European Journal of Clinical and Medical Research (EJCMR)
Volume 1, Issue 1, 2025

Original Article

Socio-cultural Determinants of Artificial Reproductive Technology (ART) uptake among Infertile Couples Visiting Fertility Clinics in FCT, Abuja

O. O. Eweoya [1], H. T. Dike [1], O. O. Adeniyi [1] and S. B. Kareem [2]

[1] Department of Anatomical Sciences, University of Abuja, Nigeria
[2] Department of Anatomy, University of Ilorin, Kwara State, Nigeria
* Correspondence: O. O. Eweoya, Department of Anatomical Sciences, University of Abuja, Nigeria. West Africa. E-mail: ewegbenga@gmail.com

Abstract:
Introduction: Infertility is defined as the failure of a couple to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse, and it is ranked the 5th highest global disease. Assisted Reproductive Technology (ART) is one of the safest healthcare options for infertility, which offers a chance at parenthood to infertile couples. Nigeria is the largest and most populous African country with three major tribes, namely, Yoruba, Igbo, and Hausa. Scanty information about the socio-cultural effects of ART uptake on infertile couples prompted this study.
Methods: Two hundred and twenty-seven (227) consented participants attending infertility clinics in Abuja, Nigeria, aged 18- 49 years for females and 18 years and above for males, obtained by simple random sampling, were used for the study. Prior ethical approval has been sought and obtained from the hospital management of the two private and two public hospitals. A descriptive cross-sectional questionnaire was given to the participants to complete for the study that lasted three months. Data were obtained and statistically analyzed using SPSS version 23.0.
Results: Greater percentage of the respondents were educated, and enlightened about ART, most Protestants Christian accept the uptake of ART, Invitro Fertilization (IVF) is the most embraced of all ART types and ART uptake also varies along tribal line in our study with the Igbo tribe having a higher percentage of uptake.
Conclusions: From this study, it can be reasonably concluded that socio-cultural components had an influence on the uptake of ART in Abuja, Nigeria.

Keywords: ART; Socio-Cultural; Abuja; Infertile; Clinic

Received: May 4th, 2025
Revised: June 21st, 2025
Accepted: June 25th, 2025
Published: July 1st, 2025

Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

Infertility is a major public health problem with devastating consequences, which affects both men and women with almost equal frequency [1]. According to World Health Organization, infertility is defined as the failure of a couple to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse [2]. Infertility as a disease in women was ranked the 5th highest global disease [3]. There are two types of Infertility: Primary & Secondary. Infertility is a global phenomenon that affects between 60million and 168million people worldwide, and there are over 186 million couples in developing countries with infertility [4]. In Nigeria, infertility rate across ethnic groups; 13.5 to 14.3% in Hausa, Fulani and Kanuri of the Northern Nigeria, 14% Yoruba of SW, 10% Tiv, 10.5% Nupe and 6.9% Chambas (Middle Belt), 19.1% (highest) in Igbos of southeast and 16% Cross River State, [5]. It is a source of distress for couples as societal norms and perceived religious dictums may equate infertility with failure on a personal,

interpersonal, emotional or social level [4]. Women are verbally or physically abused in their own homes, deprived of their inheritance, sent back to their parents, ostracized, looked down upon by society or even have their marriage dissolved or terminated if they are unable to conceive [6]. Women may be more willing to defy their religious and cultural beliefs about reproductive technology because of their desperation to have children. This has also been attributed to the high premium placed on childbearing and rights to inheritance, a very common practice in Eastern Nigeria [7].

In Nigeria, Oladapo Ashiru and Giwa-Osagie pioneered IVF in 1984, and the first IVF baby was delivered on March 17, 1989, at the Lagos University Teaching Hospital (LUTH), Idi-Araba [8,9]. In Northern Nigeria, 1st test tube baby was Miss Hannatu Kupchi, delivered on Feb. 11th, 1998 at Nisa-Premier Hospital, Abuja [9]. Moreover, culture, religious values and beliefs, etc., affect the level of Assisted Reproductive Technology (ART) services provided in any one country [10]. Family, relatives, and friends, apart from the community, are sources of bias and prejudice for infertile couples seeking ART. In developing countries such as Senegal, social pressure and lack of family acceptance are factors that affect the choice of treatment [11].

Assisted Reproductive Technology (ART) as a means of treating infertility offers a chance at parenthood to couples who, until recently, would have had no hope of having a biologically related child [12]. Anatomists, and particularly embryologists, now play a significant role in the field of assisted conception since the development of assisted reproductive technology [13]. Assisted Reproductive Technique includes, but is not limited to: In Vitro Fertilization (IVF), Trans-Cervical Embryo Transfer (TCET), Gametes Intra Fallopian Transfer (GIFT), Zygote Intra-Fallopian Transfer (ZIFT), Intra Uterine Insemination (IUI), Gamete and embryo cryopreservation, Oocyte and embryo donation, Gestational surrogacy, Intra-cytoplasmic sperm injection (ICSI). Despite the high levels of infertility in Africa, the continent still records the lowest rate of assisted reproductive technology (ART) utilization in comparison to other regions of the world [2]. Scant available information on the effect of socio-cultural factors on couples with infertility and their acceptance of ART as a treatment option, despite it being proven to be an effective treatment option in the management of infertility, prompted the research work.

2. Materials and Methods

The study was carried out in the Federal Capital Territory (FCT), Abuja, Nigeria. Abuja has a landmass of approximately 7,315 km^2 and 1.4 million people [14], and an estimated 2020 population of about 3.2 million people, with women of reproductive age group 14-49 years constituting 383,707. The city is bordered by Kaduna, Niger, Kogi and Nasarawa states to the West, East, and Southwest and Southeast corner respectively. The official language of the city is English. Other common languages spoken include Gbagyi, Igbo, Hausa, and Yoruba. In Abuja, there are six area councils, namely: Abuja Municipal, Gwagwalada, Bwari, Kuje, Abaji, and Kwali.

Ethical approval for this study was obtained from the Federal Capital Development Authority (FCDA) Ethics Committee and the National Hospital, Abuja Ethics Review Board. Additionally, approval was obtained from the management of Nisa/Garki Hospital and Medimax Hospital. Written informed consent was obtained from each participant after explaining the objectives of the study, the procedures involved, and assurance of confidentiality.

The study population was made up of infertile couples within the age bracket of 18-49 years for females and 18 years and above for males. The age-based selection was guided by biological relevance and ethical considerations. Participants recruited were those attending the selected fertility clinics in FCT Abuja, and had given their consent to participate in the study, which lasted three months. All infertile couples who visited the selected

fertility clinics in Abuja, FCT, and fell within the stated age range above were included in the study, while infertile couples with hysterectomy and those who declined consent to participate in the study, and fertile couples were excluded from the study.

The sample size was calculated using the Leslie-Kish formula.

Sample Size (n) $=z^2pq/d^2$, where p=1-q, z= Standard deviation at the level of Significance of the study (set @1.96 for 95% confidence level), d= absolute error or precision (level of Significance of the study). p= expected proportion in population based on previous studies or pilot studies=16%. q= 1-p. [15]

$n = (1.96)^2 x\ 0.16 \times 0.84 / (0.05)^2 = 3.8416 \times 0.1344/0.0025$

$n = 0.51631104/0.0025$, $n = 207$

Adding a non-response rate of 10% [16], the minimum sample size for the study was 227. Four fertility clinics were used (2 private and 2 public) out of 20 fertility clinics in FCT, Abuja, at the time of the study, all of which are situated within the Abuja Municipal Area Council, AMAC [17]. Simple random sampling (without replacement) was used to select two private hospitals from a sampling frame of all the private fertility clinics in the FCT. While only two public fertility clinics listed were automatically selected, the selection of these clinics was guided by their high patient volume, accessibility to a diverse socio-economic and ethnic population, and the availability of comprehensive ART services. This approach allowed the inclusion of both government-subsidized and fully private service providers, capturing a broad spectrum of socio-cultural and economic backgrounds relevant to the study objectives, thus enhancing the heterogeneity of the study population and supporting broader applicability of the findings to urban Nigerian settings. Nonetheless, caution should be exercised in extrapolating these results to areas of low healthcare structures. Questionnaire allocation to each facility was based on the average number of clients seen by each clinic within a three-month period, as estimated from their previous clinic records, and Questionnaires were proportionately allocated to each clinic using the proportionate allocation fraction. The questionnaire was validated through expert review and a pilot study with 20 participants to ensure clarity, cultural sensitivity, and reliability. Feedback led to revisions for improved comprehension and flow. During data collection, questionnaires were checked for completeness; those with major missing sections were excluded, while minor gaps were handled using listwise deletion to maintain data integrity and representativeness.

A semi-structured questionnaire was administered to obtain data for this study. The questionnaire was written in English and administered by the Doctors seeing the Patient, the researcher, and the research assistant. Each questionnaire was checked in the field for completeness, and they were sorted, cleaned, coded, and entered into a Microsoft Excel spreadsheet. Analysis for descriptive and inferential statistics was performed using the IBM/Statistical Package for Social Sciences (IBM/SPSS) version 23.0 software with the level of significance set at $p< 0.05$.

3. Results

The average number of clients seen by both public and private clinics within a three-month period was estimated to be 220 and 160, respectively. A total of more than 350 participants were approached to participate in the study, but only 227 met the inclusion criteria and received questionnaires. One hundred and forty-eight (148) questionnaires were completed and returned by the participants in the public facilities, and seventy-nine (79) by the participants in the private facilities.

Table 1: Socio-Demographic Characteristics of Respondents

Variables	Frequency (n=227)	Percentage

Age		
<35 years	81	35.7
≥35 years	146	64.3
Gender		
Male	56	24.7
Female	171	75.3
Marital status		
Single	8	3.5
Married	208	91.6
Divorced	4	1.8
Widowed	3	1.3
Cohabiting	3	1.3
Separated	1	.4
Level of Education		
No formal education	5	2.2
Primary	16	7.0
Secondary	23	10.1
Vocational	9	4.0
Tertiary	174	76.7
Occupation		
Civil servant	119	52.4
Self-employed	76	33.5
Unemployed	14	6.2
Others	18	7.9
Income (₦)		
<100,000	87	38.3
100,000 – 250,000	76	33.5
250,000 – 350,000	22	9.7
>350,000	42	18.5
Tribe		
Igbo	71	31.3
Yoruba	53	23.3

Hausa	35	15.4
Others	68	30.0
Religion		
Christianity (Catholic)	72	31.7
Christianity (Protestants)	106	46.7
Islam	41	18.1
Traditional	8	3.5
Hospital		
Private	79	34.8
Public	148	65.2

From Table 1, it was shown that the greatest percentage (64.3%) of the studied group was aged 35years and above. More than half of the respondents (76.7%) attained tertiary education; the majority of the studied group were married (91.6%), civil servants (52.4%), and 38.3% earned less than ₦ 100,000 monthly. Most respondents (46.7%) were protestant Christians from the Igbo tribe (31.3%).

Table 2: Knowledge levels of Assisted Reproductive Technology among the studied group

Variables	Private (n=79)	Public (n=148)	$\chi 2$	p-value
Ever heard of ART				
Yes	62(78.5)	107(72.3)	1.035	0.309
No	17(21.5)	41(27.7)		
If yes, source of information				
Family	14(22.6)	26(24.3)	2.380	0.666
Friends	15(24.2)	32(29.9)		
Health facility	13(21.0)	14(13.1)		
Media	14(22.6)	27(25.2)		
Others	6(9.7)	8(7.5)		
Types of ART you know				
In-vitro fertilization	65(82.3)	108(73.0)	2.460	0.117
Intrauterine insemination	15(19.0)	37(25.0)	1.054	0.304
Gamete intra fallopian transfer	5(6.3)	28(18.9)	6.571	0.010*
Cytoplasmic sperm injection	6(7.6)	15(10.1)	0.396	0.529
Surrogacy	28(35.4)	33(22.3)	4.529	0.033
None	13(16.5)	29(19.6)	0.337	0.562

Do you know any one that has used ART				
Yes	42(53.2)	84(56.8)	0.269	0.604
No	37(46.8)	64(43.2)		
Overall knowledge score				
Good	21(26.6)	45(30.4)	0.365	0.546
Poor	58(73.4)	103(69.6)		

Table 2 shows the frequency distribution table of the studied group according to their knowledge level about assisted reproductive techniques. Participants in both private and public facilities had poor knowledge of ART, with 73.4% and 69.6%, respectively. However, major source of information for both participants in private and public facilities was from friends (24.2% & 29.9% respectively). There is a significant difference in the knowledge gap for GIFT between those attending public and private facilities, with those attending public facilities having more knowledge than those in private facilities.

Table 3: Perception toward assisted reproductive technology among the studied group

Variables	Private (n=79)	Public (n=148)	χ2	p-value
ART does not contradict my tradition				
Yes	74(93.7)	119(80.4)	7.117	0.008*
No	5(6.3)	29(19.6)		
ART contradicts my belief				
Good	70(88.6)	113(76.4)	4.951	0.026*
Poor	9(11.4)	35(23.6)		
Use of ART is morally wrong				
Good	71(89.6)	127(85.8)	0.736	0.382
Poor	8(10.1)	21(14.2)		
Children born through ART are abnormal				
Good	67(84.8)	120(81.1)	0.439	0.482
Poor	12(15.2)	28(18.9)		
Couples who use ART are reproductively weak				
Good	55(69.6)	113(76.4)	1.213	0.271
Poor	24(30.4)	35(23.6)		
ART is not too expensive				
Yes	13(16.5)	26(17.6)	0.045	0.832
No	66(83.5)	122(82.4)		

Praying/waiting is more preferable than use of ART				
Good	41(51.9)	79(53.4)	0.045	0.832
Poor	38(48.1)	69(46.6)		
ARTs do not work as infertility is a spiritual problem				
Good	58(73.4)	100(67.6)	0.833	0.361
Poor	21(26.6)	48(32.4)		
Overall perception				
Good	34(43.0)	59(39.9)	0.214	0.643
Poor	45(57.0)	89(60.1)		

$\chi 2$ = chi-square; statistically significant differences (P<0.05) are marked in *bold

Table 3 shows the group's frequency distribution based on how they perceive assisted reproductive technology. The overall perceptions for participants in both private and public facilities were poor (57.0% & 60.1%) respectively.

93.7% & 80.4% of participants in private and public facilities, respectively, do not agree that "ART contradicts my tradition," and while the majority agreed that "ART is too expensive" (83.5% & 82.4%), which made many prefer prayer or wait for God's time.

However, among those in private and public facilities, there were significant differences (p-values of 0.008 and 0.026, respectively) between those who believe that ART contradicts their tradition and belief.

Table 4: Willingness to use assisted reproductive technology among the studied group

Variables	Private (n=79)	Public (n=148)	$\chi 2$	p-value
Are you willing to use ART				
Yes	63(79.7)	99(66.9)	4.165	0.041*
No	16(20.3)	49(33.1)		
If no, why not?				
My spouse against it	4(25.0)	7(14.9)	4.151	0.528
My family/friends will mock me	1(6.3)	1(2.1)		
My religion not in support	4(25.0)	10(21.3)		
Against my cultural beliefs	2(12.5)	9(19.1)		
Unsure of competence of service providers	0	7(14.9)		
Others	5(31.3)	13(27.7)		
Are there ART types you would never use?				
Yes	27(34.2)	47(31.8)	0.137	0.711
No	52(65.8)	101(68.2)		
If yes, specify				

IVF	7(25.9)	15(31.9)	8.925	0.063
IUI	4(14.8)	2(4.3)		
GIF	0	5(10.6)		
ICSI	2(7.4)	0		
Surrogacy	14(51.9)	25(53.2)		
Willingness to use third party sperm/egg				
Yes	33(41.8)	50(33.8)	1.417	0.234
No	46(58.2)	98(66.2)		
Not sure				
Affordability	345,000±28701	302231±27069	1.045	0.298

$\chi 2$ = chi-square; statistically significant differences (P<0.05) are marked in bold*

79.7% and 66.9% of the respondents are willing to use ART, with a significant difference between those attending both facilities. Most declined Surrogacy & third sperm donation.

Table 5: Relationship between tribe and knowledge of assisted reproductive technology

Tribe	Poor knowledge n=161(%)	Good knowledge n=66(%)	$\chi 2$	p-value
Igbo	54(79.4)	14(20.6)	13.219	0.004*
Hausa	30(85.7)	5(14.3)		
Yoruba	29(54.7)	24(45.3)		
Others	48(67.6)	23(32.4)		

Statistically significant differences (P<0.05) are indicated in bold*, $\chi 2$ = chi-square

This indicates the relationship that tribe and knowledge are significantly correlated with a p-value of 0.004.

The Yoruba & Other tribes (45.3% & 32.4%) had good knowledge of ART as compared with the Igbo and Hausa tribes (20.6% & 14.3%).

The Hausa tribe has the poorest knowledge, 85.7% of ART, while the Yoruba tribe has better knowledge, 45.5% of assisted reproductive technology.

There is a significant difference in the knowledge of ART among different tribes p-value of 0.004.

Table 6: Relationship between tribe and perception of assisted reproductive technology

Tribe	Poor Perception n=161(%)	Good Perception n=66(%)	$\chi 2$	p-value
Igbo	42(61.8)	26(38.2)	1.748	0.626
Hausa	23(65.7)	12(34.3)		
Yoruba	25(47.2)	28(52.8)		
Others	30(42.3)	41(57.7)		

Statistically significant differences (P<0.05) are indicated in bold*, $\chi 2$ = chi-square.

From Table 6, among the respondents, the Yoruba and Other tribes had a better perception, with 52.8% and 57.7%, respectively, while the Hausa and Igbo tribes had a lower perception, with 34.3% and 38.2%, respectively. There is no significant difference in the perception of ART among different tribes.

Table 7: Relationship between religion and knowledge of assisted reproductive technology

Religion	Poor knowledge n=161(%)	Good knowledge n=66(%)	$\chi 2$	p-value
Christianity (Catholic)	55(76.4)	17(23.6)	7.243	0.065
Christianity (Protestants)	67(63.2)	39(36.8)		
Islam	34(82.9)	7(17.1)		
Traditional	5(62.5)	3(37.5)		

Statistically significant differences (P<0.05) are indicated in bold*, $\chi 2$ = chi-square

The respondents who were Protestant Christians and traditionalists (36.8% and 37.5%, respectively) had better knowledge of ART than the Catholic Christians and Muslims (23.6% and 17.1%, respectively). There is no significant difference in the knowledge of ART among different religions (p=0.065).

Table 8: Relationship between religion and perception of assisted reproductive technology

Religion	Poor perception n=161(%)	Good perception n=66(%)	$\chi 2$	p-value
Christianity (Catholic)	41(56)	31(43.1)	0.543	0.909
Christianity (Protestants)	64(0.4)	42(39.6)		
Islam	25(61.0)	16(39.0)		
Traditional	4(50.0)	4(50.0)		

Statistically significant differences (P<0.05) are indicated in bold*, $\chi 2$ = chi-square

The traditionalist (50.0%) also had a better perception towards ART than the Catholic Christians, Protestant Christians, and Muslims (43.1%, 39.6%, and 39.0%, respectively).

Muslim respondents (61.0%) have the worst perception of assisted reproductive technology.

There is no significant difference in the perception of ART among different religions (p=0.065).

4. Discussion

This study revealed that ethnic differences significantly shaped ART knowledge and perception. The Yoruba respondents, alongside other southern tribes, demonstrated better knowledge of ART (45.3% and 32.4%, respectively) compared to the Igbo (20.6%) and Hausa (14.3%) groups. This pattern aligns with findings by Adenike et al. [21], who also reported higher ART awareness among the Yoruba in Southwest Nigeria. These differences may reflect cultural openness and greater exposure to Western biomedical practices among the Yoruba, while the Hausa, who had the lowest knowledge scores, may be influenced by stronger traditional and religious conservatism that views ART as conflicting with divine will or natural conception. The Igbo respondents also showed lower knowledge, possibly influenced by cultural emphasis on natural fertility and lineage continuity. Furthermore, the widespread belief among both public and private facility users that ART contradicts religious teachings (93.7% and 80.4%, respectively) underscores the

deep-rooted role of faith-based perceptions in these ethnic groups, affecting willingness to accept ART.

Although the study population was relatively well-educated—with 76.7% attaining tertiary education—and mostly employed as civil servants (52.4%), ART knowledge and perception remained poor, contradicting the assumption that higher education correlates with greater ART awareness as reported by Eladle et al. [16]. This suggests that education alone may not suffice in improving ART understanding, possibly due to prevailing cultural or religious beliefs overriding formal knowledge. Income levels are also likely to confound ART acceptance, as the majority earned below ₦ 100,000 monthly, limiting their ability to afford expensive ART services. This economic barrier may have driven the preference for spiritual or traditional solutions over biomedical interventions, as evidenced by the predominant reliance on friends (32% in public and 15% in private facilities) rather than healthcare professionals for ART information. Thus, education and income likely interacted with socio-cultural and religious factors, jointly shaping respondents' attitudes toward ART.

The present findings correspond with Dattijo et al. [20], who reported low ART awareness among infertile women in Bauchi, Northern Nigeria—especially older women—despite formal education, thereby supporting the argument that cultural and religious factors may dilute the positive influence of schooling. Conversely, this study contrasts with Eladle et al. [16], who observed that individuals older than 25 years with higher education had better ART knowledge, indicating possible regional variations in how education impacts awareness. The preference for IVF as the most recognized ART method in this study aligns with reports by other researchers [18, 19], confirming IVF's dominance in public consciousness across Nigeria. These comparisons reinforce the idea that while knowledge patterns may appear similar in certain regions, socio-cultural and economic contexts shape ART perception and uptake in distinct ways.

Funding: No funding was obtained from any organization be it public, commercial or Non-governmental Organization.

Acknowledgments: We acknowledge our infertile couples, the doctors, the research assistant, and all those who have assisted in one way or another for the success of this study.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Ola TM. Assisted reproductive technology in Nigeria: flawed or favored? Int J Soc Sci Humanit. 2012;2(4):331.
2. World Health Organization. International Classification of Diseases, 11th Revision (ICD-11). Geneva: World Health Organization; 2018.
3. World Health Organization. Infertility definitions [Internet]. 2020 [cited 2025 Jun 30].
4. Ali S, Sophie R, Imam AM, Khan FI, Ali SF, Shaikh A, Farid-ul-Hasnain S. Knowledge, perceptions and myths regarding infertility among selected adult population in Pakistan: a cross-sectional study. BMC Public Health. 2011;11:1–7.
5. Araoye MO. Epidemiology of infertility: social problems of the infertile couples. West Afr J Med. 2003;22(2):190–6.
6. Cain M. The consequences of reproductive failure: dependence, mobility, and mortality among the elderly of rural South Asia. Popul Stud. 1986;40(3):375–88.
7. Arisukwu O, Igbolekwu C, Adebisi T, Akindele F. Perception of domestic violence among rural women in Kuje. Heliyon. 2021;7(2):e06303.
8. Ajayi RA. A decade of IVF in Nigeria: Our joy, their challenges. THISDAYONLINE. 2013 Apr 20.
9. Nisa Premier Hospital. Infertility and IVF. 2016 [cited 2025 Jun 30]. Available from: https://nisa.com.ng
10. Tolulope MO. Assisted Reproductive Technology in Nigeria: Flawed or Favoured. Int J Soc Sci Humanit. 2012;2(4):331–4.
11. Seybold D. Choosing therapies: a Senegalese woman's experience with infertility. Health Care Women Int. 2002;23(6–7):540–9.

12. Adamson GD, Tabangin M, Macaluso M, De Mouzon J. The numbers of babies born globally after treatment with the assisted reproductive technologies (ART). Fertil Steril. 2013;100:S42.
13. Ashiru AO, Akinola A. Fertility Fraud. Daily Sun. 2013 Apr 14;6(2343).
14. National Population Commission. Census 2006. Official Gazette Federal Republic of Nigeria.
15. Omokanye LO, Olatinwo AO, Durowade KA, Raji ST, Biliaminu SA, Salaudeen GA. Assisted reproduction technology: Perceptions among infertile couples in Ilorin, Nigeria. Saudi J Health Sci. 2017;6(1):14.
16. Eladle SAM, Aboraiah MIH, Mohamed HES. Knowledge, Attitude and Acceptability of Assisted Reproductive Technology among Infertile Women. Int J Nov Res Healthc Nurs. 2022;6(1):299–311.
17. Fertility Hub Nigeria. 2017 [cited 2025 Jun 30].
18. Begum MR. Assisted reproductive technology: Techniques and limitations. J Bangladesh Coll Phys Surg. 2008;26:135–41.
19. Jain M, Singh M. Assisted Reproductive Technology (ART) techniques. National Library of Medicine. 2023 Jun 7 [cited 2025 Jun 30].
20. Dattijo L, Andreadis N, Aminu B, Umar N, Black K. Knowledge of infertility among infertile women in Bauchi, Northern Nigeria. Age (Years). 2016;20(13):3–2.
21. Adenike OB, Wasiu A, Sunday O, Olaniyan B, Olufemi O. Prevalence of infertility and acceptability of assisted reproductive technology among women attending gynecology clinics in tertiary institutions in southwestern Nigeria. Gynecol Obstet. 2014;4:1–7.