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Factors associated with infertility in women less than 25 years

Facteurs associés à l'infertilité chez les femmes de moins de 25 ans

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Original Article

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ABSTRACT

Background: Infertility among women at peak reproductive potential, is a growing concern in resource-limited settings. Preventable causes like untreated sexually transmitted infections (STIs), unsafe abortions, and postpartum infections are common. This study examined factors associated with infertility in young women in Yaoundé.

Methodology: We conducted a retrospective case–control study of 150 women aged 21–25 years from two referral hospitals between 1st January and 31st December 2021. Cases: women consulting for infertility (n = 75) and controls: postpartum women matched by age (n = 75). Data were analyzed using Chi-square/Fisher's exact tests and multivariate logistic regression. Adjusted odds ratios (AOR) with 95% confidence intervals (CI) were calculated; significance was $p < 0.05$.

Results: Primary infertility accounted for 81.3% of cases. Leading causes included genital tract infections (47.5%), tubal obstruction/adhesions (22.0%), and polycystic ovary syndrome (11.9%). Independent predictors of infertility were being in union (AOR 8.08, 95% CI 2.34–27.94), unemployment (AOR 67.21, 95% CI 3.76–1201.49), precocious menarche (AOR 9.30, 95% CI 1.03–83.86), history of STI (AOR 8.52, 95% CI 1.56–46.58), obesity (AOR 64.85, 95% CI 4.41–953.59), and alcohol use (AOR 45.41, 95% CI 8.79–234.76). Secondary education was protective (AOR 0.14, 95% CI 0.03–1.06). Financial barriers prevented diagnostic evaluation in 21.3% of cases.

Conclusion: Infertility is strongly linked to preventable and modifiable factors. Interventions focused on STI prevention, lifestyle modification, reproductive health education, and reducing financial barriers are essential to mitigate this burden.

RESUME

Contexte : L'infertilité chez les jeunes femmes est une préoccupation majeure. . Les infections sexuellement transmissibles (IST) non traitées, les avortements à risque et les infections post-partum sont fréquents. Le but de cette étude était d'examiner les facteurs associés à l'infertilité chez les jeunes femmes à Yaoundé.

Méthodologie : une étude cas-témoins rétrospective a été menée auprès de 150 femmes âgées de 21 à 25 ans dans deux hôpitaux entre janvier et décembre 2021. Les cas étaient des femmes consultant pour infertilité (n = 75) et les témoins des femmes en post-partum appariées par âge (n = 75). Les données ont été analysées par tests du chi carré ou exact de Fisher et régression logistique multivariée. Le ratio comparatif ajusté (RCA) et l'intervalle de confiance (IC) à 95 % ont été calculés avec $p < 0,05$.

Résultats : L'infertilité primaire représentait 81,3 % des cas. Les principales causes étaient les infections génitales (47,5 %), les adhérences tubaires (22,0 %) et le syndrome des ovaires polykystiques (SOPK) (11,9 %). Les facteurs prédictifs incluaient la vie en couple (RCA 8,08), le chômage (RCA 67,21), la ménarche précoce (RCA 9,30), les IST (RCA 8,52), l'obésité (RCA 64,85) et l'alcool (RCA 45,41).

Conclusion : L'infertilité chez les jeunes femmes est liée à des facteurs modifiables. Les stratégies de prévention des IST, l'éducation reproductive sont essentielles pour en réduire le fardeau.

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Introduction

Infertility, defined as the inability to achieve pregnancy after 12 months of regular unprotected intercourse (or 6 months in women over 35), is a growing concern among women under 25 years—a demographic traditionally considered to be at peak reproductive potential. Although infertility affects about one in six people worldwide, recent evidence shows a rising trend across all age groups, including younger women (1).

According to the World Health Organization (WHO), infertility affects approximately 17.5% of the global adult population, with similar rates across high-, middle-, and low-income countries (2). In France, infertility prevalence is estimated at 15.6%, with rates among women aged 18–29 ranging from 7% to 13% (3). A 2021 study in Iran reported a prevalence of 7.88%, which is 1.3 to 1.9 times higher than previous national estimates (4). In Nigeria, Adegbola et al. found an infertility incidence of 26.8% among gynecological consultations (5). In Cameroon, Egbe et al. found a prevalence of 19.2%, with 46.4% of affected women aged 20–29 (6).

In resource-rich settings, subfertility in young women is often linked to lifestyle factors such as obesity, delayed childbearing, and polycystic ovary syndrome (PCOS), with access to advanced diagnostic and treatment options like assisted reproductive technologies (ART). However, despite technological advances, rising rates of emotional distress and delayed fertility awareness persist among young women that setting (7).

Conversely, in resource-poor settings, subfertility is frequently driven by preventable causes such as untreated sexually transmitted infections, unsafe abortions, and postpartum infections (8). In Cameroon, Egbe et al. found that the factors that independently increased the risk of infertility in logistic models for women were a history of reproductive tract infection/STI, uterine fibroids, dysmenorrhea, and induced abortion (6). These regions also face significant barriers to care, including limited access to fertility services, high out-of-pocket costs, and pervasive social stigma (1). In many low- and middle-income countries (LMICs), traditional beliefs and lack of reproductive health education further compound the issue, often leading women to seek informal or traditional remedies (1).

As the global burden of female infertility continues to rise—with over **110 million women affected in 2021 alone (9)—understanding the unique challenges faced by younger women, especially in underserved populations, is critical for shaping effective public health strategies and improving reproductive outcomes.

Methods

A retrospective case-control study using medical records, conducted at two referral hospitals in Yaoundé: University Teaching Hospital Yaoundé (CHUY) and Yaoundé Gynecology, Obstetrics, and Pediatrics Hospital (HGOPY). We recruited patients from February to May 2022. Our cases were complete records of women aged 21–25 consulting for infertility, and controls were complete records of women aged 21–25 in immediate postpartum. We excluded records of women <21 or >25 years, or incomplete files. We matched cases and controls by age (±1 year). Genital tract infection was defined based on patient-reported history of sexually transmitted infection. Tubal obstruction or adhesions were identified by hysterosalpingography and/or laparoscopic exploration. Data were processed using IBM SPSS Statistics version 23.0. Categorical variables were summarized as frequencies and percentages. To identify factors associated with infertility, we performed univariate analysis using the Chi-square test or Fisher's exact test, followed by multivariate analysis using binary logistic regression. Associations were measured using odds ratios (OR) with 95% confidence intervals (CI). A p-value < 0.05 was considered statistically significant.

Results

Distribution of female infertility

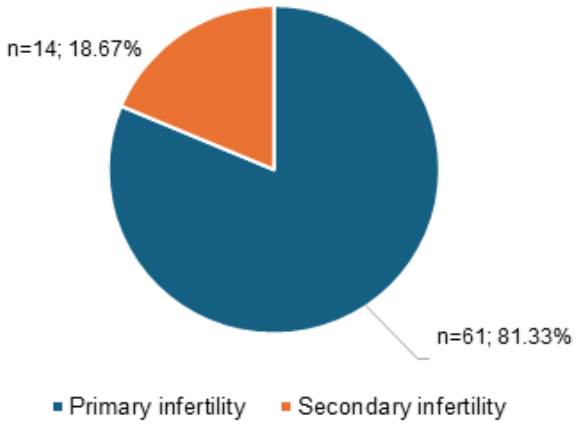

Figure 1. distribution of female infertility

Figure 1 above shows that the most common type of infertility among women under 25 was primary infertility, accounting for 81.3% of cases.

In our study subjects, sixteen patients, or 21.3% of cases, were undiagnosed due to financial constraints resulting in their inability to perform diagnostic examinations. Figure 2 below shows the distribution of causes of female infertility of study participants. The three main causes of female infertility were genital tract infections (47.5%), tubal obstruction/pelvic adhesions (22.0%), and PCOS (11.9%) (Figure 2).

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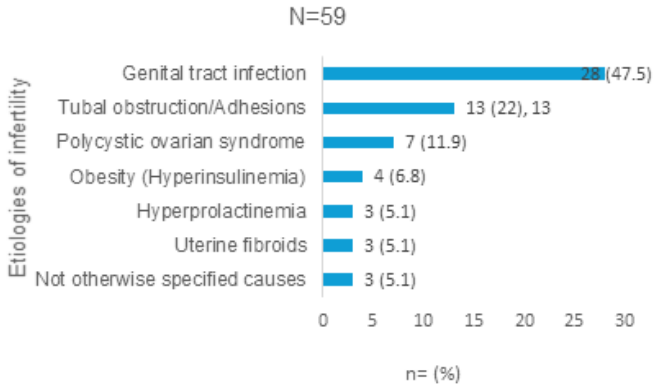

Figure 2. distribution of the population according to causes of female infertility

No significant association was found between age or educational level and infertility among women aged 21–25. However, marital status showed a strong link: unmarried women were significantly less likely to be infertile (OR = 0.24, p < 0.001), while being in a relationship was associated with higher odds (OR = 4.21), possibly reflecting greater likelihood of seeking care or diagnosis. Unemployment was strongly associated with infertility (OR = 16.98, p < 0.001), suggesting socioeconomic challenges or underlying health issues, whereas private sector employment appeared protective (OR = 0.31, p = 0.024). No significant association was observed between place of residence and infertility, likely due to the small number of rural participants (Table 1).

Table 1. Sociodemographic characteristics associated with infertility

Variables	Cases	Controls	OR	p-value
	N=75 ; n(%)	N=75 ; n(%)	[95% CI]	
Age (in years)				
21	9 (12.0)	14 (18.7)	0.59 [0.24-1.47]	0.183
22	10 (13.3)	12 (16.0)	0.81 [0.33-2.00]	0.409
23	21 (28.0)	17 (22.7)	1.33 [0.63-2.78]	0.287
24	17 (22.7)	19 (25.3)	0.86 [0.41-1.83]	0.424
25	18 (24.0)	13 (17.3)	1.51 [0.68-3.35]	0.210
Marital status				
Unmarried	35 (46.7)	59 (78.7)	0.24 [0.12-0.49]	< 0.001
In a relationship	40 (53.3)	16 (21.3)	4.21 [2.06-8.61]	
Educational level				
Secondary	28 (37.3)	18 (24.0)	1.89 [0.93-3.83]	0.055
Tertiary	47 (62.7)	57 (76.0)	0.53 [0.26-1.08]	
Occupation				
Unemployed	14 (18.7)	1 (1.3)	16.98 [2.17-132.84]	< 0.001
Student	20 (26.7)	19 (25.3)	1.07 [0.52-2.22]	0.500
Informal sector worker	31 (41.3)	32 (42.7)	0.95 [0.50-1.81]	0.500
Public sector employee	5 (6.7)	9 (12.0)	0.52 [0.17-1.64]	0.200
Private sector employee	5 (6.7)	14 (18.7)	0.31 [0.11-0.91]	0.024
Place of residence				
Rural	2 (2.7)	1 (1.3)	2.03 [0.18-22.85]	0.500
Urban	73 (97.3)	74 (98.7)	0.49 [0.04-5.56]	

As shown on Table 2, nulliparity was strongly linked to infertility (p < 0.001), with 78.7% of cases having never given birth versus none in the control group. Prior childbirth appeared protective, as primiparity and pauciparity were less common among cases. Voluntary pregnancy termination was more frequent in cases (28.0%) than controls (16.0%), suggesting a possible risk (OR = 2.04), though not statistically significant (p = 0.057). Uterine scars were less common in cases (OR = 0.13, p = 0.032), but interpretation is limited by sample size. Tubal surgery was significantly associated with infertility (OR = 7.62, p = 0.032). No link was found between hormonal contraceptive use and infertility (p = 0.336).

Table 2. Obstetrical characteristics associated with infertility

Variables	Case	Control	OR	p-value
	N=75 ; n(%)	N=75 ; n(%)	[95% CI]	
Parity				
Nulliparous	59 (78.7)	0 (0.0)	/	0.000
Primiparous	10 (13.3)	54 (72.0)	0.06 [0.03-0.14]	0.000
Pauciparous	6 (8.0)	21 (28.0)	0.22 [0.08-0.59]	0.001
Voluntary pregnancy termination				
Yes	21 (28.0)	12 (16.0)	2.04 [0.92-4.53]	0.057
No	54 (72.0)	63 (84.0)	0.49 [0.22-1.09]	
Single uterine scar				
Yes	1 (1.3)	7 (9.3)	0.13 [0.02-1.10]	0.032
No	74 (98.7)	68 (90.7)	7.62 [0.91-63.53]	
History of tubal surgery				
Yes	7 (9.3)	1 (1.3)	7.62 [0.91-63.53]	0.032
No	68 (90.7)	74 (98.7)	0.13 [0.02-1.10]	
Hormonal contraception				
Yes	15 (20.0)	12 (16.0)	1.31 [0.57-3.03]	0.336
No	60 (80.0)	63 (84.0)	1	

Table 3 below shows that precocious menarche (<8 years) was strongly linked to infertility (OR = 6.51, p = 0.001), while normal menarche appeared protective (OR = 0.15). Early coitarche (15–16 years) showed a borderline association with infertility (OR = 2.12, p = 0.053), and later coitarche (≥19 years) suggested a possible protective effect (OR = 0.53, p = 0.055). Primary dysmenorrhea showed no significant link (OR = 0.93, p = 0.500). Spaniomenorrhea was exclusive to cases (14.7%), indicating a strong association (p < 0.001).

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Table 3. Other obstetric characteristics associated with infertility

Variables	Case	Control	OR	p-value
	N=75 ; n(%)	N=75 ; n(%)	[95% CI]	
Menarche				
Precocious (< 8 ans)	16 (21.3)	3 (4.0)	6.51 [1.81-23.41]	0.001
Normal [8-13]	59 (78.7)	72 (96.0)	0.15 [0.04-0.55]	
Age at coitarche				0.001
15-16	20 (26.7)	11 (14.7)	2.12 [0.93-4.80]	0.053
17-18	37 (49.3)	36 (48.0)	1.06 [0.56-2.00]	0.500
≥ 19	18 (24.0)	28 (37.3)	0.53 [0.26-1.08]	0.055
Primary Dysmenorrhea				
Yes	19 (25.3)	20 (26.7)	0.93 [0.45-1.94]	0.500
No	56 (74.7)	55 (73.3)	1	
Spaniomenorrhea				
Yes	11 (14.7)	0 (0.0)	/	< 0.001
No	59 (78.7)	75 (100.0)	/	

PCOS and uterine fibroids were found only in cases (9.3%, p = 0.007), indicating a strong link to infertility. Dyspareunia (10.7% vs. 1.3%, OR = 8.83, p = 0.017) and STIs (41.3% vs. 13.3%, OR = 4.58, p < 0.001) were significantly more common in cases. Among STIs, chlamydia (p = 0.029) and gonococcus (p = 0.003) were strongly associated with infertility, while syphilis showed borderline significance (p = 0.060) and mycoplasma showed no difference (p = 0.641) (Table 4).

Table 4. Gynecological characteristics associated with infertility

Variables	Case	Control	OR	p-value
	N=75 ; n(%)	N=75 ; n(%)	[95% CI]	
Gynecological history				
PCOS*	7 (9.3)	0 (0.0)	/	0.007
Uterine fibroids	7 (9.3)	0 (0,0)	/	0.007
Dyspareunia	8 (10.7)	1 (1.3)	8.83 [1.08-72.51]	0.017
STI**	31 (41.3)	10 (13.3)	4.58 [2.04-10.28]	< 0.001
Type of STI				
Chlamydiae	15 (20.0)	6 (8.0)	2.88 [1.05-7.88]	0.029
Syphilis	4 (5.3)	0 (0.0)	/	0.060
Mycoplasma	4 (5.3)	4 (5.3)	1.00 [0.24-4.16]	0.641
Gonococcus	8 (10.7)	0 (0.0)	/	0.003

**Polycystic Ovarian Syndrome ; **Sexually Transmitted Infection*

As shown on Table 5, obesity was strongly linked to infertility (21.3% vs. 1.3%, OR = 20.07, p < 0.001), while HIV showed no association. Alcohol use (57.3% vs. 10.7%, OR = 11.25) and tobacco use (16.0% in cases only) were significantly associated with infertility (both p < 0.001).

Table 5. Comorbidities and toxicological history associated with infertility

Variables	Case	Control	OR	p-value
	N=75 ; n(%)	N=75 ; n(%)	[95% CI]	
Comorbidity				
Obesity	16 (21.3)	1 (1.3)	20.07 [2.59-155.74]	< 0.001
HIV* Infection	2 (2.7)	2 (2.7)	1.00 [0.14-7.29]	0.690
Toxicological history				
Alcohol consumption	43 (57.3)	8 (10.7)	11.25 [4.74-26.71]	< 0.001
Tobacco use	12 (16.0)	0 (0.0)	/	< 0.001

**Human Immunodeficiency Virus*

Table 6 shows a multivariate analysis shows both socio-demographic and clinical determinants of female infertility. Significant risk factors (p < 0.05) include being in union (AOR 8.08), unemployed (AOR 67.21), precocious menarche (AOR 9.30), history of STIs (AOR 8.52), obesity (AOR 64.85), and alcohol consumption (AOR 45.41). In contrast, tubal surgery and chlamydia infection were not independent factors, while secondary education appeared protective (AOR 0.14).

Table 6. Independent factors associated with female infertility

Variables	Case	Control	OR	Adjusted p-value
	N=75 ; n(%)	N=75 ; n(%)	[95% CI]	
Marital status				
In union	40 (53.3)	16 (21.3)	8.08 [2.34-27.94]	0.001
Educational level				
Secondary	28 (37.3)	18 (24.0)	0.14 [0.03-1.06]	0.021
Occupation				
Unemployed	14 (18.7)	1 (1.3)	67.21 [3.76-1201.49]	0.004
Private sector employee	5 (6.7)	14 (18.7)	0.12 [0.02-20.67]	0.021
Voluntary abortion				
Yes	21 (28.0)	12 (16.0)	0.44 [0.08-2.36]	0.339
History of tubal surgery				
Yes	7 (9.3)	1 (1.3)	0.68 [0.02-20.67]	0.823

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Variables	Case	Control	OR	Adjusted
	N=75 ; n(%)	N=75 ; n(%)	[95% CI]	p-value
Menarche				
Precocious (<8 ans)	16 (21.3)	3 (4.0)	9.30 [1.03-83.86]	0.047
Coitarche				
15-16	20 (26.7)	11 (14.7)	2.11 [0.47-9.37]	0.328
≥ 19	18 (24.0)	28 (37.3)	0.26 [0.07-1.04]	0.057
Gynecological history				
Dyspareunia	8 (10.7)	1 (1.3)	23.47 [0.77-713.0]	0.070
STI*	31 (41.3)	10 (13.3)	8.52 [1.56-46.58]	0.013
Type of STI				
Chlamydiae	15 (20.0)	6 (8.0)	0.63 [0.06-6.60]	0.698
Comorbidities				
Obesity	16 (21.3)	1 (1.3)	64.85 [4.41-953.59]	0.002
Toxicological history				
Alcohol consumption	43 (57.3)	8 (10.7)	45.41 [8.79-234.76]	< 0.001

**Sexually Transmitted Infection*

Discussion

This case–control study of women aged 21–25 in Yaoundé underscores that infertility in very young women is multifactorial, with strong contributions from socio-economic status, infections, and modifiable lifestyle factors. This is highlighted in Table 1, which shows that age alone is not significantly associated with infertility. In multivariable models, unemployment, precocious menarche, prior STI, obesity, and alcohol use independently increased infertility odds, while secondary education appeared protective; notably, chlamydia and prior tubal surgery were not independent predictors in the adjusted model.

The scale of infertility in our study corroborates WHO estimates (~17.5% of adults experience infertility), and the barriers to affordable care mirror WHO's call for expanded access—particularly salient in LMIC contexts like Cameroon (10). In our study, 21.3% participants were unable to afford diagnostic examinations.

In this cohort, primary infertility predominated (81.3%), contrasting with many sub-Saharan African series where secondary infertility is often more common due to post-infectious tubal damage from unsafe abortion, postpartum infection, and untreated STIs (11). This divergence may reflect cohort age (≤25 years), earlier care-seeking in urban settings, and differential exposure windows to postpartum/postabortal infections.

The strong adjusted association between history of STI and infertility in our data aligns with extensive evidence that chlamydia and gonorrhea drive pelvic inflammatory disease (PID), tubal factor infertility (TFI), and ectopic pregnancy (12,13). While chlamydia did not remain an independent predictor in our adjusted model—likely due to sample size and collinearity with "any STI"—large cohort and review data continue to demonstrate elevated risks of PID and TFI after prior chlamydia infection (5,13).

Our finding that precocious menarche was independently associated with infertility echoes emerging literature linking non-normative menarche (early or late) with reduced fecundability and adverse gynecologic outcomes, though directionality can vary across populations (14). Evidence remains mixed—with some cohorts reporting higher infertility with later menarche—suggesting that biological (e.g., ovarian reserve, endocrine milieu) and social pathways (e.g., early sexual debut, STI exposure) may differ by context (10). In LMICs, early menarche has also been tied to earlier sexual initiation and STI risk, reinforcing a plausible behavioral link to infertility (15).

Regarding obesity, the very large adjusted effect of obesity observed here is directionally consistent with reviews showing that excess adiposity impairs ovulation, increases menstrual dysfunction, and reduces fecundability (16). The magnitude in our model likely reflects small numbers and residual confounding, but it highlights an important, modifiable target for prevention and preconception care.

The strong adjusted association between alcohol consumption and infertility is broadly concordant with meta-analytic evidence linking female alcohol intake with reduced fecundability and lower pregnancy rates (particularly at higher weekly doses), although professional guidance notes heterogeneity across studies (17–19). These nuances suggest dose and pattern (e.g., binge vs. light/moderate) matter and should be captured in future studies. Organic conditions such as PCOS and uterine fibroids were observed only among cases in univariate analyses in our cohort, aligning with global data that PCOS is a leading cause of anovulatory infertility and that its population burden is rising (20,21).

Etiologically, genital tract infections (47.5%), tubal obstruction/adhesions (22.0%), and PCOS (11.9%) dominated, consistent with African literature emphasizing infection-related tubal damage as a major cause (22). Importantly, 21.3% of cases lacked definitive etiologic workups due to financial constraints, underscoring access gaps that likely

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attenuate accurate classification and timely treatment.

Given the young age of the affected population, the social and psychological consequences are substantial. Prevention priorities in similar settings include STI screening and treatment, weight management, and alcohol-use reduction, alongside health-literacy interventions and policies that reduce out-of-pocket costs for diagnostic evaluation and fertility services (10).

Strengths include age-matching and multivariable adjustment, which identified independent correlates specific to very young women.

Limitations—retrospective design, modest sample size, hospital-based selection, and incomplete diagnostics—likely contributed to wide confidence intervals and may explain why some expected factors (e.g., chlamydia) lost significance after adjustment.

Conclusion

Among women under 25, infertility reflects an interplay of preventable infections, modifiable lifestyle risks, and socio-economic factors. Aligning clinical pathways (early STI detection and treatment; metabolic risk management; alcohol-use counseling) with financing strategies to complete diagnostics could meaningfully reduce the burden of infertility in this age group.

Conflict of interest: The authors declare that they have no conflicts of interest regarding the publication of this paper.

Author's contributions: Under the supervision of M.K.V and D.S.J, the research protocol, data collection, compilation were performed by M.N.J.A. and C.J.F.N. The latter drafted the initial manuscript, performed data analysis and contributed to interpretation of the results. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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