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Screening Strategies for Precancerous Cervical Lesions in Women at the Departmental University Hospital Center of Oueme Using HPV Testing in 2025

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Abstract

Introduction: Cervical cancer remains a major public health problem. Its prevention is possible through the 3T approach. **Objective:** To study the 3T approach at the Ouemé Departmental University Hospital Center in 2025. **Materials and Methods:** This was a descriptive cross-sectional study with an analytical and prospective aim, conducted from May 15 to November 2025. The study population consisted of women aged 25 to 65 years residing in the municipality of Porto-Novo. Informed consent and anonymity were ensured. Exhaustive sampling was used. HPV testing was performed and complemented by visual inspection with acetic acid (VIA) and Lugol's iodine (VILI), coupled with colposcopy, followed by biopsy and histological examination when pathological findings were present. Data were collected over three months. Analysis was carried out using Epi Info software version 7.1.3.3, and tables were produced using Microsoft Excel version 2018. **Results:** Among the 321 women recruited, 26 had positive HPV tests, giving a prevalence of 8.10%. The mean age was 42.52 ± 11.52 years, with a range of 25 - 65 years. The most represented age group was 25 - 34 years (28.44%), followed by 35 - 44 years (26.88%). Educational levels were secondary (34.58%), primary (23.36%), higher education (19.31%), and no formal education (22.74%). Most participants were traders (44.55%), multigravida (79.44%), and multiparous (75.70%). Among the 26 HPV-positive women, colposcopy combined with VIA/VILI was positive in 65.40% and negative in 34.60%. Nine biopsies were performed, yielding the following results: 19.23% CIN 1, 3.84% CIN 2, 7.69% CIN 3, and one case of advanced-stage cancer (3.84%). Treatments included

thermocoagulation (6 cases), hysterectomy (2 cases), and chemotherapy. **Conclusion:** HPV testing, complemented by VIA/VILI and colposcopy, is an effective strategy for identifying women at risk of cervical cancer and providing appropriate treatment. The 3T approach is an effective tool for eradicating cervical cancer and reducing maternal mortality.

Keywords

Precancerous Lesions, Cervix, 3T Approach, Oueme-Benin

1. Introduction

Cervical cancer is one of the most common cancers among women worldwide and remains a major public health problem despite the availability of effective prevention based on the 3T approach (Triage; Test, Treat). The majority of cervical cancers are caused by persistent infections with oncogenic high-risk human papillomaviruses (HPV), mainly genotypes 16 and 18, although several other types may also be involved [1]. Most cervical cancers develop in women who have never been screened [2]. Primary screening based on HPV testing is recommended for women aged 25 to 65 years because of its high sensitivity for detecting precancerous lesions compared with cytology alone [3]. Colposcopy is an essential diagnostic triage step in women with a positive HPV test, allowing visual assessment of cervical lesions and targeted biopsies for histological confirmation [4]. No study has yet comprehensively evaluated the relationship between HPV test results, colposcopy, and histology. This study aims to assess the 3T approach at the Oueme Departmental University Hospital Center in 2025, in order to optimize screening and follow-up of women at risk of cervical cancer.

2. Methodology

This was a descriptive cross-sectional study with an analytical and prospective aim, conducted from May 15 to November 2025. The study population consisted of all women aged 25 to 65 years residing in the municipality of Porto-Novo at the time of the survey who provided free, informed oral consent. Women who did not consent or who did not meet sampling criteria were excluded, namely those with menstruation, obvious infection, local vaginal treatment, sexual intercourse within the previous 48 hours, or vaginal douching on the day of sampling. Because the HPV test is a molecular detection of viral DNA and not a cellular interpretation like cytology. Sexual intercourse may mask or simulate this viral presence in a more direct and technical way, affecting the specificity of the test, leading to falsely positive or false-negative results, or to a less reliable sample. Screening was performed using HPV testing and complemented by visual inspection with acetic acid (VIA) and Lugol's iodine (VILI), coupled with colposcopy when results were positive. Any pathological colposcopy finding was biopsied to confirm precancerous lesions on histopathological examination and to provide appropriate treat-

ment. Prior authorization was obtained from the Mayor of the municipality of Porto-Novo, the Oueme Departmental Health Director, and the Director of the Oueme Departmental University Hospital Center. Informed consent and confidentiality of participants were ensured. An exhaustive sampling approach was applied. Data collection was carried out using EpiData software version 3.1 (French version), processed with Microsoft Word version 2018, and tables were produced using Microsoft Excel version 2018. Data analysis was performed using Epi Info software version 7.1.3.3. Data were collected over a three-month period, from July 3 to November 3, 2025, and stored anonymously and confidentially. Each participant was assigned a unique study identifier. The database containing participants' information was password-protected and accessible only to authorized personnel involved in the research In accordance with the principles of medical ethics and the code of ethics and professional conduct for health research in the Republic of Benin, the anonymity and confidentiality of the information collected were respected.

3. Results

3.1. Frequency of HPV Test Positivity, Colposcopy, and Biopsy among Participants

A total of 321 women were recruited, of whom 26 had a positive HPV test result, corresponding to a positivity rate of 8.50%. Among the 26 women with a positive HPV test, colposcopy was positive in 5.30%, negative in 9.03%, and not performed in 85.67% because these participants had a negative HPV test. Biopsy was performed in nine participants following colposcopy. The results were as follows: CIN 1, 19.23%; CIN 2, 3.84%; CIN 3, 7.69%; one case of advanced-stage cancer, 3.84%; and negative biopsy performed in 65.40% (Table 1).

Table 1. Results of HPV testing, colposcopy, and biopsy among screened women.

Results	Frequency (N = 321)	Percentage (%)
[1]HPV Test		
Negative	295	91.90
Positive	26	8.10
Colposcopy/IVA + IVL[2]	**Frequency (N = 26)**	**Percentage (%)**
Positive	17	65.40
Negative	9	34.60
Biopsie	**Frequency (N = 26)**	**Percentage (%)**
[3]CIN1	5	19.23
CIN2	1	3.84
CIN3	2	7.69
Advanced stage of cancer	1	3.84
Negative	17	65.40

[1]HPV, [2]IVA/IVL: Visual inspection with acetic acid and Lugol's iodine (VIA/VIL). [3]CIN: Cervical Intraepithelial Neoplasia.

3.2. Socio-Demographic Characteristics of Women Screened Using HPV Testing

The mean age of the participants was 42.52 ± 11.52 years, with a range of 25 - 65 years. The 25 - 34-year age group was the most represented (28.44%), followed by 35 - 44 years (26.88%), 45 - 54 years (27.18%), and 55 - 65 years (17.50%).

Regarding educational level, 34.58% had secondary education, 23.36% primary education, 19.31% higher education, and 22.74% had no formal education.

Most participants were traders (44.55%), followed by salaried workers (14.02%), housewives (7.79%), farmers (6.85%), students (2.80%), health professionals (7.48%), teachers (0.93%), and other occupations (15.58%) (Table 2).

Table 2. Socio-demographic characteristics of women screened using HPV testing at the oueme departmental university hospital center.

	Frequency (N = 321)	Percentage (%)
Age group (years)		
[25 - 34]	91	28.44
[35 - 44]	86	26.88
[45 - 54]	87	27.18
[55 - 65]	56	17 ;50
Education		
No schooling	73	22.74
Primary	75	23.36
Secondary	111	34.58
High school	62	19.31
Marital status		
Married	254	79.13
Never married	36	11.21
Divorced	8	2.49
Widowed	23	7.17

3.3. Obstetric History and Behaviors

Most women were multigravida (80.06%); nulligravida accounted for 11.53%, primigravida for 7.79%, and paucigravida for 0.62%. They were predominantly multiparous (75.70%), followed by nulliparous (15.58%), primiparous (6.23%), and pauciparous (2.49%).

Among the 321 women, 14 were vaccinated against HPV, corresponding to a coverage rate of 4.36%; 3.12% were known to be living with HIV (PLHIV), and 25 (7.79%) had a history of regular gynecological follow-up (Table 3).

Table 3. Obstetric history and behaviors.

	Frequency (N = 321)	Percentage (%)
Age at the first sexual intercourse (years)		
Less than 16	122	38.01
More than 16	163	50.78
Unknown	36	11.21
Gravidity		
Nulligravida[1]	37	11.53
Primigravida[2]	25	7.79
Paucigravida[3]	2	0.62
Multigravida[4]	257	80.06
Parity		
Nulliparous[5]	20	6.23
Primiparous[6]	8	2.49
Pauciparous[7]	243	75.70
Multiparous[8]	50	15.58
PVVIH		
No	311	96.88
Yes	10	3.12
Family history of cancer		
Yes	18	5.61
No	303	94.39
HPV Vaccination		
No	307	95.64
Yes	14	4.36
Previous gynecological follow-up		
No	296	92.21
Yes	25	7.79%

Nulligravida[1]: woman with no previous pregnancies; **Primigravida[2]:** one previous pregnancy; **Paucigravida[3]:** two to three previous pregnancies; **Multigravida[4]:** more than three previous pregnancies. **Nulliparous[5]:** no previous deliveries; **Primiparous[6]:** one previous delivery; **Pauciparous[7]:** two to three previous deliveries; **Multiparous[8]:** woman who has delivered more than four times.

3.4. Therapeutic Management

Women with pathological histological results were treated. Management included six thermocoagulations, two hysterectomies, and one course of chemotherapy.

3.5. Descriptive Analysis of Results

3.5.1. Age Distribution

The study population consisted mainly of adult women. The most represented age groups were 25 - 34 years (28.44%), 45 - 54 years (27.19%), and 35 - 44 years (26.88%), indicating a concentration of participants between 25 and 54 years of age. Women aged 55 - 65 years accounted for 17.50% of the sample. This distribution shows that screening mainly targeted women in the genital and reproductive age period.

3.5.2. Number of Pregnancies

The majority of women were multigravida (79.44%), reflecting high obstetric exposure. Nulligravida women represented 11.53%, primigravida 7.79%, while paucigravida and grand multigravida were minimally represented (0.62% each). This predominance of multigravida women may be related to age and the sociocultural context of the study population.

3.5.3. Parity

Multiparous women accounted for 75.70% of the sample, followed by nulliparous (15.58%) and primiparous women (6.23%). Pauciparous women represented 2.49%. These results confirm a population largely composed of women with multiple deliveries, which may influence attendance at gynecological health facilities.

3.5.4. Educational Level

Secondary education was the most common level (34.58%). Women with no formal education accounted for 22.74%, those with primary education 23.36%, while 19.31% had higher education. This distribution shows educational diversity, with a substantial proportion of women having low or no education.

3.5.5. Occupation

Traders were the most represented group (44.55%), followed by women in other occupations (15.58%) and salaried workers (14.02%). Health professionals accounted for 7.48%, housewives 7.79%, farmers 6.85%, students 2.80%, and teachers 0.93%. The predominance of the informal sector reflects the socioeconomic profile of the population.

3.5.6. HIV Status

Most participants were HIV-negative (96.88%). People living with HIV represented 3.12% of the sample, indicating a low proportion of HIV/HPV co-infection.

3.5.7. HPV Test Results

Among the 321 women screened, 281 had a negative HPV test, while 26 tested positive, indicating a relatively low prevalence of HPV infection in the study population.

3.5.8. HPV Vaccination

Of the 321 women, 14 were vaccinated against HPV, corresponding to a vaccina-

tion coverage of 4.36%, indicating very low uptake. Notably, all vaccinated women had a negative HPV test, appears to be a protective effect of vaccination in this population.

3.5.9. Colposcopy

Among the 26 HPV-positive women, colposcopy combined with VIA/VILI was positive in 65.4%, indicating a strong concordance between HPV test positivity and the presence of visible cervical lesions. However, 34.6% of HPV-positive women had a negative colposcopy, suggesting either transient infections or subclinical lesions not detectable by visual examination.

3.5.10. Biopsy and Histopathological Results

Among the biopsies performed, lesions were mainly CIN 1 (19.23%), followed by CIN 3 (7.68%), CIN 2 (3.84%), and one case of advanced-stage cervical cancer (3.83%). These results show a low but present proportion of precancerous and cancerous lesions, highlighting the importance of screening.

3.5.11. Gynecological Follow-Up

Only 25 women benefited from regular gynecological follow-up, representing 7.79% of the sample, indicating a low rate of preventive consultations.

3.5.12. Therapeutic Management

Regarding treatment, six patients underwent thermocoagulation, two underwent hysterectomy, and two received chemotherapy, reflecting management adapted to lesion severity.

4. Discussion

4.1. Prevalence of Human Papillomavirus (HPV) Infection

The observed prevalence of HPV infection was approximately 8.1% (26/321). This prevalence is lower than that reported in many African studies, where overall prevalence varies widely depending on populations and methods (approximately 10% - 50% depending on studies and the presence or absence of STI/HIV). Several recent meta-analyses and reviews show marked heterogeneity but often report prevalences above 10% in the general female population of sub-Saharan Africa [5]-[7]. The relatively low prevalence may be explained by the selection of the study population, possibly representing women presenting for opportunistic screening, thus yielding a hospital-based rather than a general population prevalence.

4.2. Sociodemographic Characteristics and Risk Factors

The age distribution, dominated by women aged 25 - 54 years, corresponds to an age range in which some HPV infections may already have been spontaneously cleared, potentially contributing to a lower prevalence. The study population consisted mainly of women of reproductive age, multigravida and multiparous. This observation is consistent with studies by Mengistie *et al.* and Magagi *et al.*, show-

ing that multiparity and high gravidity are frequently associated with prolonged exposure to cervical cancer risk factors, particularly persistent HPV infection [6] [8].

The low educational level observed in nearly half of the participants (none or primary) is a recognized unfavorable factor in the literature, negatively influencing knowledge of cervical cancer, screening uptake, and gynecological follow-up [9] [10]. The predominance of women working in the informal sector, particularly traders, reflects a modest socioeconomic level likely to limit access to preventive care.

Furthermore, early age at first sexual intercourse, observed in more than one-third of participants, is a well-established risk factor for persistent HPV infection and the development of cervical lesions [3] [5].

4.3. Vaccination Coverage: HPV Vaccination

HPV vaccination coverage in this study was extremely low (4.36%). This finding is consistent with data reported by the WHO, Bruni *et al.*, and Okunade *et al.*, showing that most African countries have not yet achieved satisfactory vaccination coverage despite gradual vaccine introduction into national programs [9] [10]. Notably, all vaccinated women had a negative HPV test, seems to be a protective effect of vaccination even in a low-coverage context. Although limited by the small sample size, this observation reinforces existing evidence on the effectiveness of HPV vaccination against oncogenic genotypes [1] [3]. These results highlight the urgent need to strengthen vaccination strategies, particularly through school-based and community campaigns adapted to the local sociocultural context.

4.4. Performance of the 3T Strategy: HPV Testing, Colposcopy, and Histology

The 3T approach (Test-Triage-Treat) enabled the identification of women at risk and histological confirmation of precancerous and cancerous lesions. The presence of precancerous lesions and an invasive cancer confirms that HPV infection remains a major public health issue requiring systematic and organized screening.

4.5. Prevalence of Precancerous Lesions and Invasive Cancer

The detection of CIN 1, CIN 2, CIN 3 lesions and one case of advanced-stage cervical cancer, although infrequent, is clinically significant. In sub-Saharan Africa, studies show wide variability in the prevalence of precancerous lesions, often higher in targeted screening programs or among women living with HIV [6]-[8]. The presence of advanced-stage invasive cancer in this study illustrates the still frequent diagnostic delay in these settings and confirms the need for early and regular screening [11]-[13].

4.6. Therapeutic Management

Therapeutic management in this study was consistent with recommendations

adapted to low-resource settings. Thermocoagulation, performed in most treated patients, is now recognized as an effective, safe, and acceptable method in screen-and-treat strategies [12]-[14]. Hysterectomy and chemotherapy were reserved for more advanced cases, consistent with international recommendations and practices reported in African literature [14], showing that in the absence of widespread screening, some cancers are diagnosed at an advanced stage requiring radical treatment.

4.7. Gynecological Follow-Up and Adherence

The low rate of regular gynecological follow-up (7.79%) constitutes a major barrier to screening effectiveness. Studies by Mengistie *et al.* and Destaw *et al.* report similar rates, attributed to financial, geographical, organizational, and informational barriers [6] [15]. Innovative strategies such as HPV self-sampling, patient navigation, and immediate on-site treatment have shown significant improvement in follow-up adherence in comparable settings [6].

5. Conclusion

This study confirms the value of HPV testing as a cervical cancer screening tool, enabling early identification of women at increased risk. Vaccination appears to play a protective role because those vaccinated have negative test results for HPV, but the sample size of vaccinated women (n = 14) is too small to establish statistical significance. It also emphasizes the need to improve screening coverage and follow-up of positive cases to reduce cervical cancer incidence and mortality. HPV-based screening, complemented by VIA/VIL and colposcopy, is an effective strategy for identifying women at risk of cervical cancer.

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Contributions and Implications of the Study

This study provides original local data on the integrated application of the 3T approach at the Oueme Departmental University Hospital Center in Benin. It highlights:

- The feasibility of HPV test-based screening,
- The relevance of screen-and-treat strategies
- Vaccination appears to play a protective role, but the sample size of vaccinated women is too small to establish statistical significance

Ethical Considerations

The study was approved by the Institutional Ethics Committee.

Conflicts of Interest

None declared.

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