

Research Article

Study of the Direct Medical Costs Incurred by Women Diagnosed with Cervical Cancer and Followed up at the Institute Curie of Aristide Le Dantec Hospital

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Abstract

Introduction: Cervical cancer constitutes a major public health challenge, both in terms of its morbidity and its financial burden on health systems and patients. This study aimed to assess the direct medical costs incurred by women diagnosed with cervical cancer and managed at the Institute Curie of Aristide Le Dantec Hospital in Dakar, as well as to identify the main cost drivers. **Methodology:** A retrospective, cross-sectional, descriptive and analytical study was conducted from January to April 2018, including 94 patients. Data were collected from medical records and entered into Microsoft Excel. Statistical analyses were performed using the *Analysis module of SPSS version 18 (Statistical Package of Social Science)*. **Results:** Among the 94 patients included in the study, 67.0% were diagnosed at a locally advanced stage, 20.2% at an advanced stage, and 10.6% at an early stage. The majority of patients originated from outside Dakar. Squamous cell carcinoma accounted for 83% of cases. Stage IIb was the most frequently observed stage, and the mean delay between the onset of initial symptoms and the first oncology consultation was 6 months. The average duration of symptoms before consultation was 8.7 months. A combination of chemotherapy, radiotherapy and surgery was administered to 31 patients, chemotherapy alone to 32 patients, while 17 patients did not receive active treatment. The main cost drivers for both national and non-national patients were medical imaging and radiotherapy. The average direct medical cost of cervical cancer management was estimated at 371,804 FCFA per patient, with a standard deviation of 174,205 FCFA. Medical imaging represented the largest cost component, followed by the cost of radiotherapy. The annual mean costs of hospitalization and endoscopic examinations were significantly higher among patients diagnosed with adenocarcinoma or other histological types, with p-values of 0.035 and 0.04, respectively. Similarly, the annual mean costs of consultations, hospitalizations, and histopathological examinations were significantly higher among patients diagnosed at stages III and IV, with p-values of 0.046, 0.027, and 0.021, respectively. **Conclusion:** Primary and tertiary prevention strategies, based on the effective implementation of policies aimed at reducing risk factors and providing financial support to patients, represent the most effective approach to lowering the burden of cervical cancer morbidity.

Keywords

Prevention, Costs, Cervical Cancer, Treatment

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1. Introduction

Cervical cancer represents a major public health problem worldwide, with approximately 0.6 million new cases and 0.3 million deaths recorded each year. It ranks fourth among cancers in terms of both incidence and mortality in women [1].

The burden of cervical cancer weighs disproportionately on Africa. Nineteen of the twenty countries most affected by this disease are located on the African continent. In 2018, more than 81,000 deaths from cervical cancer were recorded in Africa, with an age-standardized mortality rate estimated at 20 per 100,000 inhabitants [2, 3].

Africa remains the most affected continent, accounting for 23% of global cervical cancer mortality in 2022. This corresponds to an estimated 153,000 deaths [4].

Sub-Saharan Africa is particularly impacted, with an incidence rate of 34.8 cases per 100,000 women and a mortality rate of 22.8 deaths per 100,000 women [5].

In Senegal, cervical cancer ranks second among cancers affecting women after breast cancer in terms of incidence, and third in terms of mortality [3, 6]. Several risk factors have been identified in the development of this cancer, with infection by the « *Human Papilloma Virus* » (HPV) playing a major role in oncogenesis. HPV infection is responsible for precancerous lesions that can be detected through Pap smear screening.

Unfortunately, diagnosis often occurs at relatively advanced stages in approximately 70% of cases, frequently at a locally advanced stage, with a 5-year survival rate not exceeding 35% [7].

Given that the average age at diagnosis of cervical cancer is relatively young compared to most other major cancer types, it results in a proportionally higher loss of years of life [5].

Age-specific analyses have clearly shown that cervical cancer occurs at various stages of adulthood, when women often carry significant economic and family responsibilities.

Consequently, analyzing the costs associated with the management of cervical cancer is an essential economic evaluation process. Indeed, it provides valuable insight into the national economic burden of caring for affected patients.

In view of the high frequency of cervical cancer and its complications, as well as the substantial cost of its management, this study was initiated with the objective of analyzing the direct medical costs incurred by women diagnosed with cervical cancer and followed up at the Institut Curie of Hôpital Aristide Le Dantec between January 2018 and April 2019.

2. Methodology

2.1. Study Design and Period

This was a retrospective, cross-sectional, descriptive, and analytical study conducted from January 2018 to April 2019.

2.2. Study Population

The study population consisted of all patients diagnosed with cervical cancer and followed up at the Institut Curie of Hôpital Aristide Le Dantec (HALD).

2.2.1. Inclusion Criteria

Included in the study were all patients with a histologically confirmed diagnosis of cervical cancer between January 1, 2018, and April 30, 2019, who had a complete and accessible medical record at the Institut Curie of HALD.

2.2.2. Exclusion Criteria

Patients whose medical records were unusable (poorly maintained or incomplete) were excluded.

2.3. Recruitment

An exhaustive recruitment of patients meeting the inclusion criteria was carried out.

2.4. Data Collection Methods and Tools

Patient records were reviewed.

And a structured data collection form was developed in line with the study objectives.

All data were collected from patient medical records and transcribed onto a structured data collection form specifying the following domains:

- 1) Socio-demographic data;
- 2) Clinical data;
- 3) Paraclinical data;
- 4) Therapeutic data;
- 5) Economic data.

The questionnaire enabled the collection of the following information:

1. Socio-demographic data
 - 1) Patient's age;
 - 2) Marital status;
 - 3) Place of residence.
2. Clinical data
 - 1) Date of first symptoms;
 - 2) Date of first consultation;
 - 3) Place of diagnosis;
 - 4) New cancer or recurrence;
 - 5) Number of consultations;
 - 6) Number of hospitalizations;
 - 7) Cancer stage at diagnosis;
 - 8) Type of cancer.
3. Paraclinical data
 - 1) Histopathological examinations performed;
 - 2) Laboratory examinations performed;
 - 3) Medical imaging examinations performed;
 - 4) Endoscopic examinations performed.
4. Therapeutic data

- 1) Type of treatment received.
5. Economic data
 - 1) Annual costs of follow-up tests;
 - 2) Annual consultation fees;
 - 3) Annual hospitalization costs;
 - 4) Annual treatment-related expenses.

2.5. Data Entry and Analysis

The collected data were entered and analyzed using Excel. The database analysis was performed using the *Analysis module of SPSS 18 (Statistical Package of Social Science)*. The data analysis comprised two parts: descriptive and analytical.

Descriptive analysis: This involved calculating parameters such as mean, median, minimum and maximum values, and standard deviation for quantitative variables, as well as frequencies for qualitative variables.

Cost Calculation

Tariffs for various laboratory and radiological tests were obtained from the hospital's service tariff management system (*Hopitalia software*). Hospitalization costs were calculated by multiplying the number of days of hospitalization by 5,000 FCFA, which is the daily hospital stay rate. The cost calculations were as follows:

- 1) Consultation fee: 5,000 FCFA per consultation;
- 2) Annual hospitalization cost = 5,000 FCFA × number of hospital days per year;
- 3) Annual consultation cost = 5,000 FCFA × number of consultations per year;
- 4) Annual laboratory cost = $\sum (\text{Tariff} \times \text{number of laboratory tests performed in the year})$;
- 5) Annual radiology cost = $\sum (\text{Tariff} \times \text{number of radiological examinations performed in the year})$;
- 6) Annual medication cost = $\sum (\text{Price of medication} \times \text{quantity of medications purchased in the year})$;
- 7) Annual direct cost = $\sum (\text{Costs of transportation} + \text{medications} + \text{laboratory tests} + \text{radiology} + \text{consultations} + \text{hospitalization})$;
- 8) Mean annual direct cost = total annual direct cost of all patients / number of patients.

These costs were calculated under the assumption that state subsidies for chemotherapy and radiotherapy are considered as part of the cervical cancer management program.

Radiotherapy sessions cost 50,000, 75,000, or 150,000 FCFA, depending on the type of treatment.

For chemotherapy, the drugs used were provided free of charge. Each session was estimated at 7,000 FCFA, comprising 5,000 FCFA for medications and 2,000 FCFA for the consultation.

Analytical analysis: A comparison of mean costs was performed according to the:

- 1) Cancer stage at diagnosis;
- 2) Histological type.

Student's t-test was used to compare the means, and a

p-value less than 0.05 was considered statistically significant.

3. Results

At the end of our recruitment period, 94 patients were enrolled.

3.1. Descriptive Results

3.1.1. Sociodemographic Characteristics

Patients' ages ranged from 34 to 82 years, with a mean age of 55 years (SD = 10.33). The modal age group was 45–55 years, representing 37.2% of the cohort. Most patients were married (79.8%), followed by widows (14.8%). The majority of patients came from other regions of Senegal (51.1%), followed by 9.3% from Dakar and its suburbs, and 7.3% from neighboring countries in the sub-region.

3.1.2. Clinical Data

The mean interval between the onset of the first symptoms and the first oncology consultation was 8.7 months, with extremes ranging from 1 to 24 months. Most patients experienced their first symptoms between 3 and 6 months before the first oncology consultation (26.6% of the cohort). The majority of patients presented with a new cancer (86 cases; 93.75%). Most patients were diagnosed in a public health facility (80.9%).

Almost half of the patients (46.8%) had attended between 1 and 5 consultations. Half of the patients were not hospitalized (50%). Among those hospitalized, 14 patients were admitted to the oncology department, with a mean duration of 9.5 days (SD = 7.3) and extremes ranging from 1 to 60 days.

The most frequent cancer stages were:

- 1) Stage IIB at 23.4%;
- 2) Stage IIA at 11.7%;
- 3) Stage IIIA at 14.9%;
- 4) Stage IVB at 16%.

Most patients were seen at a locally advanced stage of the disease (67 cases), followed by an advanced stage (20 cases). Regarding surgery, 73 patients (77.7%) underwent an operation.

All patients underwent a biopsy with histopathological examination of the specimen. Squamous cell carcinoma was identified in 78 cases (83%).

3.1.3. Therapeutic Data

Type of treatment received by patients

Among the 94 patients in our series, 18.1% did not receive any specific treatment. Chemotherapy was administered in 33.0% of cases. Surgery combined with chemoradiotherapy was performed in 34.0% of patients. Radiotherapy alone, surgery alone, and chemotherapy combined with surgery were each performed in 2.1% of patients. Palliative chemotherapy

was administered in 3.2%, and other treatments were each performed in one patient.

Treatment received according to cancer stage

Among patients diagnosed at the locally advanced stage, 23 received combined chemotherapy and radiotherapy, 21 received chemotherapy alone, and 11 underwent therapeutic abstention.

3.1.4. Economic Data

Annual consultation costs

The mean annual cost of consultations was 51,666.67 FCFA per patient, ranging from 25,000 to 70,000 FCFA. Most patients spent between 15,000 and 30,000 FCFA on consultations (53.2% of the cohort), followed by those spending less than 15,000 FCFA (18%), and those spending between 30,000 and 45,000 FCFA (10.8%).

Annual hospitalization costs

The mean annual hospitalization cost was 36,666.67 FCFA per patient, with a range of 30,000 to 50,000 FCFA.

The most frequent hospitalization costs in FCFA were:

- 1) [30 000 - 45 000], 50% of patients;
- 2) [15 000 - 30 000], 16,7% of patients;
- 3) Less than 15 000, 16,7% of patients.

Annual spending for biological tests

The mean annual expense on biological tests was 52,000 FCFA per patient, ranging from 26,000 to 78,000 FCFA.

Most patients spent between 15,000 and 30,000 FCFA (59.6% of the cohort).

Annual spending for medical and cardiac imaging

The mean annual cost for medical and cardiac imaging was 201,666.67 FCFA per patient, with a range of 102,500 to 295,000 FCFA. Most patients (60%) spent between 100,000 and 150,000 FCFA.

Annual spending on histopathological tests

Most patients (81%) spent between 30,000 and 45,000 FCFA.

The mean annual cost of cytology and anatomical pathology per patient was 61,666.67 FCFA, with a range of 40,000 to 90,000 FCFA.

Annual spending on endoscopic examinations

The mean annual cost of endoscopic examinations was 33,333.33 FCFA per patient, ranging from 25,000 to 50,000 FCFA.

Most patients (89%) spent less than 30,000 FCFA (Table 2).

Annual spending on radiotherapy

The mean annual cost of radiotherapy was 171,666.67 FCFA per patient, ranging from 75,000 to 700,000 FCFA.

Among the 94 patients, 30 received radiotherapy. Most patients (73%) spent 150,000 FCFA, while 7% spent more than 700,000 FCFA.

Annual spending on chemotherapy

The mean annual cost of chemotherapy was 32,666.67 FCFA per patient, with a range of 28,000 to 42,000 FCFA.

Of the 94 patients studied, 41 received chemotherapy.

The most frequent spending ranges were:

- 1) [15 000 - 30 000] of 34,1% patients;
- 2) [30 000 - 45 000] of 29,3% patients;
- 3) [45 000 - 60 000] of 29,3% patients.

Annual spending on surgery and surgical kits

The mean annual expense on surgery was 152,000 FCFA per patient, ranging from 135,000 to 186,000 FCFA. Among the 94 patients, 9 underwent surgery.

Most patients (55.6%) spent between 100,000 and 150,000 FCFA for surgical treatment.

Table 11. Annual expenses for the management of patients diagnosed with cervical cancer.

Annual Expenses	Mean (FCFA)	Minimum (FCFA)	Maximum (FCFA)
Consultation	51666,67	25000	70000
Hospitalization	36666,67	30000	50000
Biological tests	52000	26000	78000
Medical and cardiac imaging	201666,67	102500	295000
Histopathological tests	61666,67	40000	90000
Endoscopic examinations	33333,33	25000	50000
Radiotherapy	171666,67	75000	700000
Chemotherapy	32666,67	28000	42000
Surgery and surgical kits	152000	135000	186000

Annual expenditure per patient

The mean annual expenditure per patient was 371,804 FCFA, with a standard deviation of 174,205 FCFA.

Two peaks were observed:

- 1) Less than 200 000 FCFA; 23 patients, i.e., 24,5%;
- 2) [200 000 - 300 000] FCFA; 26 patients, i.e. 27,7%.

Table 2. Distribution of patients diagnosed with CCU according to annual spending.

Annual expenditure per patient (FCFA)	Number of patients	Percentage (%)
Less than 200 000	23	24,5

Annual expenditure per patient (FCFA)	Number of patients	Percentage (%)
[200 000 - 300 000]	26	27,7
[300 000 - 400 000]	16	17,0
[400 000 - 500 000]	11	11,7
[500 000 - 600 000]	5	5,3
[600 000 - 700 000]	3	3,2
[700 000 - 800 000]	2	2,1
[800 000 - 900 000]	4	4,3
900 000 or more	4	4,3
Total	94	100,0

3.2. Analytical Results

3.2.1. Analysis of Average Annual Costs by Type of Histology

Table 3. Analysis of average annual costs by expenditure category and histological type.

EXPENDITURE CATEGORIES	Squamous cell carcinoma			ADK et Autres			p value
	N	Mean (FCFA)	SD	N	Mean (FCFA)	SD	
CONSULTATION	75	25266,67	14493,552	17	26176,47	20881,317	0,133
HOSPITALIZATION	10	26500,00	12030,055	2	162500,00	194454,365	0,035
BIOLOGICAL TESTS	76	29040,79	17767,192	17	30588,24	24982,641	0,354
MEDICAL IMAGING	77	155733,77	87728,858	17	157647,06	76390,601	0,349
CYTOLOGY ET HISTO-PATHOLOGY	77	37597,40	13992,723	17	36764,71	13221,807	0,381
ENDOSCOPIC EXAMINATIONS	76	26381,58	5750,286	15	30000,00	11338,934	0,04
RADIOTHERAPY	22	157954,55	125210,861	8	209375,00	199972,096	0,648
CHEMOTHERAPY	34	56852,94	117770,226	7	40714,29	9141,741	0,833
SURGERY AND KITS	8	150875,00	88625,113	1			0,558

The average annual costs for hospitalizations and endoscopic examinations were significantly higher among patients diagnosed with adenocarcinoma or other histological types compared with those with squamous cell carcinoma, with respective p-values of 0.035 and 0.04 (Table 3).

3.2.2. Analysis of Average Annual Costs by Cancer Stage

The average annual costs for consultations, hospitalizations, and histopathological examinations were significantly higher among patients diagnosed at stages III and IV, with p-values of 0.046, 0.027, and 0.021, respectively (Table 4).

Table 4. Analysis of average annual costs by expenditure category and cancer stage.

EXPENDITURE CATEOR- IES	CANCER STAGE						p value
	I + II			III + IV			
	N	Mean (FCFA)	SD	N	Mean (FCFA)	SD	
CONSULTATION	29	33965,52	19057,212	50	22700,00	12825,755	0,046
HOSPITALIZATION	4	30000,00	16329,932	7	63571,43	31284,980	0,027
BIOLOGICAL TESTS	30	32666,67	20920,759	50	28942,00	19322,949	0,73
MEDICAL IMAGING	30	193566,67	109649,499	51	145431,37	70918,899	0,126
CYTOLOGY ET HISTO- PATHOLOGY	30	45833,33	19122,262	51	34019,61	8661,386	0,021
ENDOSCOPIC EXAMINA- TIONS	30	28333,33	9222,661	50	25900,00	14989795,918	0,300
RADIOTHERAPY	16	135937,50	30233,467	11	179545,45	176003,616	0,206
CHEMOTHERAPY	16	38750,00	10344,080	23	66434,78	143021,876	0,636
SURGERY AND KITS	4	121500,00	65566,760	5	181400,00	93817,909	0,549

4. Discussion

4.1. Sociodemographic Characteristics

In our cohort of 94 patients followed at Dantec, the mean age was 55 years, with extremes ranging from 34 to 84 years.

Globally, the mean age at diagnosis of cervical cancer is approximately 53 years [2].

In a study conducted in an African setting, the mean age of patients was 48.5 years, with a range of 30 to 81 years and a peak incidence between 41 and 50 years [8].

In Tunisia, the mean age was 53.8 ± 11.7 years [9].

These data are comparable to those found in our study.

A retrospective study conducted in 2008 reviewed the records of 616 cases of cervical carcinoma at the Cancer Institute of Dakar from 1977 to 1999. All squamous cell carcinoma cases were included, and their epidemiological, clinical, and therapeutic aspects were described. The mean age of patients in that series was 35 years, with 86% older than 35 years [10].

The mean age observed in our study was lower than that reported by Dène et al. This difference may be explained by the larger sample size in their study. In a retrospective analysis of 49 patients treated in 2019 at Hôpital Dalal Jamm, the mean age was 56 years [11].

Married women represented 82.6% of our study population, followed by widowed women (16.3%). These proportions are higher than those reported by Koffi N'guessan (2009), who

found 63.2% of married patients [8]. The prevalence of polygamous marriage in Senegal is an additional sociocultural factor that may explain this difference.

4.2. Clinical Characteristics

Stage IIB was the most frequently observed (24.2%) in our study, followed by stages IIA and IIIB. These findings are consistent with those of Dène et al., who, based on the Fédération Internationale de Gynécologie et d'Obstétrique (FIGO) classification, reported a predominance of advanced stages (IIB, III, and IV) in 72.7% of cases [10].

The majority of patients (94%) were diagnosed at advanced stages of the disease. This figure is higher than the 80.7% reported by N'guessan et al. 2009. Delays in consultation and diagnosis likely explain the high proportion of advanced-stage cases.

Late diagnosis of cervical cancer remains a significant public health issue in our setting. In our series, as in most African publications, the diagnostic delay was particularly long (more than 10 months). The interval between the onset of first symptoms and the first medical consultation ranged from 1 to 24 months, with a mean of 8.4 months. These results are similar to those reported by Dène et al., where the mean delay was 9 months [10].

These findings differ from those of Hasiniatsy (2014) in Antananarivo, who reported an average delay of 12 months [12].

Errachdi et al. (2014) in Morocco, who found a median delay of 7 months (range: 1–18 months) [13].

A 2017 study conducted at Institut Joliot-Curie de Dakar on 153 patients also showed that cervical cancer is often diagnosed at a late stage. The reasons for this delay were multiple, mainly including:

- 1) Lack of knowledge (89.5%), most patients were illiterate, which underscores the crucial need for awareness campaigns targeting women;
- 2) Diagnostic wandering (62.1%), many patients sought care earlier but experienced diagnostic delays, primarily due to initial misdiagnoses and the complex care pathways in oncology;
- 3) Medical treatment (47.4%) and paramedical treatment (44.4%), many women consulted a physician, nurse, or midwife; however, the absence of a complete gynecological examination, including speculum inspection and biopsy, prevented an early diagnosis;
- 4) Traditional medicine with 46.4% in S'énégale.

Traditional healers are more accessible than hospitals, which often leads women due to ignorance, misdiagnosis, or as a first recourse to consult them rather than a medical facility [14].

4.3. Histological Data

In our study, squamous cell carcinoma was the most common histological type, accounting for 83% of cases, followed by adenocarcinomas (9.6%). Lankoandé and col. (1998) similarly reported that squamous cell carcinoma represented 78.3% of their cases, with only one case of endometrioid adenocarcinoma [15]. Abboud J. et al. (1992) observed a predominance of squamous cell carcinoma in more than 83% of patients [16].

4.4. Therapeutic Data

In our cohort, the therapeutic abstention rate was 17.2%, which is considerably lower than the 55% reported by Banza K. et al. (1999), compared to 45% of patients who underwent surgery [17].

In a retrospective study conducted in a gynecology department, Koffi N'guessan et al. reported that 91.2% of patients received palliative care only, while 8.8% underwent surgical treatment [8].

Conversely, Abboud J. and col. (1992), who had access to radiotherapy, observed a very low abstention rate (7%).

In our cohort, 31 patients received combined chemotherapy and radiotherapy, most of whom were diagnosed at stage IIB. In addition, 33 patients received chemotherapy alone, and 17 patients underwent therapeutic abstention.

4.5. Economic Data

The direct medical cost corresponded to the total expenses incurred for different healthcare services, including hospitalization (hotel services), outpatient consultations, complementary examinations, diagnostic procedures (e.g., endos-

copy), surgical procedures, and cancer treatments such as chemotherapy and radiotherapy. Regarding hospitalization, one day of inpatient care costs 5,000 FCFA in the oncology department.

The cost of one day of hospitalization does not include the expenses related to non-specific medications.

The cost of an outpatient consultation was set at 5,000 FCFA.

The cost calculation was based on the rates established by Hôpital Aristide Le Dantec for the management of patients in the health facility.

Thus, the cost of care during the first year following diagnosis was estimated for each patient by multiplying the volume of health-care consumption for each component of care by the corresponding unit costs.

In this distribution of annual consultation expenses, patients whose expenditures ranged from 15,000 FCFA to 30,000 FCFA represented 53.5%. More than half of them attended between three and six consultations during the year.

The annual consultation cost was higher among patients diagnosed at stages I and II compared with those diagnosed at stages III and IV. This may be explained by the fact that patients diagnosed at early stages (I and II) generally have a preserved general condition. Almost all patients who underwent radio-chemotherapy and/or surgery were at stages I or II, which may explain their higher number of consultations, as they required closer follow-up for therapeutic evaluation.

Among hospitalized patients, 50% incurred hospitalization costs between 30,000 FCFA and 45,000 FCFA. The length of hospital stay was between 6 and 9 days for most patients. The mean annual hospitalization cost was higher among patients diagnosed at stages III and IV compared with those at stages I and II, with average costs of 63,571.43 FCFA and 30,000.00 FCFA, respectively. This difference may be attributed to the fact that patients at advanced stages (III and IV) often present with a deteriorated general condition secondary to the multiple consequences of cancer, making them more likely to require multiple hospitalizations.

The mean annual cost was also higher among patients with adenocarcinoma or other histological types compared with those with squamous cell carcinoma.

All patients in the series incurred expenses for biological and anatomopathological examinations. Most had expenditures between 30,000 FCFA and 45,000 FCFA. The mean annual cost of anatomopathological examinations was higher in patients at stages I and II compared with those at stages III and IV, with average values ranging from 34,019 FCFA to 45,833.33 FCFA.

In our study, 81% of the patients spent less than 30,000 FCFA on endoscopic examinations. The annual cost of endoscopy was higher among patients diagnosed with adenocarcinoma or other histological types compared with those diagnosed with squamous cell carcinoma, with mean costs of 30,000 FCFA and 26,381.58 FCFA, respectively.

Regarding medical and cardiac imaging, 60.6% of patients

incurred annual expenses ranging between 100,000 FCFA and 150,000 FCFA.

These expenses were not associated with the histological type or cancer stage.

In our cohort, 30 patients underwent radiotherapy. Among them, 73% spent 150,000 FCFA on radiotherapy, 20% spent 75,000 FCFA, and 6.7% spent more than 700,000 FCFA. This discrepancy can be explained by the fact that radiotherapy was subsidized for Senegalese patients but not for patients from other countries in the subregion.

Nine patients underwent surgical treatment. The mean cost of surgery was estimated at 152,000 FCFA.

A Malian study reported a mean cost of 298,000 FCFA for surgical treatment [8], which aligns with our findings when accounting for biological assessments, hospitalization, and consultation fees. In that Malian study, the mean cost of management during the first year of treatment was 365,590.91 FCFA for stage IIA, 448,977.27 FCFA for stage IIB, 337,464.29 FCFA for stage IIIA, 292,428.57 FCFA for stage IIIB, 442,333.33 FCFA for stage IVA, and 396,073.33 FCFA for stage IVB.

A British study demonstrated the relationship between disease stage at diagnosis and the cost of cervical cancer treatment. It showed an average cost of £386 (approximately 250,900 FCFA) for the treatment of pre-invasive tumors, while the cost for stage I invasive cancer was estimated at £6,623 (approximately 4,304,950 FCFA). The costs for these two stages were lower than those for stages II to IV (respectively £10,910 or 7,091,500 FCFA; £10,579 or 6,876,350 FCFA; and £10,375 or 7,172,750 FCFA) [7].

These results are consistent with those of a French study conducted at CHU de Besançon, which assessed the cost of the first six months of treatment according to the disease stage. In that study, the cost of managing invasive cervical cancer with limited extension was higher compared with earlier stages.

Furthermore, a systematic review conducted in low- and middle-income countries found that the cost of cervical cancer treatment varies widely across countries and can be extremely high, reaching up to 70,968 USD [18].

These figures are relatively higher than those reported in our study. On the one hand, this difference may be explained by the fact that indirect costs could not be assessed in the present work. On the other hand, the study protocol allowed for the valuation of only those healthcare services documented in medical records. It is also possible that some procedures were performed but not recorded in the patient files.

However, in our study, the main source of expenditure for patients was radiological examinations, particularly radiotherapy for patients from neighboring countries in the subregion.

Vaccination and screening for human papillomavirus (HPV) are well-established, effective strategies for preventing cervical cancer [19].

Expanding cervical cancer screening coverage alone could prevent 215,000 (95% CI: 205,000–227,000) cases of cervical

cancer and 49,000 (95% CI: 48,000–52,000) deaths over the period 2023–2100 [20].

The HPV vaccine is safe and reduces the risk of developing cervical cancer by up to 90% (BM, 2024). Most studies (64%) were conducted in African countries, mainly as part of pilot or demonstration HPV vaccination projects (60%). The cost of vaccine delivery ranged from USD 0.31 to USD 24.07 per dose for financial costs and from USD 1.48 to USD 48.70 per dose for economic costs [21].

5. Conclusion

Cervical cancer remains a major public health concern. It is the second most common cancer among women in Senegal, after breast cancer. A large proportion of patients are diagnosed at an advanced stage of the disease, and many are lost to follow-up during treatment, partly due to financial constraints. Despite its increasing prevalence, the cost of care remains high, placing a significant socio-economic burden on families.

Based on the findings of this study, recommendations should focus on an integrated approach to the prevention of cervical cancer. This includes strengthening HPV vaccination coverage and promoting early screening through targeted communication strategies to ensure timely and appropriate management of the disease. Finally, strong advocacy for comprehensive cervical cancer care within the framework of the (UHC) is essential to improve access to care, particularly for the most vulnerable populations.

Abbreviations

HPV	Human Papilloma Virus
UHC	Universal Health Coverage Agency

Conflicts of Interest

The authors declare no conflicts of interest.

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