

Barriers to Early Diagnosis of Cervical Cancer: A mixed-method study in Côte d'Ivoire, West Africa

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Abstract

Background: Cervical cancer, a major public health problem in many developing countries, is usually associated with a poor survival related to an advanced disease at diagnosis. In Côte d'Ivoire and other developing countries with high cervical cancer prevalence, little is known about factors associated with advanced cervical cancer stages in a context of limited access to screening services.

Methods: From May to July 2019, we conducted a cross-sectional study using a mixed, quantitative and qualitative method. Information on socio-demographic and history of the disease was extracted from a rapid case ascertainment study performed by the cancer registry of Côte d'Ivoire that enrolled all women diagnosed with cervical cancer between July 2018 and June 2019. In-depth semi-structured interviews were conducted among a subset of these women (12 women) and six healthcare providers to further capture barriers to early cervical cancer diagnosis. Factors associated with an advanced stage III, IV (according to FIGO classification) were estimated by a logistic regression model. Qualitative data were analyzed using a thematic analysis technique guided by the treatment pathway model and triangulated with quantitative data.

Results: In total, 95 women with cervical cancer [median age=51 (IQR 42-59)] years, were included. Among them, 18.9% were living with HIV and only 9.5% were covered by a health insurance. The majority (71.5%) were diagnosed with advanced cervical cancer. Being HIV-uninfected (aOR=5.4; [1.6-17.8], p=0.006) and being uninsured (aOR=13.1; [2.0-85.5], p=0.007) were independently associated with advanced cervical cancer in multivariate analysis. Qualitative data raised additional factors potentially related to advanced cervical cancer stages at diagnosis including the lack of information on cervical cancer among healthcare providers and inadequate awareness and screening campaigns.

Conclusion: In a context of challenges in access to systematic cervical cancer screening in Côte d'Ivoire, access to health insurance or integrated healthcare program appear to be key determinants of early diagnosis of cervical cancer.

Introduction

The management of cervical cancer (CC) remains a major public health issue in developing countries, partly due to a usually advanced disease at the moment of diagnosis (1). Considerable efforts were undertaken by stakeholders through implementing screening and early detection programs for precancerous and cancerous lesions of the cervix, with established effectiveness (1–3). Despite all these efforts, access to CC screening at a populational level remains limited and most CC in developing countries are diagnosed at an advanced stage (4–6). According to the latest world cancer statistics, CC is the fourth most common diagnosed cancer and the fourth leading cause of cancer death in women worldwide, with approximately 604,000 new cases and 342,000 deaths. The highest regional incidence and mortality is in sub-Saharan Africa, partly due to the lack of formalised screening programmes (7).

In Côte d'Ivoire, CC is the second most common cancer in women and the leading cause of cancer death in women. Age-standardized incidence and mortality rates are estimated at 31.2 cases and 22.8 deaths per 100,000 women in 2020, respectively (8). Since 2009, the Ivorian Ministry of Health, through its National Cancer Control Program (PNLCa), has implemented a national program of screening for CC and treatment of

precancerous lesions, based on visual inspection with acetic acid and cryotherapy, respectively. This screening program has been subsequently scaled-up over 134 healthcare facilities. Despite these efforts, screening coverage for CC remains relatively low (1.2% in the urban area of Abidjan) and approximately 70% of CC were reported to be diagnosed at advanced stage a decade ago (9,10). This is a serious concern, given that CC is highly preventable and curable if diagnosed and treated early. Indeed, in high-income countries, organized screening and early treatment of precancerous lesions have significantly reduced the CC incidence and mortality in the past decades (11–13).

CC diagnosed at an advanced stage leads to poor prognosis and is one of the main causes of the high and early cancer-related mortality among women (14,15). Beyond the WHO call for elimination targeting 90% of women diagnosed with CC accessing care, access to an effective treatment is largely mediated by the extension of the disease when diagnosed (16). It is therefore crucial to have a better understanding of factors associated with advanced CC stages in a context of limited information from low and middle-income countries (4,5,17–19). The aim of this study was to identify the main barriers of early diagnosis of CC in Côte d'Ivoire.

Material And Methods

Population and design

A cross-sectional study using a mixed method quantitative and qualitative was conducted in Abidjan, the economic capital of Côte d'Ivoire from July 2018 to June 2019. Our study population was nested in a larger project supported by the cancer registry of Abidjan that initiated a rapid case ascertainment of all CC diagnosed in the urban area of Abidjan during a two-year period. During this period, all units potentially managing CC from the public sector (four units from the three public referral hospitals in Abidjan and the recently opened radiotherapy center) as well as one of the major clinics from the private sector with the capacity to manage CC in the urban area of Abidjan, were asked to systematically include all adult women (\geq 18 years old) attending with a suspected or confirmed diagnosis of CC. Cervical biopsies and histologic examination by the local pathology unit were systematically proposed and financially supported by the research project, when appropriate.

Collected information

Trained clinical monitors administered a structured questionnaire to women enrolled in this research project to collect clinical and sociodemographic characteristics such as age, formal education (categorized as no school, primary school, secondary school and above), parity, personal monthly income, personal health insurance coverage. Cancer clinical stage at CC diagnosis was assessed based on the International Federation of Gynecology and Obstetrics (FIGO) staging system (20). Based on available information after the initial assessment of the tumor extension, clinical stage at diagnosis was reported by clinicians and dichotomized as early (stage I and II) or advanced (stage III and IV) disease.

A nationally approved rapid HIV test (Determine, Abbott Diagnosis) was systematically performed by collecting capillary blood by a finger prick test at the time of interview. In case of positive result, a venous blood sample was collected for confirmation purposes, according to the national algorithm of Côte d'Ivoire.

From May to July 2019, all women included in this rapid case ascertainment study were systematically contacted by phone for additional information for the purpose of the present study. Women who refused or were physically unable to participate or those who could not be reached by phone during the study period were excluded.

A sample of 12 women from the total participants were selected for semi-structured interviews. They were selected purposively on the basis of different characteristics such as age, HIV status, place of residence, International Federation of Gynaecology Obstetrics (FIGO) stage and level of education to obtain a diversified profile that reflects the characteristics of the overall enrolled participants. The number was determined on the principle of data saturation. Additional interviews were conducted with Key Informants (KIs) comprising health professionals (n = 5) and public stakeholders (n = 1) worked in the cancer referral hospitals participate in the project.

For the quantitative analysis, data were collected using a standardized questionnaire administered face-to-face at the referral hospital in which patients were diagnosed for CC or by phone for participants who could not attend in person. For the qualitative component all semi-structured interview guides were administered through face-to-face interviews. We designed the questionnaire based on contributing factors and intervals in the Andersen's model (Fig. 1) and findings from studies on CC in low and middle-income countries (5,6,18,19,21). The Andersen's model was designed to describe the decision and behavioural processes that occur prior to the diagnosis and treatment of cancer and other infectious diseases (21). This model was adapted and we considered the intervals for symptom appraisal, care seeking and total time that can influence the diagnosis of CC.

The questionnaire included questions on socio-demographics, health insurance coverage, access to traditional healers, access to specialized facilities, prior knowledge of CC, past history of cervical screening, history of the disease including the intervals based on Andersen's model (symptom appraisal, care seeking and total time) and the pre-referral consultations. The symptom appraisal interval is defined as the time between detection of unexplained symptoms and the decision to consult a healthcare provider. The care seeking interval is the time between the first symptoms detected and the first consultation to a healthcare provider. The total time interval represents the time between the first symptoms and the histological diagnosis of CC (21–23). (See Fig. 1). Pre-referral consultations is defined as any visit to a healthcare provider before the diagnosis of CC (24).

For qualitative approach, interview guides included questions on gynaecological follow-up prior to the diagnosis of CC, therapeutic pathway leading to CC diagnosis, various obstacles encountered in help-seeking care and diagnosis access, cultural and religious beliefs regarding CC, cervical screening and diagnosis services in Côte d'Ivoire, and suggestions for improving the quality of these services. Time taken for each interview was about 30 to 50 minutes and interviews were recorded using a dictaphone.

Mixed methods data analysis

For quantitative analysis, we present continuous variables as median with their interquartile range (IQR) and categorical variables as absolute numbers and percentages (%). The measured outcome was CC stage at diagnosis dichotomised as early (stage I and II) or advanced (stage III and IV). To determine factors associated with advanced CC stages, univariate and multivariate logistic regressions were used. For multivariate

regression analysis, variables with a p value ≤ 0.20 in univariate regression were included in the initial model. A stepwise descending procedure was performed to obtain the final model. Both unadjusted (UOR) and adjusted Odd's ratios (AOR) were computed together with their 95% confidence limits (95% CI). In the final model, a p-value of ≤ 0.05 was considered significant. The variable Knowledge of CC was not significant but remained in the model as a confounder for HIV status and Health insurance covariates. All statistical analysis were performed using the Version 3.5.0 of the R software.

For qualitative component, interviews were all manually transcribed from Microsoft Word the day of the interview. Data were analyzed using thematic analysis technique with the aid of QDA miner Lite software. Guided by the Model of Pathways to Treatment, themes and sub themes have been identified, indexed, interrelated and described. These were then colour-coded, quotations were selected to represent each emerging theme and are reported as the study results (25,26). We further triangulated qualitative themes and quantitative data to identify areas of convergence and divergence related to factors contributing to an advanced cervical cancer stages at diagnosis. In the results section of the manuscript, verbatim quotes from participants were identified by participant's pseudonym, age in year and FIGO stage. However, information from Keys Informants were used as guidance in the interpretation of our results and the study discussion.

Results

Respondents' Characteristics

A total of 158 women with a histological diagnosis of CC between July 2018 and June 2019 were identified by the Abidjan cancer registry and requested through phone calls to participate in our study. Of these, 50 died before the time of our survey. Among the 108 alive, 13 were excluded for the following reasons: unreachable by phone (n = 6), refusal (n = 3), unaware of their disease (n = 1) or FIGO not available in the medical records (n = 3). Thus, 95 women were included in our quantitative analyses.

Their median age was 51 (IQR 42–59) years. About two third 61 (64.2%) were unmarried; 41 (43.2%) lived in Abidjan; 33 (34.7%) had no monthly income and 54 (56.8%) had monthly income less than 250 USD. Forty four women (46.0%) reported no formal education; 39 (41.1%) were unemployed and 55 (57.9%) were diagnosed with CC six months or more after the onset of the first symptoms. HIV infection was found in 18 (18.9%) respondents and only 9 (9.5%) were covered by a health insurance. Approximately 62 (65.3%) of the participants in our study had three or more consultations prior CC confirmation. All participants in our study were diagnosed with CC based on the occurrence of pre-existing signs and symptoms. An advanced CC stage at diagnosis was reported in 68 (71.6%) respondents and majority of them had squamous cell carcinomas 86 (90%) (Table 1).

Table 1
 Characteristics of 95 women diagnosed with cervical cancer in Côte d'Ivoire, 2019.

Characteristics	Early stage (n = 27)		Advanced stage (n = 68)		Total (n = 95)	
	n	%	n	%	n	%
Age, median [IQR]	49	[41–57]	52	[42–60]	51	[42–59]
Age group (years)						
<40	5	18.5	12	17.6	17	17.9
40–59	18	66.7	37	54.4	55	57.9
≥60	4	14.8	19	27.9	23	24.2
Education level						
None	11	40.7	33	48.5	44	46.3
Primary	8	29.6	20	29.4	28	29.5
Secondary and over	8	29.6	15	22.0	23	24.2
Marital status						
Married	12	44.4	22	32.4	34	35.8
Widowed	5	18.5	20	29.4	25	26.4
Living with partner	6	22.2	12	17.6	18	18.9
Single or divorced	4	14.8	14	20.6	18	18.9
Occupation						
Employed	17	63.0	39	57.4	56	58.9
Unemployed	10	37.0	29	42.6	39	41.1
Number of biological children						
< 5	12	44.4	31	45.6	43	45.3
≥5	15	55.6	37	54.4	52	54.7
HIV status						
Positive	9	33.3	9	13.2	18	18.9
Negative	18	66.7	59	86.8	77	81.1
Place of living						
Abidjan	10	37.0	31	45.6	41	43.2
Other cities [§]	17	63.0	37	54.4	54	56.8
Health Insurance coverage						

Characteristics	Early stage (n = 27)		Advanced stage (n = 68)		Total (n = 95)	
Insured	6	22.2	3	4.4	9	9.5
Uninsured	21	77.8	65	95.6	86	90.5
Monthly income (USD)						
None	8	29.6	25	36.8	33	34.7
<250	14	51.9	40	58.8	54	56.8
≥250	5	18.5	3	4.4	8	8.4
Estimated distance from home to referral hospital (Kilometres)						
< 100	12	44.4	36	52.9	48	50.5
≥ 100	15	55.6	12	47.1	47	49.5
Histological subtypes						
Adenocarcinoma	1	3.7	8	11.8	9	9.5
Squamous cell carcinoma	26	96.3	60	88.2	86	90.5
Total time interval® (days)						
Median, [IQR]	231	[120–379]	208	[113–439]	216	[117–429]
< 180	10	37.0	30	46.1	40	42.1
≥ 180	17	63.0	38	53.9	55	57.9
Number of pre-diagnosis visits						
Median, [IQR]	3	[2–4]	3	[2–4]	3	[2–4]
<3	9	33.3	24	35.3	33	34.7
≥3	18	66.7	44	64.7	62	65.3

Notes: ®, time between the first symptoms and the histological diagnosis of cancer; \$, people who lived in other districts of Côte d'Ivoire except Abidjan.

For qualitative component, 18 semi-structured interviews were conducted; 12 with women diagnosed with CC and 6 with key informants (KIs), i.e. health professionals and public stakeholders. Most of the women involved in the qualitative survey lived in Abidjan (8/12). Half of them reported no formal education and low economic level (those with a monthly income of less than 250 \$USD). Four of them were infected with HIV at the time of CC diagnosis and 8 were diagnosed with advanced CC (FIGO III or IV). (Table 2). All KIs respondents were working at health facilities in Abidjan. Two were oncologists, of which one was also working at the PNLCA. Two were gynaecologists and practiced respectively at university hospital and general hospital, and the other two were midwives. (Table 3).

Table 2
 Characteristics of women surveyed in qualitative component, Côte d'Ivoire, 2019.

Participant	Age	Place of living	Education level	Socio-Economic Status	HIV Status	Health Insurance	FIGO stage
Linda	59	Abidjan	Primary	Low	Negative	Uninsured	III
Elizabeth	38	Lagunes	None	Low	Negative	Uninsured	IV
Marise	54	Abidjan	None	Very Low	Positive	Uninsured	IV
Claude	34	Abidjan	None	Very Low	Negative	Uninsured	III
Jeanne	56	Zanzan	None	Low	Negative	Uninsured	III
Patricia	38	Abidjan	None	Low	Positive	Insured	I
Marlie	36	Abidjan	None	Very Low	Negative	Uninsured	III
Rose	43	Bas-Sassandra	Primary	Low	Negative	Uninsured	III
Sandra	43	Abidjan	Primary	Low	Positive	Uninsured	II
Amanda	49	Comoé	Primary	Very Low	Positive	Uninsured	II
Nanie	38	Abidjan	Secondary and over	Medium	Negative	Insured	II
Zila	49	Abidjan	Secondary and over	Medium	Negative	Uninsured	IV

Abbreviations: FIGO- International Federation of Gynaecology and Obstetrics.

Notes: Very low socio-economic status- Participant with no monthly income, Low socio-economic status- Participant with a monthly income less than 250 USD, Medium socio-economic status- Participant with a monthly income between 250 USD and 500 USD.

Table 3
 Characteristics of Keys informants interviewed in qualitative component, Côte d'Ivoire, 2019.

Characteristics	KI (1)	KI (2)	KI (3)	KI (4)	KI (5)	KI (6)
Age	48	44	59	36	45	49
Gender	W	M	W	M	M	M
Designation	Midwives	Oncologist	Midwives	Gyneacologist	Gyneacologist	Oncologist
Working experience (years)	10	9	22	9	15	11
Working place	University hospital	Radiotherapy center	Private hospital	University hospital	General Hospital	PNLCA

Notes: W- Women; M- Men; KI- Key Informant; PNLCA- National Cancer Control Program.

Factors associated with advanced cervical cancer

Patient related factors

In the multivariate model, HIV-uninfected respondents were more likely to have advanced CC than those HIV-infected (AOR = 5.4; 95% CI [1.6–17.8], $p = 0.006$). (Table 4).

Table 4
Factors associated with advanced cervical cancer (stage III or IV), Côte d'Ivoire, 2019, (n = 95).

Cancer Stage at diagnosis						
	Early stage (I/II)	Advance stage (III/IV)	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Factors	n/N	n/N				
Age group (years)				0.36		
<40	5/17	12/17	1			
40–59	18/55	37/55	0.8 [0.2–2.8]			
≥60	4/23	19/23	2.0 [0.4–8.9]			
Education level						
None	11/44	33/44	1	0.70		
Primary	8/28	20/28	0.8 [0.3–2.4]			
Secondary and over	8/23	15/23	0.6 [0.2–1.9]			
Marital status				0.32		
Married	12/34	22/34	1			
Living with partner	6/18	12/18	1.1 [0.3–3.6]			
Widowed or single or divorced	9/43	34/43	2.0 [0.7–5.7]			
Occupation						
Employed	17/56	39/56	1			
Unemployed	10/39	29/39	1.2 [0.51–3.16]	0.61		
Place of living						
Abidjan	10/41	31/41	1			
Other cities ^{\$}	17/54	37/54	0.7 [0.3–1.7]	0.44		
Menopause						
No	15/36	21/36	1			
Yes	12/59	44/59	2.8 [1.1–7.0]	0.02	-	-
HIV Status						

Bold typeface indicates statistically significant values.

*Confounding factor with HIV status and Health insurance coverage.

Cancer Stage at diagnosis						
Positive	9/18	9/18	1		1	
Négative	18/77	59/77	3.3 [1.1–9.5]	0.02	5.4 [1.6–17.7]	0.006
Health insurance coverage						
Yes	6/9	3/9	1		1	
No	21/86	65/86	6.2 [1.4–26.9]	0.01	13.1 [2.0–85.5]	0.007
Prior Knowledge of cervical cancer™						
Yes	19/51	32/51	1		1	
No	8/44	36/44	2.7 [1.0–6.9]	0.04	2.1 [0.7–6.3]	0.16*
Use traditional healers©						
No	22/63	51/63	1			
Yes	5/32	27/32	2.9 [1.0–8.5]	0.05	-	-
Access to specialized facilities¥						
Reference	25/76	51/76	1		1	
Directly	2/19	17/19	4.2 [0.9–19.4]	0.07	7.1 [1.1–44.0]	0.01
Number of pre-diagnosis visits						
<3	9/33	24/33	1			
≥3	18/62	44/62	0.9 [0.3–2.3]	0.85		
Histological subtypes						
Adénocarcinoma	1/9	8/9	1			
Squamous cell carcinoma	26/86	60/86	0.3 [0.03–2.4]	0.25		
Total time interval®						
<180	10/40	30/40	1			
≥180	17/55	38/55	0.7 [0.3–1.8]	0.52		
Bold typeface indicates statistically significant values.						
*Confounding factor with HIV status and Health insurance coverage.						

Notes: \$, people who lived in other districts of Côte d'Ivoire except Abidjan; ™, Prior knowledge of CC before disease onset; ©, Use of traditional healthworkers after recognition of early symptoms; ¥, How women get access to specialized facilities; ®, time between the first symptoms and the histological diagnosis of cancer.

Abbreviations: OR- Odds ratio; CI- Confidence Interval.

In-depth interviews showed that it is not usual for healthy ivorian women to have regular gynaecological follow-up. However, patients with a chronic disease, such as HIV, are more likely to be tested early within the management of their disease according to national guidelines.

"... I used to get tested for cervical cancer every year at the HIV clinic where I received my medication. The last time was in 2017." (Patricia, 38 years old, stage I)

"Before the illness, I didn't use to consult the gynaecologist because I had no disease." (Elizabeth, 38 years old, stage IV).

"Africans visit gynaecologist except for childbirth or other serious health problems. And often, in our culture, we say to avoid waking up the sleeping illness. Laughing." (Rose, 43 years old, stage III)

Being uninsured was significantly associated with advanced CC (AOR = 13.1, 95% CI [2.0-85.5], $p = 0.007$) (Table 4).

In-depth interviews, lack of money was mentioned by most respondents as a major cause of delay in performing the test to confirm a diagnosis of CC. One participant mentioned that she was privileged to perform the biopsy early and to be diagnosed at an early stage of the disease through her health insurance.

"Biopsy is still expensive. I was fortunate enough to have it done the day it was prescribed and diagnosed at early stage because my insurance covered more than half of the cost." (Nanie, 38 years old, stage II)

"I couldn't do the biopsy on the same day as it was prescribed because of lack of money. So I waited two weeks before coming back to do it for free at the university hospital." (Marlie, 36 years old, stage III)

Participants who came directly to specialized facilities were more likely to be diagnosed with advanced cervical CC compared to those referred by a peripheral healthcare provider, (AOR = 7.05, 95% CI [1.13–44.07], $p = 0.03$).

During our in-depth interviews, some participants reported that the cause of direct attendance at specialized facilities was mainly the deterioration of conditions because of ignorance about CC and its treatment at the beginning of the disease.

"At the beginning, I didn't consider my illness, I thought it was common. It was a few months later, when I saw that I was bleeding too much and becoming very weakened, I went directly to the university hospital." (Linda, 59 years old, stage III)

Statistically significant association was not found between the total number of pre-diagnosis visits (OR = 0.9, 95% CI [0.3–2.3], $p = 0.85$), total time interval (OR = 0.7, 95% CI [0.3–1.8], $p = 0.52$), histologic type (OR = 0.3, 95% CI [0.0-2.4], $p = 0.25$) and diagnosis of advanced CC (Table 4).

Health providers-related factors

In-depth interviews highlighted the role of healthcare providers in the diagnosis of advanced CC stages. Two sub-themes were identified as priorities: lack of patient information and awareness about CC, and inadequate

knowledge concerning the signs and symptoms of CC.

1. Lack of patient information and awareness about cervical cancer and screening by healthcare providers

Some of the participants reported that the physicians they consulted before contracting the disease are partially responsible for the advanced stage of their disease. In previous visits, they said that they had never been informed of the CC or proposed the screening test. For others, whether information about CC and the screening was provided, it would appear to be unclear and not explicit. One respondent said that they did not understand the benefits of the test or the severity of the disease and no longer returned for the follow-up. This would have caused a poor uptake or adherence to the screening test, leading to advanced CC stages at diagnosis.

"If I went to the gynaecologist before my illness, it was also to orient me and help me avoid other illnesses. He prescribed blood tests and echography, but he never told me about the cervical cancer or proposed me a smear." (Zila, 49 years old, stage IV).

"The doctor I followed asked me for this test every year. Each time I tested, he would never give me the result. I didn't even know why I was doing it... For the past four years, I have not returned for this test." (Marise, 54 years old, stage IV)

2. Inadequate knowledge of the signs and symptoms of cervical cancer

Some respondents mentioned that some healthcare providers appear to be unfamiliar with the signs and symptoms of CC. This sometimes leads to misdiagnosis and inappropriate management, which can be a barrier to early diagnosis of CC.

"At the General Hospital, the doctor who examined me gave me a blood test and then told me that I had malaria." (Jeanne, 56 years old, stage III)

"[...] As the bleeding persisted, I went to see a midwife at the general hospital. After examination, she told me that my cervix was open. If at least she knew the small signs of cervical cancer, she could have referred me immediately to the specialized hospital to see a gynecologist." (Marlie, 36 years old, stage III)

"[...] When I get at the dispensary, the nurse gave me two injections to stop the blood and then asked me to come back a week later. I didn't return because the injections was hurting me too hard and worsening my pain." (Jeanne, 56 years old, stage III)

Health system factors

Inadequate awareness and screening campaigns

Inadequate awareness and screening campaigns was mentioned as a barrier to early diagnosis of CC by some respondents. Some mentioned poor distribution of these campaigns, which are more concentrated in large cities compared to villages; irregularity of these campaigns; ambiguity of the information spread; and lack of CC awareness campaigns compared to other diseases. Others respondents emphasize inadequacy of communication tools for the local context.

"[...] There is more awareness campaigns on breast cancer than cervical cancer. Those who talk about cervical cancer don't give enough information about the causes and symptoms." (Zila, 49 years old, stage IV)

"I heard that the message about cervical cancer and screening only plays on the radio. However, in the village, I don't have radio. That is why I did not have access to information about it before my illness." (Claude, 34 years old, stage III)

Discussion

This study provides insights of the different barriers limiting early diagnosis of CC in Côte d'Ivoire. Our findings showed that some characteristics related to patients (HIV-uninfected, being uninsured), healthcare providers (inadequate knowledge of the signs and symptoms of CC, lack of patient information and awareness about CC), and health system (inadequate awareness and screening campaigns) were highlighted as potential drivers of an advanced CC stages at diagnosis.

More than two-thirds of the respondents were diagnosed at an advanced stage. A similar result was found in a study in Sudan (71.5%) and in a previous study performed in Abidjan (70.0%) (9,27). According to the literature, advanced CC is associated with complications, poor treatment outcomes, and high mortality rate (14,28). The likelihood of being diagnosed with advanced CC stages was greater among women uninsured. Similar finding was also reported in Sudan showing a correlation between lack of health insurance and advanced CC (OR = 7.7; [3.76–15.38]) (27). Lack of health insurance can hinder some ivorian women from seeking care for medical check-up, illness and paying the costs of medical services. In Côte d'Ivoire, according to the PNLCa, the overall costs for CC diagnosis are estimated between 34 and 37 \$USD in the public sector; and between 59 and 76 \$USD in the private sector- including consultation fees and the cost of the biopsy. This could be a financial barrier for most ivorian women and could delay diagnosis tests confirming CC. Our study showed that few of the participants were covered by health insurance; access to universal health coverage in Côte d'Ivoire might reduce social health inequalities, advanced CC stages and others chronic conditions and respond health requirements of the ivorian population. Several studies has shown the positive effect of health insurance on the early diagnosis of some cancers (breast, colon, lung, uterus, prostate) (29–31). HIV-infected participants were diagnosed with CC at an earlier stage than did their uninfected counterparts. The same result was found in a study in Uganda and in a recent study conducted in Bostwana (32,33). This finding is probaly linked to the lack of access to healthcare and/or poor services especially in public facilities in limited-income countries. Inadequate access to healthcare deprives women in the general population from having gynaecological follow-up and seeking care at the onset of signs and symptoms for early diagnosis. Furthermore, CC screening is increasingly integrated within the package of services for HIV-infected women, ensuring better protection towards advanced stages. According to this result, integrating CC screening programs within other pre-existing care systems could improve access and quality of care, providing a holistic care to all patients attending the health facility (34–36).

Participants who came directly to specialized facilities were more likely to be diagnosed at advanced stage than those referred by peripheral healthcare providers. This result was rather a consequence of the advanced stage of CC, as most women who attended specialized facilities directly came because of deteriorating conditions and were mostly at in advanced stage. This finding could be explained by limited knowledge and

awareness of the signs and symptoms of CC among women and/or or inadequate management at previous visits. Furthermore, results of our qualitative approach suggest that inadequate knowledge of the signs and symptoms of CC, especially among primary healthcare providers, leading to misdiagnosis and inappropriate management. This is consistent with results from two studies conducted in Rwanda and Malawi (19,37). Aside from the gap in CC knowledge, some healthcare providers are also not communicating with their patients about CC and screening. These findings could explain the limited effectiveness of the CC screening programs implemented by the ivoirian ministry of health that have so far. This lack of knowledge and awarness towards CC screening surely contributes to the under-use of CC screening services, a key factor in preventing CC diagnosis at an advanced stage. Indeed, a few of the participants in our study had been screened for CC prior to their illness. Studies in Ghana and Iran confirm a significant association between lack of screening for CC and advanced stage (4,38).

These findings showed that considerable efforts through implementation early CC surveillance programs, including public awareness and health providers education about the disease might reduce the number of advanced CC cases. Accordingly, the results of a pilot program in Malaysia focusing on educating women and health professionals showed a significant reduction in advanced cervical and breast cancer with cost-effectiveness (39). Results of others studies showed that large-scale interventions including public awarness and education reduced proportion of cancer diagnosed at late stage (40,41).

Our quantitative results showed no association between total time interval prior CC diagnosis and advanced CC. This result is similar to a study conducted in northern Uganda (18). All participants in our study were diagnosed with CC based on pre-exisiting signs and symptoms. Most of them were at an advanced stage at the time of recognition of these signs and symptoms as abnormal regardless of the number of pre-diagnosis visits and the total time interval. These results confirm that access to a systematic CC screening remains a key determinant to reduce the proportion of advanced CC as mentioned above.

Strengths and limitations

This study has several limitations; firstly a significant number of women initially recorded through the cancer registry project had died at the time of our survey. Moreover, as all the cancer management facilities are based in Abidjan, some suspected cases found outside the city could not reach Abidjan to confirm the CC's diagnosis. Both situations could potentially underestimated the proportion of CC diagnosed at an advanced stage. However, the proportion of advanced stage of women with CC is quite similar to previous reports from Côte d'Ivoire and from other settings in sub-Saharan Africa (9,18,27). Secondly, a retrospective recall bias might have been introduced when determining the exact time intervals between the onset of symptoms and the diagnosis. It was often difficult for participants to accurately determine the date of symptom onset, or whether the symptoms were actually associated with CC. However, in a mixed study like this, the inability to accurately determine the intervals of symptom onset, care-seeking, and total time did not affect participants' perceptions of the therapeutic pathway to diagnosis of CC.

Conclusion

Factors involving facilitated access to healthcare system prior to diagnosis of cervical cancer (being insured, accessing a vertical healthcare program such as HIV) tend to act as protective factors for diagnosis at advanced CC stages in Côte d'Ivoire. Qualitative interviews with women diagnosed with CC and key informants revealed several gaps in information about CC and its prevention. Further studies including primary care workers are needed to complement qualitative findings regarding their potential role on advanced CC stages at diagnosis. Improvement of existing education and awareness raising programs among women and healthcare providers should also be considered and its impact on advanced CC stages should be explored.

In addition, widespread awareness and education campaigns are needed to promote access to systematic CC screening and ongoing training programs for healthcare providers to reduce advanced CC. Moreover, implementing inclusive health insurance could help in early detection of CC to avoid advanced CC stages and reduce health inequalities in the perspective of CC elimination, targeted by WHO by 2030.

Abbreviations

AOR: Adjusted Odd's Ratio; CC: Cervical cancer; FIGO: International Federation of Gynaecology and Obstetrics; HPVs: Human papillomaviruses; KIs: Keys Informants; PNLCA: National Cancer Control Program; OR: Odd's Ratio.

Declarations

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Authors' contributions:

MKP conceptualized, designed and implemented the study, collected data, performed data analysis/interpretation and drafted the manuscript. SB worked on study implementation, data collection and reviewed the manuscript. PC assisted data collection and analysis. AI, BT, AP, AT and FD made the critical review of the manuscript for important intellectual content. AB assisted qualitative data collection/analysis and drafting of the manuscript. AJ supervised the study's conceptualization, design, implementation, data collection and analysis, also assisted drafting of the manuscript. All authors contributed to reviewed and approved the final version of the manuscript.

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Availability of data and materials:

The datasets generated and/or analyzed during the current study are not publicly available as they contain confidential information that could compromise privacy but can be made available with non-identifiable aspects from the corresponding author on reasonable request.

Ethics approval and consent to participate:

The present study has been performed in accordance with the Declaration of Helsinki and has been approved by the National Ethics Committee of Côte d'Ivoire (approval number: 011-19/MSHP/CNESVS-kp). Informed consent to participate in the study and to do audio recording were obtained before each interview. All the questionnaires, recorded tapes and transcripts were kept anonymous in the personal computer of the researchers which had a password.

Consent for publication:

Not applicable.

Competing interests:

The authors declare that they have no competing interests.

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Figures

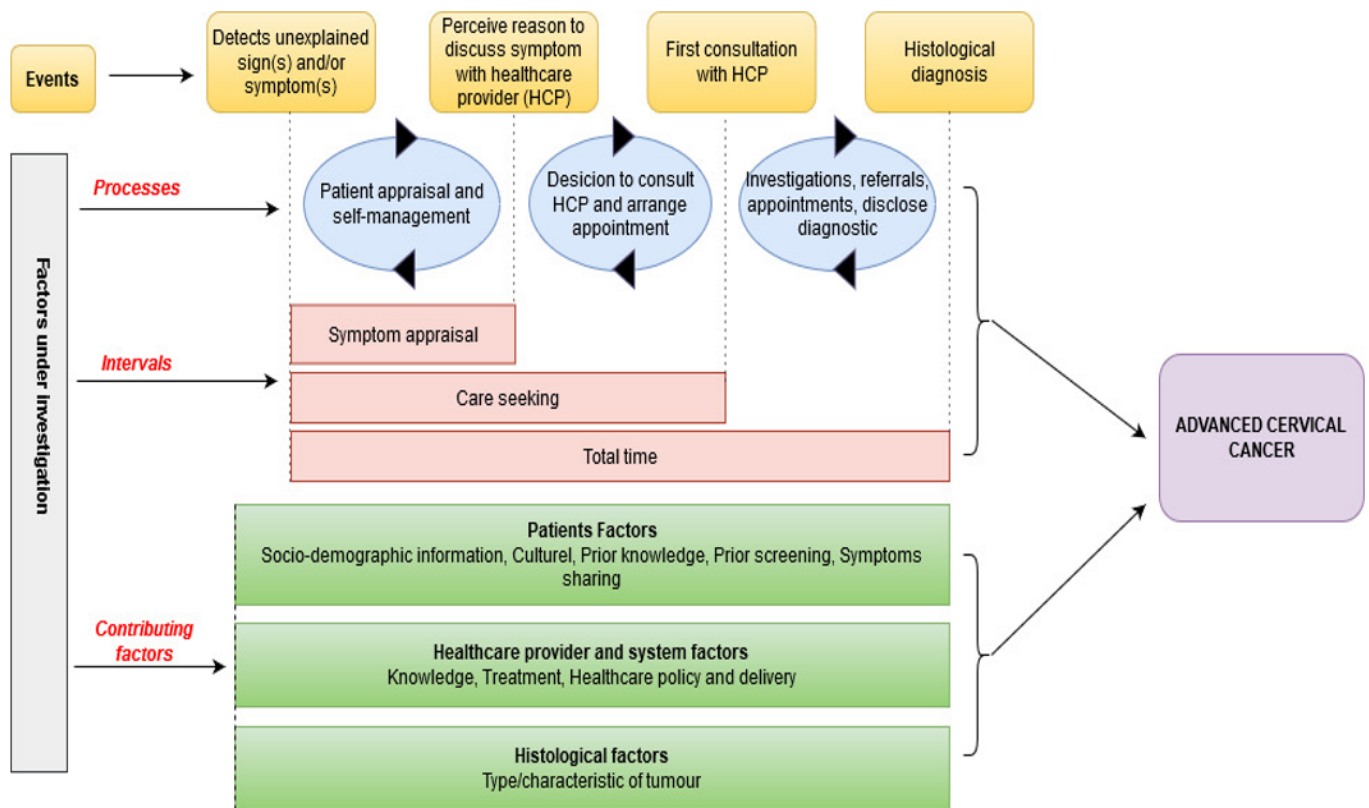


Figure 1

Conceptual framework for the study based on Andersen's model and data from the literature.