parts. Part 1 captured sociodemographic characteristics: age, employment status, marital status, place of residence, health insurance coverage, and history of alcohol and tobacco use. Part 2 captured patient-specific characteristics: contraceptive use, parity, personal history of cancer, comorbidities (diabetes mellitus, hypertension and chronic pulmonary disease), HIV status, Hepatitis B status, history of sexually transmitted infection and prior cervical cancer screening. Part 3 captured pathological characteristics: histological type, FIGO stage at diagnosis, tumor grade, lymph node involvement and lymphovascular space invasion.

Data were abstracted from February 2026 to May 2026 by three people: the principal investigator and two research assistants. The tool was piloted before use, and abstracted entries were checked by the second research assistant. Conflicting or unclear entries were referred to the principal investigator, who re-examined the physical file and resolved the entry. Problems identified with the tool during abstraction were corrected.

Place of residence was classified as urban or rural based on the patient's recorded primary address. Personal history of cancer was defined as any documented prior malignancy, including previous cervical cancer or distinct second primary tumors. Contraceptive exposure included any documented history of contraceptive use prior to diagnosis. Employment status was categorized into three groups—employed, unemployed, or self-employed—as documented on the initial visit form. Parity was defined as the number of pregnancies that have reached viable gestational age.

Histological type was confirmed from the histology report present in the patient file, and tumor grade was extracted directly from the histology report and categorized as unknown when absent. FIGO stage, lymph node involvement and lymphovascular space invasion were taken from clinical notes, imaging, and surgical or pathology reports. Clinical stage was extracted directly from patient medical records as documented by the treating clinical team at the time of initial diagnosis, based on the prevailing FIGO staging system in use at the time of entry. Disease stage was recorded as main broad categories (Stage I, Stage II, Stage III, and Stage IV), where Stages I and II were categorized as early-stage disease and Stages III and IV were categorized as late-stage (advanced) disease.

2.6. Statistical Analysis

Data were entered and analyzed using the Statistical Package for the Social Sci-

ences (SPSS) version 27. Continuous variables were summarized as means and standard deviations, and categorical variables as frequencies and valid percentages. Valid percentages exclude records with missing data for that variable, and the number of patients with data (n) is stated for each variable. Findings are presented in tables and text.

2.7. Ethical Considerations

Ethical approval for this study was granted by the Institutional Research and Ethics Committee (IREC) of Moi Teaching and Referral Hospital (Approval Reference: FAN 5255). Research licensing was obtained from the National Commission for Science, Technology and Innovation (NACOSTI; License No: NACOSTI/P/26/4183045). Given the retrospective design of the study, IREC granted a waiver of informed consent. To safeguard participant confidentiality, all medical records and study data were anonymized using unique identifiers and stored securely to prevent unauthorized access.

3. Results

A total of 290 patients with cervical cancer treated at Chandaria Cancer Centre, Moi Teaching and Referral Hospital, were included. The characteristics are presented in three parts: sociodemographic characteristics, patient-specific characteristics and pathological characteristics of the tumors.

3.1. The Sociodemographic Characteristics

Table 1. Sociodemographic characteristics of patients (n = 290).

Variable	Category	n	Valid %
Age, years (n = 290)	Mean 52.1 (SD 13.4); range 18 - 90	290	100
Age group (n = 290)	<50 years	125	43.1
	≥50 years	165	56.9
Employment (n = 279)	Employed	34	12.2
	Self-employed	68	24.4
	Unemployed	177	63.4
Marital status (n = 289)	Single	22	7.6
	Married	197	68.2
	Divorced	19	6.6
	Separated	1	0.3
	Widowed	50	17.3
Residence (n = 287)	Urban	28	9.8
	Rural	259	90.2
Health insurance (n = 281)	Insured	140	49.8
	Uninsured	141	50.2

The mean age of the patients was 52.3 years (SD = 13.4), with a range of 18 to 90 years. Most patients were unemployed (177, 63.4%), while 68 (24.4%) were self-employed and 34 (12.2%) were employed. Two-thirds of patients were married (197, 68.2%). Fifty patients (17.3%) were widowed, 22 (7.6%) were single, 19 (6.6%) were divorced, and one (0.3%) was separated. The overwhelming majority of patients lived in rural areas (259, 90.2%), compared with 28 (9.8%) in urban areas. Health insurance coverage was evenly split, with 140 patients (49.8%) insured and 141 (50.2%) uninsured. A history of alcohol use was recorded in 13 patients (4.5%) and smoking in 9 (3.1%) (Table 1).

3.2. The Patient-Specific Characteristics

Table 2. Patient-specific characteristics (n = 290).

Variable	Category	n	Valid %
Contraceptive use (n = 288)	Yes	79	27.4
Parity (n = 277)	0	8	2.9
	1	10	3.6
	2	19	6.9
	3	40	14.4
	4	31	11.2
	>4	169	61
Diabetes mellitus (n = 289)	Yes	8	2.8
Hypertension (n = 289)	Yes	45	15.6
Chronic pulmonary disease (n = 288)	Yes	4	1.4
HIV status (n = 289)	Positive	66	22.8
	Negative	182	63.0
	Unknown	41	14.2
Hepatitis B status (n = 287)	Positive	1	0.3
	Negative	34	11.8
	Unknown	252	87.8
History of STI (n = 289)	Yes	1	0.3
	No	96	33.2
	Unknown	192	66.4
Prior cervical cancer screening	Yes	3	-

Contraceptive use was reported by 79 patients (27.4%). High parity was common: 169 patients (61.0%) had more than four children, 71 (25.6%) had three to four, 29 (10.5%) had one to two, and only 8 (2.9%) had no children. In total, 86.6% of patients had given birth to three or more children. A personal history of cancer was recorded in 27 patients (9.3%). Comorbid conditions were uncommon, except for hypertension, which was present in 45 patients (15.6%). Diabetes mellitus

was recorded in 8 patients (2.8%) and chronic pulmonary disease in 4 (1.4%). Sixty-six patients (22.8%) were HIV positive, 182 (63.0%) were HIV-negative, and the status of 41 (14.2%) was unknown. Hepatitis B status was unknown for 252 patients (87.8%), negative in 34 (11.8%) and positive in only 1 (0.3%). A history of sexually transmitted infection was unknown for 192 patients (66.4%), absent in 96 (33.2%) and present in only 1 (0.3%). Prior cervical cancer screening was documented in only 3 patients (1.0%), so 99.0% of patients had no documented screening before diagnosis (Table 2).

3.3. The Pathological Characteristics

Table 3. Pathological characteristics of the tumours (n = 290).

Variable	Category	n	Valid %
Histological type (n = 290)	Squamous cell carcinoma	269	92.8
	Adenocarcinoma	20	6.9
	Adenosquamous carcinoma	1	0.3
FIGO stage at diagnosis (n = 286)	Stage I	46	16.1
	Stage II	93	32.5
	Stage III	122	42.7
	Stage IV	25	8.7
	Stage I - II	139	48.6
	Stage III - IV	147	51.4
Tumour grade (n = 287)	Well differentiated	23	8.0
	Moderately differentiated	161	56.1
	Poorly differentiated	73	25.4
	Not known	30	10.5
Lymph node involvement	Yes	26	-
Lymphovascular space invasion	Yes	15	-

Squamous cell carcinoma was the predominant type, found in 268 of 289 patients (92.7%). Adenocarcinoma was recorded in 20 patients (6.9%), and a single case of adenosquamous carcinoma (0.3%) was identified. In total, 21 patients (7.3%) had a non-squamous histology. Stage III was the most common (122 patients, 42.7%), followed by Stage II (93, 32.5%), Stage I (46, 16.1%) and Stage IV (25, 8.7%). Grouped by extent of disease, 139 patients (48.6%) presented with early-stage disease (Stages I - II) and 147 (51.4%) with advanced-stage disease (Stages III - IV) (Table 3).

Most tumors were moderately differentiated (161, 56.1%), followed by poorly differentiated (73, 25.4%) and well differentiated (23, 8.0%). Grade was not known for 30 patients (10.5%). Lymph node involvement was documented in 26 of 287 patients, and lymphovascular space invasion (LVSI) in 15 of 286. Nodal status and

LVSI depend on imaging and on surgical or pathological assessment, which were available for only some patients, so these figures may underestimate their true occurrence.

4. Discussion

4.1. Sociodemographic Characteristics

The mean age of patients in this study (52.1 ± 13.4 years) was higher than the 49.5 years reported in Ethiopia by Wassie *et al.* [12] and close to the older end of the 45 - 64-year range that dominated the Nigerian cohort described by Alegbeleye *et al.* [13]. This older age profile is consistent with the natural history of cervical cancer, which usually presents after several decades of persistent HPV infection, and it suggests that opportunities for detection through screening at younger ages are being missed locally. The wide age range (18 - 90 years) also shows that the disease affects women across the reproductive and post-reproductive years.

The cohort was predominantly unemployed (63.4%), married (68.2%), and living in rural areas (90.2%). The high unemployment rate is comparable to the 85.6% reported in Ethiopia by Wassie *et al.* [12]. It reflects the structural gradient linking lower socioeconomic status with heightened vulnerability to cervical cancer [14]. Recent regional evidence from multi-country demographic analyses across sub-Saharan Africa confirms that cervical cancer screening and preventative access are deeply entrenched in pro-rich and pro-education inequalities, leaving vulnerable, low-income populations disproportionately unreached [15]. Furthermore, in post-screening contexts, Isaacson *et al.* [16] demonstrated that low socioeconomic standing directly compounds loss to follow-up and creates severe structural barriers to initiating definitive treatment among HPV-positive women. The high proportion of rural residents is consistent with the resource-limited catchment area served by MTRH, where geographical distance and travel costs present major structural barriers to timely diagnosis and care [10].

Health insurance coverage was almost evenly split between insured (49.8%) and uninsured (50.2%) patients. That half of the patients had no insurance is important in a setting where the cost of cancer care has been shown to push households into catastrophic expenditure [9]. The low prevalence of alcohol use (4.5%) and smoking (3.1%) may partly reflect under-recording in clinical files, since these behaviors are often poorly documented.

4.2. Patient-Specific Characteristics

High parity defined this cohort. Nulliparous patients constituted 2.9% (n = 8), while those with 1, 2, 3, and 4 children accounted for 3.6% (n = 10), 6.9% (n = 19), 14.4% (n = 40), and 11.2% (n = 31) of the population, respectively. Combining these categories reveals that 25.6% (n = 71) had 3 - 4 children, 61.0% (n = 169) had >4 children, and a cumulative 86.6% (n = 240) had 3 children (or 72.2% with >3 children). Biologically, high parity acts as a documented cofactor in HPV-mediated carcinogenesis through recurrent mechanical micro-trauma to the cer-

vical transformation zone during childbirth alongside prolonged exposure to elevated gestational steroid hormones, which upregulate viral oncogene transcription. Comparison with Alegbeleye *et al.* [13] [Parity 3 - 4]: Aligning identical parity thresholds reveals that our cohort's parity 3 - 4 rate of 25.6% (n = 71) is nearly double the baseline demographic rate of 14.1% reported in Nigeria.

When evaluating multiparity against regional literature using harmonized thresholds, our cohort demonstrated a consistently high reproductive burden across comparative benchmarks. Aligning our data to the >3-children threshold used by Wassie *et al.* [12] in Ethiopia yields a cumulative prevalence of 72.2% (n = 200/277), confirming a sustained, elevated rate of multiparity across both East African oncology populations. Furthermore, standardizing grand multiparity to >4 children reveals that our study's rate of 61.0% (n = 169/277) exceeds the sub-Saharan African regional baseline of 38.4% reported in multi-country DHS survey data by Hailegebireal *et al.* [17].

HIV prevalence in this cohort was 22.8%, aligning closely with the 29.0% reported in a similar East African oncology cohort in Rwanda by Park *et al.* [18] and exceeding the 18.4% reported by Wassie *et al.* [12]. This figure is substantially higher than the general population prevalence in Kenya, reflecting the well-documented six- to eight-fold increased risk of invasive cervical cancer among women living with HIV [11]. An additional 14.2% of patients had unknown HIV status, suggesting that the true overall burden may be higher. Among other documented comorbidities, hypertension was most common (15.6%), while diabetes mellitus (2.8%) and chronic pulmonary disease (1.4%) were less common. A personal history of cancer was recorded in 9.3% of patients.

Documented prior cervical cancer screening was strikingly low (1.0%), even lower than the 11.5% screening uptake reported among Nigerian patients by Alegbeleye *et al.* [13], where 88.5% had never been screened. Documentation of infection-related history was also poor: Hepatitis B status was unknown for 87.8% of patients and STI history for 66.4%. These gaps reflect incomplete recording in clinical files rather than a true low prevalence, and they limit what can be said about these exposures in this cohort.

4.3. Pathological Characteristics

Squamous cell carcinoma was the predominant histological subtype (92.7%). This proportion is higher than the 88.1% reported in India by Jain *et al.* [19] and the 71.8% reported in Nigeria by Alegbeleye *et al.* [13], but consistent with the global pattern in which squamous cell carcinoma accounts for the large majority of cervical cancers [2]. Adenocarcinoma accounted for 6.9% of tumors, and the small number of non-squamous cases (n = 21) limits any meaningful description of these subtypes.

Just over half of patients (51.4%) presented with advanced-stage disease (FIGO Stages III - IV), broadly comparable to the 51.90% reported in India by Jain *et al.* [19] but considerably lower than the over 90% late-stage presentation reported

nationally for Kenyan facilities by Mwaliko *et al.* [8]. In either case, more than half of patients presenting with locally advanced or metastatic disease are with the near-absence of documented prior screening in this cohort.

Most tumors were moderately differentiated (56.1%), and one in four was poorly differentiated (25.4%), with grade unknown for 10.5% of patients, which points to incomplete pathology documentation. Lymph node involvement (9.1%) and lymphovascular space invasion (5.2%) were uncommon. These figures are likely to be underestimated because nodal status and LVSI depend on imaging and on surgical or pathological assessment, which were available for only some patients.

4.4. Limitations

- It is a single-center review at a referral hospital, so the patients may not represent women with cervical cancer in the wider population, and women who never reached the center are not captured.
- Files with missing or illegible records were excluded, and records were sampled in filing order, so selection bias is possible; the diagnosis dates in the sample are concentrated in 2018-2019, and some fall outside the stated study period.
- Information was abstracted from clinical files, so documentation bias is likely: unrecorded exposures cannot be distinguished from absent ones for several variables, and unknown categories were large for Hepatitis B, STI history and HIV.
- Pathological assessment was unequal across patients, which affects nodal involvement, LVSI and grade, and pathology reports were not independently reviewed. FIGO staging may have been recorded under different editions across the study period, substages were not recorded, and the historical study period may not reflect current practice.

5. Conclusions and Recommendations

5.1. Conclusions

The findings of this study reveal a predominantly older population, married, lives in rural areas and unemployed, with significant socioeconomic vulnerability, as half of the patients were uninsured. The high parity, the notable burden of HIV positivity and the very limited documented history of prior screening reflect the complex clinical and reproductive profile of this population. The predominance of squamous cell carcinoma, the moderately differentiated grade of most tumors, and the presentation of just over half of the patients with recorded stage at Stages III - IV underscore the need for interventions that promote early detection, expand cervical cancer screening, support uninsured and rural patients, and strengthen clinical and pathological documentation within the health system. These findings are partly in keeping with patterns reported in other sub-Saharan African cohorts. As a descriptive record review, however, this study cannot establish the causes of

late presentation, and it underscores the need for targeted interventions and prospective studies to improve outcomes for women with cervical cancer in Kenya.

5.2. Recommendations

- Link uninsured patients to social support and insurance-enrollment services at diagnosis, as half of the patients had no health insurance.
- Offer routine HIV testing and integrate HIV and cancer care, given the high HIV prevalence.
- Strengthen medical records and pathology reporting so that Hepatitis B status, STI history, tumor grade, nodal status and lymphovascular space invasion are consistently recorded.
- A prospective, multi-center study with standardized data collection would give a more complete and generalizable profile of women with cervical cancer in Kenya.
- Future studies should examine how these patient and tumor characteristics relate to treatment outcomes, using time-to-event methods with active follow-up.

Author Contributions

Chelangat Priscah—Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Writing—original draft. Tracy Irura: Supervision, Writing—review. George Muthui: Supervision, Validation, Investigation, Resources, Writing—review & editing.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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