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Prevalence and Factors Associated with Genital Infections in Pregnancy at the Ebolowa Regional Hospital Center

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Abstract

Genital infections are a major public health problem affecting millions of women worldwide. This study aimed to determine the prevalence of genital infections and associated factors among women consulting for infection at the Ebolowa Regional Hospital Center. **Methodology:** This was a descriptive cross-sectional study with an analytical component conducted between January and August 2025 in the gynaecology department of this institution. Our study included all pregnant patients who attended the obstetrics outpatient clinic and for whom a genital infection assessment had been requested. Sociodemographic, clinical and paraclinical data were collected using an anonymous questionnaire, which had been previously tested and validated, and then analysed using Microsoft Excel and SPSS version 25.0 software. **Results:** During our study, we recruited 300 patients who had undergone genital infection screening during pregnancy. Among these patients, the prevalence of genital infections was 77% (231/300). The most common infection was bacterial vaginosis (30%; 90/300), followed by vulvovaginal candidiasis (21.21%; 63/300) and Chlamydia trachomatis infection (21%; 62/300). Marital status (single, p = 0.0001), primary education level (p = 0.0032) and history of genital infections (p = 0.02) significantly influenced the occurrence of these infections.In a multivariate analysis, being a single woman (AOR = 4.5; CI [1.02 - 10.51], p = 0.005) and having a primary school education (AOR = 3.6; CI [2.30 - 8.23],

p = 0.01) were independent risk factors for genital infection during pregnancy. **Conclusion:** Genital infections during pregnancy remain predominant at the Ebolowa Regional Hospital Center, and vaginal candidiasis is the most frequent cause. These results raise the interest of future studies on the evaluation of the impact of genital infections on the maternal-foetal prognosis.

Keywords

Prevalence, Associated Factors, Genital Infections, Pregnancy, Ebolowa

1. Introduction

Genital infections refer to all infections affecting the female reproductive organs, namely the vagina, uterus, fallopian tubes and ovaries [1]. There are two types of genital infections: lower genital infections, which include conditions such as vulvitis, vaginitis and cervicitis, most commonly caused by Chlamydia trachomatis, Neisseria gonorrhoeae, Trichomonas vaginalis, Candida albicans and Gardnerella vaginalis; and upper genital tract infections, which include more serious conditions such as endometritis, salpingitis and pelvic inflammatory disease, which can be caused by sexually transmitted infections. These infections can lead to serious complications, including infertility, chronic pain and an increased risk of HIV transmission [1]-[3].

According to the World Health Organisation (WHO), every day more than one million people aged between 15 and 49 contract a sexually transmitted infection (STI): chlamydia, gonorrhoea, syphilis or trichomoniasis. These infections have consequences for sexual and reproductive health through stigmatisation, infertility, cancer and pregnancy complications, and they can increase the risk of contracting HIV [2].

Genital infections during pregnancy are a significant public health issue due to their potential consequences for maternal and foetal health. These infections can lead to complications such as spontaneous abortions, prematurity, neonatal infections and adverse outcomes for the mother and newborn. Despite their significant impact, these infections during pregnancy remain underdiagnosed and undertreated in Africa due to stigma, lack of access to healthcare during pregnancy, and low awareness of these issues. These infections are common during pregnancy due to changes in the vaginal flora during pregnancy and reduced maternal immunity [1].

Worldwide, the prevalence of these infections varies from one study to another. According to the WHO, in 2020 in developed countries, the most common causes of genital infections during pregnancy were bacterial vaginosis (15 - 20%), vulvovaginal candidiasis (10 - 20%), and Chlamydia trachomatis infection (3 - 5%). In contrast, in developing countries, the prevalence of these infections was higher (bacterial vaginosis (30 - 40%), vulvovaginal candidiasis (20 - 30%), and Chlamydia trachomatis infection (10 - 15%)) [2].

Numerous African studies have highlighted a high prevalence of vulvovaginal

candidiasis (57 - 68%), bacterial vaginosis (15 - 50%) and Chlamydia trachomatis infection among pregnant women [4]-[8]. Systematic screening for group B haemolytic Streptococcus at 34 weeks of pregnancy is recommended but unfortunately not carried out, exposing women to an increased risk of neonatal infection [9]. The risk factors identified for genital infections during pregnancy in several studies are multiple and include sociodemographic factors (age, marital status, level of education) and clinical factors (history of genital infections, multiple sexual partners, immunodepression, etc.) [10]-[20].

In Cameroon, few studies have been conducted on the prevalence and profile of genital infections during pregnancy [4] [16] [18]. A study published by Kamga *et al* in Kumba in 2019 highlighted a high prevalence of bacterial vaginosis among pregnant women monitored at the Kumba district hospital [16]. Given the high number of patients attending the obstetrics department of the Ebolowa Regional Hospital Centre (CHRE), a referral hospital located in an area with a high prevalence of genital infections according to Cameroon's 2021 demographic health survey, we set ourselves the objectives of determining the prevalence and factors associated with genital infections during pregnancy in this hospital.

2. Methodology

The study was conducted in the gynaecology department of the Ebolowa Regional Hospital. We chose this location because of the large number of women who attend consultations there. Data collection took place over a period from 15 January to 15 August 2025. This was a cross-sectional, descriptive study with an analytical component. The sampling technique was consecutive and non-probabilistic.

All patients seen for suspected genital infection in the outpatient gynaecology department of the Ebolowa Regional Hospital Centre from 15 June to 15 August 2025 included all patients seen at the gynaecology department of the Ebolowa Regional Hospital Centre who had undergone a genital infection assessment and had given their informed consent. All patients who did not wish to participate in the study were excluded.

Data collection was carried out using a structured individual questionnaire covering:

- Demographic data (age, marital status, level of education, area of residence, medical history).
- Medical and social history (pregnancy, parity, contraceptive use, age at first sexual intercourse, number of sexual partners, history of genital infections, use of intimate gel, etc.).
- Results of paraclinical tests (PCV and antibiogram, Chlamydia serology, Chlamydia PCR, Mycoplasma testing, TPHA/VDRL, etc.)

Data collection was carried out daily by a trained investigator using a pre-established and tested questionnaire. During gynaecological outpatient consultations, all patients who had requested an infectious disease assessment were interviewed by the investigator, who was able to collect sociodemographic and clinical

data. After this interview, the patients were then directed to the laboratory where three vaginal samples were taken, the first being processed as a wet mount and KOH test, and the other two for Gram staining and culture.

The diagnosis of candidiasis was made by applying 20% KOH and viewing the hyphae or pseudohyphae under a microscope, and this was confirmed by the culture results.

Bacterial vaginosis was confirmed by Gram staining using the Nugent score, with a value between 7 and 10 indicating a positive result.

Trichomoniasis was investigated on wet smears showing motile flagellated trichomonas. Other bacteriological tests were performed in accordance with standard laboratory procedures.

For the diagnosis of Chlamydia trachomatis, endocervical swabs were collected during a vaginal speculum examination, and the swabs analyzed with the use of some liquid-based cervical cytologic testing platforms.

Syphilis infection was screened on blood samples by using the syphilis antibody test and gonorrhoea was detected by gram stained microscopy.

The paraclinical data were then retrieved from the laboratory records by the investigator.

This study was conducted in strict compliance with patient anonymity. We also guaranteed the confidentiality of the information provided to us in the examination forms. This information has been used solely for the purposes of the study.

The collected data were checked for completeness, inserted into Microsoft Excel and exported to SPSS version 28.0 for analysis. Statistical significant association at the bivariate analysis were put in a multiple regression model to adjust for any possible confounders and results presented in the form of Tables, pie charts and graphs. Pearson's χ^2 test was used to compare the prevalence of hepatitis in different groups. Our confidence interval was set at 95% for a significance threshold of $p < 0.05$. Adjusted Odds Ratio (AOR) with 95% confidence interval (CI) was used as a measure of association.

3. Results

A total of 315 women agreed to complete our questionnaire. However, 15 of them were excluded due to incomplete data. We therefore compiled data from 300 women, representing 86.95% of those who agreed to participate. The average age was 29.78 ± 3.25 years, ranging from 17 to 43 years. The 21 - 30 age group was the most represented, accounting for 50% (150/300) of the sample. Among the 300 women selected, there was a predominance of those with higher education (59%; 177/300), and the majority were single (75%; 225/300) (see Table 1).

Table 1. Sociodemographic characteristics of pregnant women screened for genital tract infections at the Ebolowa Regional Health Center.

Characteristics of women	
Mean age (years)	29.78 ± 3.25
Marital status, n (%)	

Continued

Maried	74 (24.6)
Single	225 (75.0)
Widow	1 (0.33)
Residence, n (%)	
Urban	198 (66.0)
Rural	102 (34.0)
Level of education, n (%)	
No education	14 (14.0)
Primary	41 (26.5)
Secondary	68 (22.6)
University	177 (59)
Age group, n (%)	
≤ 20	23 (7.7)
21 - 30	150 (50)
31 - 40	100 (33.3)
41 - 45	27 (9.0)
Profession, n (%)	
Unemployed	67 (22.3)
Private sector	103 (34.3)
Public sector	130 (43.4)

Considering their clinical characteristics, most of our patients were primigravida (40%; 120/300) seen in the first trimester of pregnancy (44.4%; 133/300). Sixty seven percent were asymptomatic. Their average number of sexual partners was 4.02 ± 1.70 with a mean age at first intercourse of 17 ± 2.0. Most declared havens had just one partner during the last 6 months (54%; 162/300), with no protection during their last intercourse (75%; 225/300). The use of condom was seldom as 71.3% of our studied population had never used or used at times a condom during sex. Patients were not proned to vaginal douching (23%; 99/300) and the introduction of objects or products per vaginally (20%; 60/300). (see Table 2)

The overall prevalence of genital infections was 77% (231/300). Among these patients, 33% were symptomatic and 67% had no signs or symptoms of the disease discovered during paraclinical examinations. (see Table 2)

Table 2. Clinical characteristics of pregnant women screened for genital tract infections at the Ebolowa Regional Health Center.

Characteristics of women	
Average number of pregnancies	2.01 ± 1.09
Gravidity, n (%)	
Primigravida	120 (40.0)
Paucigravida	80 (26.7)
Multigravida	100 (33.3)
Gestational age, n (%)	
First trimester	133 (44.4)
Second trimester	100 (33.3)
Third trimester	67 (22.3)
Symptoms of genital tract infections	

Continued

Symptomatic	99 (33.0)
Asymptomatic	201 (67.0)
Average number of sexual partners	4.02 ± 1.70
Number of sexual partners during the last six months, n (%)	
None	98 (33.0)
1	162 (54.0)
At least 2	40 (13.0)
Mean age at first sexual intercourse (years)	17.0 ± 2.00
Objects or products introduced vaginaly, n (%)	
NO	240 (80.0)
Yes	60 (20.0)
Protection last sexual intercourse, n (%)	
No	225 (75.0)
Yes	75 (25.0)
Usage of condoms, n (%)	
Never	64 (21.3)
At times	150 (50.0)
Always	86 (29.7)
Use of vaginal cleansing products	
Yes	99 (23.0)
No	201 (67.0)

Detected in 30% of the 300 patients tested, bacterial vaginosis was the most common infection, followed by Candida albicans candidiasis and Chlamydia trachomatis infection (21%; 63/300). Four percent (12/300) of our patients had syphilis during pregnancy and 2% (6/300) had Neisseria gonorrhoea infection. In our study, the rate of genital co-infection was 20.5% (61/300), with Gardnerella vaginalis/Candida albicans co-infection being the most common (19%; 57/300). Other bacteria found were Group B Streptococcus and Escherichia coli (See Table 3).

Table 3. Microorganisms responsible of genital tract infections among pregnant women followed at the ERHC.

INFECTIONS	Frequency (%) N = 300	95% CI
Gardnerella vaginalis	90 (30)	[43.10 - 108.84]
Candida albicans	63 (21.2)	[32.91 - 88.38]
Mycoplasma hominis	5 (1.6)	[0.44 - 6.01]
Trichomonas vaginalis	4 (1.3)	[0.08 - 5.08]
Chlamydia trachomatis	62 (21)	[23.10 - 94.00]
Neisseria gonorhoeae	6 (2.0)	[1.10 - 8.84]
Treponema pallidum	12 (4.0)	[6.10 - 16.11]
Streptococcus agalactiae	5 (1.6)	[3.00 - 5.04]
Co iinfection	61 (20.5)	[13.10 - 50.84]

In a univariate analysis investigating factors associated with genital infections, the age group [20 - 30] years (OR: 2.3, p = 0.035), single marital status (OR: 7.6 p = 0.0001), primary education level (OR: 4.2 p = 0.0032) and history of genital infections (OR: ¬6.2 p = 0.02) significantly influenced the occurrence of these infections. Women whose score was between [0 - 2], age at first sexual intercourse be-

tween [14 - 18] years, and cumulative number of partners between [1 - 5] were the most representative among patients with genital infection during pregnancy, but these findings were not statistically significant. (See Table 4)

Multivariate analysis revealed that being a single woman (AOR = 4.5; CI [1.02 - 10.51], p = 0.005) and having a primary school education (AOR = 3.6; CI [2.30 - 8.23], p = 0.01) were independent risk factors for genital infection during pregnancy. (See Table 4)

Table 4. Descriptive analysis and logistic regression of risk factors associated with genital tract infections among pregnant women at the ETHC.

	Descriptive analysis			**Logistic regression analysis**			
	Chi-square			**Univariate**		**Multivariate**	
	Positive N = -69	**Negative N = 231**	**p-value**	**OR (95% CI)**	**p-Value**	**a OR (95% CI)**	**p-Value**
Characteristics	n (%)	n (%)					
Age brackets							
[≤20]	6(8.7)	17 (7.4)		1		1	
[21 - 30]	30 (43.5)	120 (52.1)	0.26	2.50 (0.13 - 5.673)	0.33	1.40 (0.86 - 7.21)	0.64
[31 - 40]	16(23.2)	84(36.3)		1.02 (0.63 - 4.00)	0.10	1.01 (0.21 - 6.41)	0.33
[41 - 45]	17(24.6)	10 (4.3)		0.27 (0.11 - 2.10)	0.51	0.45(0.13 - 3.66)	0.41
Objects or Products_introduced_vaginaly			0.66				
No	50 (72.4)	190(82.3)		1		1	
Yes	19 (27.5)	41(17.7)		0.56 (0.21 - 3.20)	0.08	0.66 (0.38 - 4.01)	0.27
Use of vagina cleansing products			0.33				
No	49 (71.1)	161 (65.8)		1		1	
Yes	20 (28.9)	79 (34.2)		1.06 (0.01 - 3.66)	0.11	1.08 (0.2 - 2.67)	0.09
Marital status							
Married	43(62.3)	31(13.4)	**0.01**	0.31 (0.15 - 8.01)		0.33 (0.05 - 9.11)	
Single	25 (36.3)	200 (86.6)		6.02 (0.55 - 13.01)	**0.0001****	3.0 (0.68 - 21.02)	**0.005**
Widow	1(1.4)	0(0)		1.02 (0.17 - 7.08)	0.55	1.07 (0.90 - 9.00)	0.68
Past history of genital tract infection			**0.05**				
No	49 (71.0)	90(39.0)		0.14 (0.06 - 5.00)		1	
Yes	20 (29.0)	141 (61.0)		4.55 (0.35 - 11.13)	**0.02***	2.03 (0.49 - 18.28)	0.77
Use _of_condoms							
Never	29 (42.0)	35 (15.2)	0.53	1		1	
At times	20 (29.0)	130 (56.3)		2.09 (0.33 - 33.60)	0.19	1.05 (0.22 - 1.55)	0.21
Always	20(29.0)	66(28.5)		1		1	
Number of sexual partners during the last 6 months			0.31				
≤ 1	64 (92.7)	196 (84.8)		1		1	
>1	5 (7.3)	35 (15.2)		0.42 (1.05 - 12.41)	0.35	0.14 (0.05 - 5.55)	0.47
Level of education							
No education	3(4.3)	11(4.8)					
Primary	2(2.9)	39(16.8)	**0.012**	6.60 (0.88 - 9.41)	**0.0032***	5.02 (2.30 - 12.09)	**0.01**
Secondary	24(34.8)	44 (19.0)		0.23 (0.14 - 1.28)	0.73	0.55 (0.10 - 9.87)	0.32
University	40(58.0)	137(59.3)		1.95 (0.02 - 4.24)	0.21	1.03 (0.07 - 7.91)	0.33

4. Discussion

4.1. Prevalence of Genital Infections

The results of our study on the prevalence of genital infections in pregnant women show an alarming trend that requires special attention. With an overall prevalence of 77%, genital infections are a significant public health problem among pregnant women in our context. This rate is higher than in other studies, such as those by Konadu *et al.* in Ghana [7] and Ndeye *et al.* in Ethiopia [5], which reported a prevalence of 56.4% and 59.1% of genital infections among pregnant women. Nevertheless, our results are similar to those obtained by Katawa *et al.* [12] and Nsagha *et al.* [10] on the prevalence of genital infections in a population of pregnant and non-pregnant women. In one of these studies, the prevalence of genital infections was lower in pregnancy, probably due to educational talks during pregnancy in which rules of intimate hygiene are reiterated. Differences in study type, population, sample size, environmental factors, socioeconomic status and behaviour could explain the disparities observed from one study to the other.

The high prevalence in our case could be linked to ineffective health education during antenatal visits, where the consequences of these infections (preterm labour, premature rupture of membranes and neonatal infections) are probably not highlighted to pregnant women. Our population type could also explain this high prevalence for most participants were primigravidas consulting during the first trimester of pregnancy and hence had not participated in educational talks on intimate hygiene during pregnancy. In the same line 75% of our participants declared that their last sexual intercourse was not protected increasing the risk of genital infections as stipulated by Sethi *et al.* [6]. Nevertheless, contrary to several authors [12] [16] the rate of vaginal douching was low and this might be linked to the high level of education of our participants increasing their access and comprehension of informations linked to the risk of vaginal douching.

The majority of our participants were asymptomatic (67%) in line with several authors that concluded that most genital tract infections in pregnancy are discovered during routine antenatal screenings [12] [18] [19] [21].

4.2. The Most Common Types of Infections

Bacterial vaginosis was the most common infection in our study, identified in 30% of participants, followed by candidiasis and Chlamydia trachomatis infection. These results are consistent with those of other studies [9] [10] [12] [16], which have shown that bacterial vaginosis is a common infection in pregnant women, characterised by an imbalance in the normal vaginal flora. However, some authors have found a predominance of vulvovaginal candidiasis among pregnant women with symptomatic or asymptomatic genital infections [5] [7] [20]. This fungal infection is quite common in pregnant women due to hormonal changes that promote the growth of Candida albicans. Bacterial vaginosis is becoming increasingly common among lower genital infections in women. The excessive use of intimate gels and a lack of education on intimate hygiene may explain this fact, as demon-

strated by the relatively high rate of intimate gel use in our study. Chemicals in soap may adversely affect harmless friendly bacteria in the genitalia, thus favouring the proliferation of BV pathogens.

With regard to Chlamydia infections, our study revealed rates of around 21%, which is also in line with the results of Caiyan *et al*. [16], who found comparable rates in a study conducted in China. The prevalence of syphilis among our patients was 4%, which is a cause for concern given the risks of mother-to-foetus transmission and the potential impact on foetal development nevertheless a higher prevalence of Syphilis infection in pregnancy(30%) was found in india by Rasingh *et al*. in 2022 [22]. Sexually transmitted infections (STIs), such as syphilis and Chlamydia trachomatis, pose a significant threat to the reproductive health of pregnant women.

The rate of genital co-infection among our patients was 20.5%, which is similar to the findings of Ndeye *et al*., who found that 24.8% of pregnant women had mixed genital infections and 13.8% had genital co-infections in a study conducted in Senegal in 2024. The most common co-infection identified in both studies was Candida albicans/Gardnerella vaginalis. This highlights the complexity of managing genital infections in pregnant women. Co-infections can exacerbate the symptoms and consequences of individual infections, complicating diagnosis and treatment.

4.3. Factors Associated with Infections

The factors associated with genital infections in our patients such as age group (21 - 30 years), marital status (single), level of education (primary), and history of genital infections, are consistent with the results of other studies [11] [12]. In pregnant women with genital infections, the age at which they first had sexual intercourse (between 14 and 18 years) and the number of sexual partners (between 1 and 5) were statistically significant risk factors.

The age group most affected by genital infections during pregnancy was 21 - 30 years, as reported by Sethi *et al*. [6], and this age group is characterised by high promiscuity, exposing them to various types of genital infection. However, a study by Ranjit *et al*. found a fairly high prevalence of genital infections in the 30 - 40 age group among non-pregnant women in India. [24]

In our study, single women had a higher prevalence of genital infection. This finding is supported by studies conducted by Glehn *et al*. [12] and Ranjit *et al*. [24], who also noted that unmarried individuals engage in riskier sexual behaviour, making them more susceptible to genital infections. However, other authors have obtained contradictory results, highlighting a high prevalence of genital infections among married women and suggesting that partner promiscuity and frequent sexual intercourse could be the cause[16].

Moreso, having a primary education level was found to be a statistically significant risk factor for genital infection during pregnancy, contradicting the conclusions of Nsagha *et al*. and Chaudhary *et al*., who stated that a higher level of edu-

cation increases this prevalence because it was linked to high rates of vagina douching [10] [21]. However, Kamga *et al*. in Cameroon obtained similar results to ours [16]. Primary education may be associated with limited understanding of intimate hygiene linked councelling, limited access to modern IT tools for advice on intimate hygiene and a relatively high poverty rate, which can prevent good hygiene practices and recourse to antenatal care.

Having one to five sexual partners was also found to influence the occurrence of genital infections during pregnancy, consistent with the findings of Katawa *et al*. in Togo in 2021 [12] and Sethi *et al*. in a systematic review of genital infections during pregnancy [6]. The modern literature agrees that sexual promiscuity is a well-established risk factor for genital infections, and that education on responsible sexuality during pregnancy reduces the risk of primary sexual infection and adverse obstetric and neonatal outcomes [15].

As described by Kamga *et al*., primiparas were found to be at a higher risk of developing genital infections than multiparas; however, this observation was not statistically significant [16]. This underlines the importance of providing educational talks on intimate hygiene during antenatal appointments, since multiparous women, having experienced several previous pregnancies, have likely received more prenatal advice on this topic.

In our study, unlike several other studies, we found no statistically significant difference in terms of condom use and douching between women with and without genital infections during pregnancy.

Finally, a multivariate analysis aimed at identifying independent associated factors for genital infections during pregnancy revealed that being single and having a low level of education were associated with an increased risk of infection. These findings emphasise the importance of raising awareness and educating young women, particularly those who are single and have a low level of education, about safe sexual practices and reproductive health.

5. Limitations of the Study

The study was conducted at a point in time hence rendering causal association impossible.

The study was a hospital based study which may not be generalizable to the entire population.

The single-center study design and the use of a non-probabilistic sampling method are major limits as both could affect the generalizability of the findings.

6. Conclusion

This study, conducted at the Ebolowa Regional Hospital Centre, found that genital infections in pregnant women are very common, with a fairly high prevalence and several associated factors, as described in the literature. Bacterial vaginosis was found to be the most common infection, with young women with a low level of education being the most at risk. These results highlight the importance of sys-

tematic screening for genital infections and the need for improved sex education during pregnancy. It is also crucial to intensify awareness and prevention programmes, particularly among young people. Further research into the obstetric outcomes of women with genital infections and their newborns is imperative.

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Ethical Approval

This study was approved by the ERHC ethic committee. Informed consent was obtained from all participants prior to data collection. The study was conducted in accordance with the declaration of Helsinki and Good Clinical Practice guidelines

Authors' Contribution

- **Data design and acquisition:** Messakop M.Y, Makemgue LS, Bilo'o L;
- **Data analysis and interpretation:** Messakop M.Y, Biloa L, Mboua N.V, Bisay S.U, Bilo'o L, Atangana E.H, Elah N.C**,** Ndoumba A, Aboui F;
- **Editing of the article:** Messakop M.Y**,** Makemgue LS, Lendem I;
- **Critical review of intellectual content**: Makemgue LS, Bengono R, Foumane P, Ekono G.M.

Conflicts of Interest

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

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