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Female infertility in Niger: clinical characteristics, etiologies and challenges in access to assisted reproductive care in a tertiary referral hospital

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Abstract

Background

Infertility affects nearly 48 million couples worldwide and remains a major public health concern in sub-Saharan Africa, where women frequently experience social stigma and marital instability related to childlessness. Access to assisted reproductive technologies remains extremely limited in low-resource settings.

Objective

To assess the prevalence, sociodemographic characteristics, etiologies, management patterns and challenges related to female infertility in a tertiary referral hospital in Niger.

Methods

We conducted a hospital-based retrospective cohort study at the Assisted Reproductive Technology Unit of the National Referral Hospital of Niamey, Niger, between January 2022 and December 2024. Women consulting for infertility and their partners were included. Sociodemographic, clinical, biological, radiological and therapeutic data were extracted from medical records and analyzed using SPSS version 25. Multivariable logistic regression was performed to identify factors associated with secondary infertility.

Results

Among 2153 women consulting during the study period, 398 were managed for infertility, corresponding to a hospital prevalence of 18.5%. Secondary infertility predominated (54.3%). The mean age was 32.1 ± 8.2 years, and women aged 30–39 years represented the largest group (46.2%). Tubal pathology was the leading female cause of infertility (34.7%), followed by hormonal disorders (29.9%) and uterine abnormalities (22.4%). Abnormal semen analysis was observed in 33.9% of male partners, including azoospermia in 4.0%. Ovulation induction was the most common treatment strategy. Only 4.0% of couples underwent intrauterine insemination, whereas 46.5% had an indication for IVF/ICSI, which was unavailable locally. The overall clinical pregnancy rate was 9.3%. Older age (AOR = 2.84; 95% CI: 1.91–4.22), salaried employment (AOR = 3.12; 95% CI: 2.01–4.83) and previous cesarean section (AOR = 1.58; 95% CI: 1.03–2.43) were independently associated with secondary infertility.

Conclusion

Female infertility in Niger is characterized by a predominance of secondary infertility and tubal disease, reflecting the burden of preventable reproductive tract disorders. Access to assisted reproductive technologies remains severely limited because of financial and structural barriers. Strengthening prevention strategies and improving access to affordable fertility care should be prioritized within national reproductive health policies.

INTRODUCTION

Infertility is a major global reproductive health issue affecting approximately 48 million couples worldwide [1]. According to the World Health Organization (WHO), nearly one in six individuals experiences infertility during their reproductive life, with global prevalence estimates ranging from 10% to 15% [1, 2]. The burden is particularly high in low- and middle-income countries, especially in sub-Saharan Africa, where prevalence estimates range from 14% to 30% [3–5].

Beyond its medical implications, infertility has profound psychological, social and economic consequences. In many African societies, parenthood remains strongly associated with social identity, family stability and marital legitimacy. Consequently, childlessness often exposes women to stigma, discrimination, social exclusion and marital instability [4, 6].

The etiology of infertility is multifactorial and includes tubal damage, pelvic infections, endocrine disorders, ovulatory dysfunction, uterine abnormalities and male factor infertility [7, 8]. In sub-Saharan Africa, secondary infertility related to pelvic inflammatory disease, unsafe abortion and postpartum or post-surgical infections remains highly prevalent [9, 10].

Although assisted reproductive technologies (ART) have substantially improved fertility outcomes worldwide, access to these treatments remains highly inequitable in resource-limited settings [11]. In many African countries, IVF and intracytoplasmic sperm injection (ICSI) are either unavailable or financially inaccessible for most couples.

In Niger, published data regarding infertility remain scarce despite the increasing demand for fertility care. Understanding the epidemiological profile, etiologies and management challenges associated with infertility is essential for improving reproductive health policies and optimizing fertility services.

The aim of this study was therefore to assess the prevalence, sociodemographic characteristics, etiologies, management patterns and challenges related to female infertility in a tertiary referral hospital in Niger.

PATIENTS AND METHODS

Study design and setting

This was a hospital-based retrospective cohort study conducted at the Assisted Reproductive Technology Unit of the National Referral Hospital of Niamey, Niger. The study covered a 3-year period from January 2022 to December 2024.

The National Referral Hospital is one of the main tertiary healthcare institutions in Niger and serves as a referral center for infertility management and assisted reproductive care.

Study population

The study population consisted of all women consulting for infertility during the study period and their partners.

Infertility was defined according to WHO criteria as the inability to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse [1].

Semen analysis was interpreted according to WHO 2021 criteria.

Inclusion criteria

We included all women consulting for infertility after at least 12 months of regular unprotected intercourse and whose medical records were sufficiently documented.

Exclusion criteria

Couples with less than 12 months of infertility, irregular sexual intercourse, or incomplete medical records were excluded.

Outcomes

Primary outcome

Hospital prevalence of female infertility.

Secondary outcomes

- -Sociodemographic characteristics of infertile women;
- -Etiologies of infertility;
- -Therapeutic management patterns;
- -Challenges related to infertility care;
- -Clinical pregnancy outcomes.

Data collection

Data were retrospectively extracted from medical records using a standardized collection form.

Collected variables included: sociodemographic characteristics, obstetric and gynecological history, surgical history, clinical findings, radiological investigations, hormonal assays, semen analysis findings, therapeutic interventions, and pregnancy outcomes.

Pelvic ultrasound and hysterosalpingography (HSG) were routinely used as first-line investigations. Semen analysis was interpreted according to WHO recommendations.

Clinical pregnancy was defined as ultrasound visualization of an intrauterine gestational sac.

Statistical analysis

Statistical analyses were performed using SPSS version 25 (IBM Corp., Armonk, NY, USA).

Quantitative variables were expressed as means ± standard deviation (SD) or medians with ranges according to data distribution. Categorical variables were presented as frequencies and percentages.

Associations between categorical variables were assessed using the Chi-square test.

Variables associated with secondary infertility at $p < 0.20$ in univariate analysis were entered into a multivariable logistic regression model. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported.

Statistical significance was defined as $p < 0.05$.

RESULTS

Prevalence of infertility

Among 2153 women consulting during the study period, 398 were managed for infertility, corresponding to a hospital prevalence of 18.5%. The annual prevalence ranged from 13.75% to 26.94%.

Sociodemographic characteristics

The mean age was 32.1 ± 8.25 years (range: 17–49 years). Women aged 30–39 years represented the largest age group (46.2%). Most participants were salaried workers (58.5%). All women were married, and 82.9% were in their first marriage.

Secondary infertility was more frequent than primary infertility, accounting for 54.3% of cases. The mean duration of infertility was 7.3 ± 5.3 years (range: 1–30 years). Nulliparous women represented 58.8% of the cohort.

The main sociodemographic characteristics are summarized in Table 1.

Radiological and hormonal findings

Pelvic ultrasound revealed uterine fibroids in 15.6% of women, polycystic ovary syndrome in 6.5%, and ovarian cysts in 4.3%.

HSG findings showed bilateral tubal obstruction in 16.1% of women and hydrosalpinx in 7.8%.

Elevated FSH levels were observed in 11.6% of women, hyperprolactinemia in 14.6%, and decreased anti-Müllerian hormone levels in 9.5%.

Male factor infertility

Abnormal semen analysis, including numerical/morphological abnormalities, azoospermia and sperm infection was identified in 33.9% of male partners.

Etiologies of infertility

Tubal disease was the leading cause of infertility (34.7%), followed by hormonal disorders (29.9%) and uterine abnormalities (22.4%). Unexplained infertility accounted for 13.1% of cases.

The main radiological and hormonal findings, and etiologies of infertility are summarized in Table 2.

Therapeutic management

Ovulation induction represented the most common therapeutic approach.

Clomiphene citrate was used in 53.3% of women, letrozole in 21.6%, and gonadotropins in 13.3%.

Hyperprolactinemia was managed medically using dopamine agonists.

Surgical treatment was performed in 11.1% of women, including tubal surgery (5.0%) and myomectomy (6.0%).

Only 16 couples (4.0%) underwent intrauterine insemination using the husband’s semen.

Overall, 185 women (46.5%) had indications for IVF/ICSI; however, these procedures were unavailable in Niger during the study period.

Pregnancy outcomes

Clinical pregnancy was achieved in 37 women, corresponding to an overall pregnancy rate of 9.3%.

Among these pregnancies, 25 resulted in term deliveries, while 12 ended in spontaneous miscarriage. The main management strategies of infertility and pregnancy outcomes are summarized in Table 3.

Cost of infertility management

The average cost of infertility management remained high relative to household income levels.

The estimated mean cost of diagnostic investigations and medical treatment was approximately 668 USD, while surgical management averaged 409 USD. Intrauterine insemination cost approximately 176 USD.

Factors associated with secondary infertility

Multivariable logistic regression identified age ≥ 30 years (AOR = 2.84; 95% CI: 1.91–4.22; $p < 0.001$), salaried employment (AOR = 3.12; 95% CI: 2.01–4.83; $p < 0.001$), and previous cesarean section (AOR = 1.58; 95% CI: 1.03–2.43; $p = 0.04$) as independent factors associated with secondary infertility (Table 4).

Table 1
Sociodemographic characteristics of participants (N = 398)

Variables	Number of cases	(%)
Age (years)		
< 20	9	2.3
20–29	127	31.9
30–39	184	46.2
≥ 40	78	19.6
Parity		
0	234	58.8
1	67	16.8
2–3	71	17.8
4–5	25	6.3
≥ 6	1	0.3
Number of living children		
0	253	63.6
1	62	15.6
2–3	65	16.3
≥ 4	18	4.5
Occupation		
Unemployed	99	24.9
Student	47	11.8
Salaried worker	233	58.5
Self-employed worker	19	4.8
Surgical history		
Cesarean section	59	14.8
Myomectomy	41	10.3
Cystectomy	26	6.5
Laparotomy	21	5.3

Variables	Number of cases	(%)
Age (years)		
Tubal repair	13	3.3
Salpingectomy	8	2.0
History of IVF	3	0.7
BMI (kg/m2)		
< 25	188	47.2
25–29	84	21.1
30–39	94	23.6
≥ 40	32	8.0
Secondary infertility	216	54.3
Duration of infertility (years)		
≤ 5	252	63.3
6–10	99	24.8
11–15	33	8.3
16–20	12	3.0
21–25	1	0.3
> 25	1	0.3

Table 2
Etiologies of infertility and paraclinical findings (N = 398)

Variables	Number of cases	(%)
Ultrasound findings		
Normal	293	73.6%
Uterine fibroid	62	15.6
Polycystic ovary syndrome	26	6.5
Ovarian cyst	17	4.3
Hysterosalpingography		
Normal	242	60.8
Bilateral tubal obstruction	64	16.1
Hydrosalpinx	31	7.8
Fimbrial phimosis	21	5.3
Peritoneal adhesions	22	5.5
Uterine abnormalities (malformation/synechia)	27	6.8
FSH levels		
< 2 IU/L	6	1.5
2–12 IU/L	160	40.2
> 13 IU/L	46	11.6
AMH levels		
< 2 ng/Ml	38	9.5
2–4 ng/Ml	342	85.9
> 4 ng/ml	18	4.5
Estradiol levels		
Normal	344	86.4
High	10	2.5
Low	44	11.0
Prolactinemia		
Normal	340	85.4

Variables	Number of cases	(%)
Ultrasound findings		
High	58	14.6
Etiologies of female infertility		
Tubal infertility	138	34.7
Hormonal disorders	119	29.9
Uterine pathology	89	22.4
Unexplained infertility	52	13.1
Results of semen analysis		
Normal	263	66.1
Numerical/morphological abnormalities	116	29.1
Azoospermia	16	4.0
Sperm infection	3	0.8

Table 3
Therapeutic management and outcomes (N = 398)

Variables	Number of cases	(%)
Dopamine agonists	42	10.6
Clomiphene citrate	212	53.3
Letrozole	86	21.6
Gonadotropins	53	13.3
HCG	18	4.5
Tubal surgery	20	5.0
Myomectomy	24	6.0
Intrauterine insemination	16	4.0
IVF/ICSI indication	185	46.5
Outcomes		
Clinical pregnancies	37	9.3
Term deliveries	25	6.3
Miscarriages	12	3.0

Table 4
Factors associated with secondary infertility

Variables	Adjusted OR	95% CI	p-value
Age ≥ 30 years	2.84	1.91–4.22	< 0.001
Salaried employment	3.12	2.01–4.83	< 0.001
BMI > 30 kg/m²	1.42	0.91–2.21	0.11
Previous cesarean section	1.58	1.03–2.43	0.04

DISCUSSION

This study provides recent data regarding infertility patterns and management challenges in Niger, a setting where fertility care remains poorly documented.

The hospital prevalence of infertility observed in our study (18.5%) is consistent with reports from several sub-Saharan African countries, including Cameroon, Nigeria and Burkina Faso [9, 12–14]. These relatively high rates likely reflect the burden of preventable reproductive tract infections and limited access to reproductive healthcare services.

Secondary infertility predominated in our cohort, accounting for more than half of cases. Similar findings have been reported across sub-Saharan Africa [9, 10, 12]. In contrast, primary infertility is more common in high-income countries and North African populations [15]. The predominance of secondary infertility in our setting may be explained by post-infectious tubal damage, unsafe abortion complications and postpartum infections.

Women aged 30–39 years represented the largest group, and age ≥ 30 years was independently associated with secondary infertility. This finding is consistent with the physiological decline in ovarian reserve and fertility observed after the age of 35 years [16].

Tubal disease was the leading etiology of infertility in this study. Similar observations have been reported in many African studies where pelvic inflammatory disease and genital infections remain major contributors to infertility [9, 10]. The frequent use of hysterosalpingography instead of laparoscopy reflects the limitations of infertility investigations in resource-constrained settings.

Male factor infertility was also common, with abnormal semen analysis identified in approximately one-third of partners. This highlights the importance of systematically evaluating both partners during infertility assessment.

Although ovulation induction and limited surgical interventions were available, access to advanced assisted reproductive technologies remained extremely restricted. Nearly half of women had indications for IVF/ICSI, yet these procedures were unavailable locally.

The overall clinical pregnancy rate observed in our study (9.3%) remains relatively low compared with reports from some African fertility centers. Moreira et al. [17] in Senegal reported a lower clinical pregnancy rate of 3.8%, whereas Kasahun et al. [18] in Ethiopia observed a substantially higher rate of 33.1% among women undergoing infertility treatment. These variations may be explained by differences in patient selection, duration of infertility, etiological patterns, availability of assisted reproductive technologies, treatment protocols, and healthcare infrastructure across settings. In our context, delayed consultation, the predominance of tubal disease, limited access to IVF/ICSI, and financial constraints likely contributed to the relatively modest pregnancy outcomes observed.

The economic burden of infertility management also represents a major challenge. In a low-income setting such as Niger, the costs associated with fertility investigations and treatment remain prohibitive for most couples.

Strengths and limitations

This study provides one of the few recent datasets regarding infertility management in Niger and highlights the major structural barriers to fertility care in low-resource settings.

However, several limitations should be acknowledged. First, this was a single-center retrospective study, which may limit generalizability. Second, some hormonal investigations were unavaible for all participants. Third, laparoscopy was not routinely performed, potentially leading to underdiagnosis of pelvic pathology. Finally, the hospital-based design may have introduced selection bias toward women with greater healthcare access.

CONCLUSION

Female infertility in Niger is characterized by a predominance of secondary infertility and tubal pathology, reflecting the burden of preventable reproductive tract diseases.

Access to assisted reproductive technologies remains severely limited because of financial, infrastructural and organizational barriers.

Strengthening prevention strategies against sexually transmitted infections and improving access to affordable fertility care should be prioritized within national reproductive health policies.

Declarations

Ethics approval and consent to participate

This study adhered to ethical standards as outlined in the Declaration of Helsinki and was conducted in accordance with the ethical guidelines of Abdou Moumouni University.

Consent for publication

Not applicable

Competing interests

The authors declare no competing interests.

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Author Contribution

M.O: Conceptualization, methodology, supervision, writing – original draft.E.V.E.J.E and Z.S.L: Data collection and data curation.H.S.D, A.A.I, S.O.G and AA: Manuscript review and editing.M.N: Supervision and critical revision of the manuscript.All authors approved the final manuscript.

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Data Availability

The datasets used and analyzed during the current study are available from the corresponding author upon reasonable request.

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