

Awareness of and preventive practices against acquired female reproductive tract factor infertility among women of reproductive age in Nigeria

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Abstract

Background: Infertility is a major global reproductive health concern, with preventable acquired reproductive tract factor infertility contributing variably across populations. Limited awareness of its causes, risk factors, burden and prevention informed this study.

Aim: The aim was to assess awareness and prevention practices of acquired reproductive tract factor infertility among childbearing-age gynaecological clinic attendees.

Methods: An analytical cross-sectional study was conducted over a six-month period on 204 randomly selected participants at Niger Delta University Teaching Hospital. Data were collected through self-administered questionnaires. Dependent variables were level of awareness and prevention practices. Data were analyzed using univariate, bivariate and multivariable methods. Frequencies and percentages were used for descriptive analyses while Fisher's exact test and Student's t-test compared categorical and continuous variables respectively. Binary logistic regression analysis was used to identify factors associated with outcomes. Statistical significance was set at $p < .05$.

Results: Awareness of acquired reproductive tract factor infertility was 49.5%. Awareness was associated with education (aOR=3.13, 95%CI: 1.66-5.90, $p=0.0004$), fertility status (aOR=0.37, 95%CI: 0.16-0.85, $p=0.02$) and employment (aOR=0.34, 95%CI: 0.13-0.85, $p=0.02$). Infertile participants less practiced contraception (OR=0.45, 95%CI: 0.25-0.81, $p=0.01$) and protected sex (OR=0.49, 95%CI: 0.26-0.91, $p=0.02$). No significant difference in prevention practices among participants aware and unaware of acquired reproductive tract factor infertility ($p>.05$).

Conclusion: There was suboptimal awareness of acquired female reproductive tract factor infertility with poor preventive practices among attendees. This calls for concerted efforts through massive reproductive and sexual health campaigns and advocacy to improve awareness and health-seeking behavior in the setting.

Keywords: Awareness, prevention, reproductive tract factor infertility

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INTRODUCTION

Infertility is a major reproductive health concern globally ^{1,2} and acquired reproductive

tract factor infertility is a preventable contributor with variable prevalence across populations. Limited awareness of its causes,

risk factors, burden and preventive measures in this setting informed this study. Infertility affects approximately 10-15% of couples of reproductive age.³ The highest incidence is reported in the so called 'infertility belt of sub-Saharan Africa' where rates up to 30% are reported; much higher than the world average of 8-12%.⁴⁻⁶ Current global estimates suggest that around one in six individuals of reproductive age will experience infertility at some point in their lifetime.⁷ In patriarchal settings as Nigeria in sub-Saharan Africa, childbearing, often with a male offspring preference is high. When this is not achieved, it can trigger a chain of physical, psychological, mental, social, emotional and financial reactions in the affected couples, often extending through the immediate and extended families to the wider society. Infertility in a couple may result from male factors, female factors, a combination of both or remain idiopathic and can be either from congenital or acquired causes.

Female infertility may arise from genetic, environmental, reproductive (genital) tract, ovarian disorders or lifestyle factors.⁸ It can be primary if no prior pregnancy or secondary if at least a prior pregnancy irrespective of the outcome and currently unable to achieve a pregnancy despite one or more years of regular unprotected sexual intercourse.^{7,9-11} Secondary infertility is prevalent in areas of increased sexually transmitted infections (STIs), infection complications of first pregnancies or abortion, while primary infertility predominate where there is effective management of the aforementioned conditions.¹²⁻¹⁵ Of all these, the acquired reproductive tract factor infertility involving the utero-tubal segment constitutes a substantial and largely preventable cause.¹⁰ Studies have shown varying pattern in the spread of primary and secondary infertility across African infertile population with highest primary proportion in north Africa and highest secondary proportion in east and sub-Saharan Africa.¹³ The regional differences were attributed to the prevalent etiologic factors and level of awareness of infertility.^{13,16} Additionally, this global systematic review and meta-analysis reported that infertility risk factors disproportionately affect the women of

global South with 8.9 times prevalence of infertility in genital tuberculosis yet neglected.¹⁷

Female reproductive tract factor infertility is largely from acquired reproductive tract; uterine cavity and the fallopian tubes damage.^{9,13,18} This manifests majorly as blocked fallopian tubes and or intrauterine adhesions mostly from reproductive tract infections and inflammatory disorders.^{7,9-10,13,19} In Nigeria, about three-fifths of female infertility is caused by reproductive tract damage from infections. Many causes of acquired reproductive tract factor infertility are largely preventable.¹⁰ Other rare causes, are endometriosis, endometrial polyps, adenomyosis and uterine fibroids.^{1,9} The importance of these causes vary across the countries due to the differences in the background prevalence of sexually transmitted infections, abortion laws, healthcare system especially fertility care and differing age in populations studied coupled with sociocultural differences, pattern of sexual and reproductive health behavior.^{7,9,13,20,21}

The paucity of data on the acquired reproductive tract factor infertility particularly awareness and prevention in Bayelsa state and Nigeria at large underscores the need to investigate awareness levels and prevention practices utilized for this condition among women of childbearing age in the setting.

MATERIALS AND METHOD

This analytical cross-sectional study was conducted on women of reproductive-age attending the gynaecological clinic at Niger Delta University Teaching Hospital (NDUTH), Okolobiri, Bayelsa State, South-South Nigeria. NDUTH is a tertiary hospital providing teaching, research, clinical and reproductive health services to Bayelsa and neighboring states. The state is ethnically diverse; majorly, Izon, Nembe, Epie-Atissa, Ogbia with residents from across Nigeria and the world and rich in crude oil and natural gas. Neighboring states include Delta to the east, Rivers to the west, and the Atlantic south coastline.

Eligible participants were all the women of reproductive-age attending the clinic during the study period, excluding those who declined consent.

The sample size for this study was estimated using the Cochran formula²² for estimating sample size in cross-sectional studies, based on the known ARTFI prevalence of 13.5%.²³ The formula is as expressed;

$$z^2 \cdot p \cdot (1-p) / d^2 = 1.96^2 \times 0.135 \times 0.865 / 0.05^2 = 180$$

Plus 10% for attrition = 198

Where:

n = minimum required sample size

p = estimated prevalence of the relevant variable (here, the proportion of women with reproductive tract factor infertility)

q = 1 – p

Z = standard normal deviate corresponding to the desired confidence level (for 95% confidence, Z = 1.96 that is Z= the Z statistic for 95% confidence level (value for selected alpha level $\alpha=0.05$ which is 1.96)

d = margin of allowable error or desired precision (typically set at 0.05 for a 5% error margin). Systematic random sampling method was used to recruit consenting participants.

The sampling frame (N) consisted of the average number of gynecological clinic attendees (list of the target population; 15-49 years) recorded over the preceding three months prior to data collection, as obtained from clinic register. This was 288 attendees. From this, the sampling interval (k) was determined by dividing the estimated total number of eligible clinic attendees within data collection period by the calculated sample size (n) using this formula $k=N/n = 288/198 \approx 2$. The first participant was selected using simple random sampling technique by drawing lots among the first few eligible women on the clinic attendance list. Subsequently, every k-th (alternate) woman was systematically

selected until the required sample size was achieved.

Whenever an eligible woman declined participation or failed to meet the inclusion criteria at the time of selection, the next consecutive eligible attendee was enrolled in her place to maintain the sampling sequence. Data collection was continued daily during the clinic sessions until the targeted number of participants was recruited

Data were obtained using a pretested semi-structured questionnaire administered by the researcher and trained assistants. Cronbach's alpha coefficient was employed to evaluate internal consistency of grouped items assessing awareness and prevention measures. Values of +0.70 or more was interpreted as evidence of satisfactory internal consistency and acceptable. A satisfactory content validity was from expert assessment. Sections covered sociodemographic variables (age, occupation, marital status, parity, spouse occupation, education, ethnicity, socioeconomic class, and religion), gynecological history and knowledge of uterine factor infertility and prevention practices. Socioeconomic class was based on Olusanya's classification²⁴ using education (scores 0–2) and husband's occupation (1–3); for unmarried participants, adaptations used their education and occupation as applied in the married ones above. Classes 1-2 and 3-5 were further classified as upper and lower classes, respectively. For further subgroup analyses, the sociodemographic variables; age, education, marital status, employment were dichotomized in this study to <35 vs. ≥ 35 , $\leq$ secondary vs. tertiary, married vs. unmarried, employed vs. unemployed respectively.

Primary prevention variables included contraceptive use, consistent condom use, single sexual partner, and monogamy and hospital childbirths. Secondary prevention variables included early and appropriate treatment of PID/STI/puerperal sepsis, safe abortion practices and skilled birth attendance.

Awareness operationally referred to personally relevant knowledge of ARTFI causes, risk factors and prevention. Awareness scoring

used 34 multiple-choice questions: six on signs, 12 on aetiology/risk factors, and 16 on risk-related behaviors and preventive practices. Each correct answer/response scored one point and zero for incorrect; percentages 0–25% indicated no/very low awareness, 26–50% low, 51–75% moderate, and >75% high awareness. Awareness was therefore stratified into none/very low, low, moderate, or high respectively. These were subsequently dichotomized into aware (>50%score) or unaware ($\leq$ 50%score).

Data analysis

Data were collated with EPI INFO, and analysed using EPI INFO 3.5.1 and GraphPad InStat. Results were presented in text and tables. Primary outcomes were the proportions aware and those practicing primary or secondary prevention of ARTFI.

ARTFI-awareness was assessed across the sociodemographic characteristics of the participants, and its association with prevention practices was evaluated. Fisher's exact test and Student's T test were done for categorical and continuous variables respectively. Odds ratio from a 2x2 contingency table measured the strength of the association, while multiple logistic regression identified the significant predictors and controlled for the confounders. The statistical significance was set at $p < .05$ or 95% confidence interval exclusion of nullity of one.

Ethical considerations

Ethical approval was obtained from the Research and Ethical Committee of the study center. The participants were fully and clearly counseled on the study and verbal informed consent was obtained from each of them. They were assured of the confidentiality of data and that no personal identifiers were involved in the research questionnaires. They were informed of their rights; to participate or not. The anonymity of the participants was ensured in the presentation and the dissemination of results.

RESULTS

A total of 204 (98.6%) of 207 questionnaires were analyzed. Of 74 infertility cases,

42(56.8%) had ARTFI: tubal factor 39 (52.7%), uterine factor 2 (2.7%), and lower genital tract factor 1 (1.35%).

Table 1 summarizes participants' sociodemographic characteristics. Their median age was 32 years (IQR 12) with a modal age of 27 years and a modal age group 25–29 years (26%). Most of them were married 121(59.3%), predominantly in monogamous unions 110(90.3%) and had at least secondary education 184(90.2%). One-third were of upper, middle or lower social class respectively, 153(75%) were employed while 12.3% were unemployed and 12.7% students. The majority were Christians 199(97.5%) and Ijaw (72.5%). Over half were nulliparous 117(57.4%), and 130(63.7%) had no fertility problems.

Table 2 presents participants' awareness of acquired reproductive tract factor infertility (ARTFI). About two fifths 87(42.6%) ever heard of ARTFI while 60(29.4%) correctly defined it as inability to conceive pregnancy due to damage to the fallopian tubes, uterine cavity, cervix or vagina. Nearly half (48.5%) correctly associated tubal block to ARTFI, about one-third identified uterine fibroids (33.3%) and pelvic inflammatory disease (33.3%) while only 17.6% knew endometriosis as a possible cause. About three in ten knew that prior pelvic surgery or infection (26.5%) and sexually transmitted infections (30.9%) increase ARTFI risk. Although 82(40.2%) participants had ever discussed ARTFI with health professionals, only 87(42.6%) knew it is common in Nigeria. Most 133(65.5%) knew ARTFI affects both sexes, but only 31.4% knew uterine fibroids as a common cause of tubal block in Nigeria.

Table 3 shows participants' awareness of signs suggestive of underlying ARTFI. Most 149 (73.0%) suspected ARTFI in irregular or absent menses while about three fifths identified consistent painful sexual intercourse 121(59.3%) and consistent lower abdominal pain 117 (57.4%) as possible indicators. About 133(65.2%) associated it with prolonged abnormal vaginal discharge and failure to conceive after one year of trying. Overall, roughly half (48.5%) to over seven in ten

(73.0%) recognized common warning signs of underlying ARTFI in women.

Table 4 shows participants' awareness of risk-related behaviors and preventive practices for ARTFI. Approximately, half agreed that abortion induced by self-97(47.5%), patent medicine dealers (47.5%) or TBAs 108(52.9%) does not reduce ARTFI risk whereas 93(45.6%) believed doctor- or hospital-performed procedures reduce genital tract damage. Just over half associated hospital-supervised childbirth with fewer ARTFI-related complications while similar proportions associated TBA (53.2%) or home deliveries (51.5%) with higher risk. Nearly three-fifths knew that non-hospital miscarriage treatment does not reduce ARTFI risk but 43.1% recognized hospital care as protective. Over half identified smoking 113(55.4%), alcohol 104(51.0%) and multiple partners 107(52.5%) as non-protective, while about two-thirds 138(67.6%) knew condom use reduces STI-related ARTFI risk and about four-fifths recognized other contraceptives options as not protective.

Table 5 shows participants' levels of ARTFI-awareness. About half 103(50.5%) had low or no/very low awareness while 101(49.5%) were moderately or highly aware, giving an overall awareness rate of 49.5%. The mean awareness score was 17.52 ± 8.12 . Infertile participants had significantly lower scores than fertile counterparts (15.43 ± 7.48 vs. 18.72 ± 8.26 ; $p < 0.01$) with no difference between infertile women with ARTFI and those with other infertility causes (15.57 ± 7.40 vs. 15.25 ± 7.70 ; $p = 0.86$).

Table 6 shows factors associated with awareness of ARTFI. Participants aged ≥ 35 years were about 30% less knowledgeable than younger ones, though not statistically significant (aOR = 0.69; 95% CI: 0.38–1.24; $p = 0.22$). Education was significantly associated with awareness, as those with tertiary education were over three times more aware than those with lower education (aOR = 3.13; 95% CI: 1.67–5.90, $p < 0.01$). Parity had no significant effect, although nulliparous participants were 33% less aware than parous

ones (aOR = 0.67; 95% CI: 0.33–1.36; $p = 0.27$).

Employment significantly influenced awareness with students about 30% less aware than employed participants (aOR = 0.74; 95% CI: 0.32–1.71, $p = 0.48$), while unemployed participants were significantly 66% less aware (aOR = 0.34; 95% CI: 0.13–0.85, $p = 0.02$). Social class and marital status were not significantly associated, though upper social class participants and the unmarried were slightly more aware ($p > 0.05$). Marriage type and ethnicity also showed no significant associations, although polygamous participants were relatively less aware (aOR = 0.75; 95%CI: 0.22–2.57, $p = 0.65$). Fertility status was significant, with infertile participants 63% less aware than fertile counterparts (aOR = 0.37; 95% CI: 0.16–0.85, $p = 0.02$).

Table 7 presents ARTFI prevention practices among participants. Consistent male condom use for protected sex and contraception were significant preventive practices ($p < 0.05$). About 54% had ever used contraception, though infertile participants were 55% less likely to have done so (OR 0.45; 95% CI: 0.25–0.81; $p = 0.01$). Among contraceptive users, 35.8% used male condoms; infertile participants were 51% less likely to use condoms, a significant difference (OR 0.49; 95% CI: 0.26–0.91; $p = 0.02$).

About one-fifth treated STIs in hospital (OR=0.99, 95%CI: 0.50–1.96, $p = 1.00$) and a similar proportion used hospital care for PID with infertile participants 22% more likely though not significant. One-fifth had induced abortions in hospital ($p = 1.00$). Over three-fifths reported a single lifetime sexual partner; infertile participants were 40% less likely than fertile ones but this was not statistically significant (OR=0.62; 95% CI: 0.35–1.11; $p = 0.14$).

Table 8 shows ARTFI awareness and its preventive behaviors. The participants who were aware were about 50% more likely to practice contraception though they were statistically comparable (OR=1.49,95%CI:0.86–2.60, $p=0.16$). Similarly, those aware were 65% more likely to use male

condom during sexual intercourse, again, not statistically significant (OR=1.65, 95%CI: 0.93-2.95, $p=0.11$). Furthermore, the subset aware of ARTFI were 43% more likely to have had abdominal or pelvic surgery and this was not statistically significant (OR=1.43, 95%CI: 0.74-2.73, $p=0.32$). The ARTFI aware participants were three times less likely to indulge in cigarette smoking and 60% less likely to be taking alcohol. Nonetheless, none was statistically significant ($p>.05$). The participants were similar in their lifetime sex partners ($p>.05$) just like in their skilled attendance at childbirth despite a little 13% in favor of those aware of ARTFI. In cases of

fertility concerns, the subset who were aware of ARTFI were 40% more likely to consult health professional first but that was not statistically significant ($p>.05$). Again, those aware, had their PID about twice and STIs 35% more treated in hospital by medical doctors although they remained statistically comparable ($p>.05$). Similarly, those aware were 40% more likely to present with lower abdominal pains, nonetheless, not statistically significant (OR=1.40, 95% CI: 0.85-2.60; $p=0.20$) indicating that the observed difference may be due to chance.

Table 1: Sociodemographic profile of participants

Characteristics	Variables	Frequency	%
Age group (years)	≤34	127	62.3
	≥35	77	37.7
Marital status	Single	70	34.3
	First marriage	110	53.9
	Remarried	11	5.4
	Separated/divorced/widowed	3	1.5
	Co-habiting	10	4.9
Marriage Arrangement	Monogamous	110	90.9
	Polygamous	11	9.1
Educational level	≤Secondary	77	37.7
	≥Tertiary	127	62.3
Employment	Government employed	61	29.9
	Private Organization	16	7.8
	Self-employed	76	37.3
	Students	26	12.7
	Unemployed	25	12.3
Religion	Christianity	199	97.5
	Islam	5	2.5
Parity	0	117	57.4
	≥1	87	42.6
Tribe	Ijaw	148	72.5
	Others	56	27.5
Socioeconomic class	Upper	64	31.4
	Middle	69	33.8
	Lower	71	34.8
Type of Participants	Fertile	130	63.7
	Infertile	74	36.3

Table 2: Awareness of acquired female reproductive tract factor infertility. N=204

Test	Correct n (%)	Incorrect n (%)
Ever heard of reproductive tract factor infertility	87(42.6%)	117(57.4%)
Best definition/description of acquired female reproductive tract factor infertility	60(29.4%)	144(70.6%)
Conditions that can cause/contribute to reproductive tract factor infertility.(4):		
-endometriosis	36(17.6%)	168(82.4%)
-Fibroids	68(33.3%)	136(66.7%)
-Tubal damage/block	99(48.5%)	105(51.5%)
-Pelvic inflammatory disease	68(33.3%)	136(66.7%)
How common is reproductive tract factor infertility in Nigeria	87(42.6%)	117(57.4%)
Who does reproductive tract factor infertility affect?	133(65.5%)	71(34.5%)
Ever had a conversation/discussion with a healthcare provider on reproductive tract factor infertility	82(40.2%)	122(59.8%)
Which of these will increase the risk of having acquired female reproductive tract factor infertility?		
- History of pelvic surgery or infection	54(26.5%)	150(73.5%)
-Sexually transmitted infection (STI)	63(30.9%)	141(69.1%)
Common cause of blocked fallopian tube in Nigeria	64(31.4%)	140(68.6%)

Table 3: Knowledge of common signs indicating possible underlying acquired reproductive tract factor infertility. N=204

Sign	Correct (%)	Incorrect (%)
Consistent painful sex	121(59.3)	83(40.7)
Irregular/absent menses	149(73.0)	55(27.0)
Heavy/prolong menstrual periods	99(48.5)	105(51.5)
Consistent lower abdominal pain or discomfort	117(57.4)	87(42.6)
Prolong abnormal vaginal discharge	133(65.2)	71(34.8)
Difficulty conceiving after ≥ 1 year of trying	128(62.7)	76(37.3)

Table 4: Awareness of risk-related behaviors and prevention practices of acquired reproductive tract factor infertility. N=204

Risk-Related Behavior for ARTFI	Correct Response	Frequency of Correct Response	(%)
Behavior that has reduced risk of ARTFI:			
Self-Induced abortion	No	97	47.5
Patent medicine dealer induced abortion	No	97	47.5
Traditional birth attendant (TBA) /herbalist induced abortion	No	108	52.9
Hospital/medical doctor induced abortion	Yes	93	45.6
Home childbirth	No	105	51.5
TBA childbirth	No	108	53.2
Hospital childbirth	Yes	105	51.5
Home treatment of miscarriage	No	113	55.4
TBA treatment of miscarriage	No	104	51.5
Patent medicine dealer treatment of miscarriage	No	116	56.9
Hospital treatment of miscarriage	Yes	88	43.1
Multiple sex partners	No	107	52.5
Abdominopelvic surgeries	No	81	39.7
Alcohol consumption	No	104	51.0
Cigarette smoking	No	113	55.4
Consistent use of which of these contraceptive has reduced risk of STI, fallopian tube damage & ARTFI:			
-oral contraceptive pill contraception	No	156	76.5
- injectable contraception	No	147	72.1
- implant contraception	No	160	78.4
- male condom contraception	Yes	138	67.6
-Natural method	No	159	77.9

Table 5: Level of awareness of acquired reproductive tract factor infertility among the participants. N=204

ARTFI Awareness Scoring	Frequency	Percentage	Awareness Level
0-25%	32	15.7	Very low
26-50%	71	34.8	Low
51-75%	53	26.0	Moderate
76-100%	48	23.5	High
Total	204	100.0	

Table 6: Factors associated with awareness of acquired reproductive tract factor infertility (Multivariable Logistic Regression)

Variable	Category	Awareness frequency (%)	Bivariate analysis		Multivariate analysis	
			OR(95%CI)	p-value	aOR(95%CI)	p-value
Age	≥35	33(42.9)	0.65(0.37-1.15)	0.15	0.69(0.38-1.24)	0.22
	<35	68(53.5)	1			
Education	≤ Secondary	26(33.8)	1	<0.01	1	<0.01
	Tertiary	75(59.1)	2.83 (1.57-5.11)			
Parity	0	59(50.4)	1.09(0.63-1.90)	0.78	0.67(0.33-1.36), 1	0.27
	≥1	42(48.3)	1			
Employment	Employed	82(53.6)	1	0.53	1	0.48
	Students	12(46.2)	0.74(0.32-1.71)			
	Unemployed	7(28.0)	0.34(0.13-0.85)			
Social class	Upper	40(62.5)	2.16(1.18-3.96)	0.02	1.40(0.70-2.79)	0.34
	Lower	61(43.6)	1			
Marital Status	Married	60(48.4)	1	0.77	1	0.97
	Unmarried	41(51.3)	1.12(0.64-2.0)			
Marriage type	Monogamous	55(49.1)	1	0.76	1	0.65
	Polygamous	5(41.7)	0.74(0.22-2.47)			
Fertility status	Infertile	29(39.2)	0.52(0.29-0.93) 1	0.03	0.37(0.16-0.85)	0.02
	Fertile	72(55.4)	1			
Ethnicity	Ijaw	72(48.6)	1	0.69	1	0.89
	Non-Ijaw	29(51.8)	1.13(0.61-2.10),			

Table 7: Reproductive tract factor infertility prevention practices cross-tabulated by the infertile and fertile subsets of participants N=204

Prevention practice	Frequency 204 (%)	Infertile (N= 74)	Fertile (N= 130)	OR(95% CI)	p-value
Consistent male condom use	73(35.8)	19(25.7)	54(41.5)	0.49(0.26-0.91)	0.02
Consistent Hospital deliveries	46(22.5)	16(21.6)	30(23.1)	0.92(0.5-1.8)	0.86,
Medical doctor induced abortion provider / in hospital/clinic	39(19.1)	13(17.6)	26(20.0)	0.85(0.41-1.8)	0.71
Contraception practice	111(54.4)	31(41.9)	80(61.5)	0.45(0.25-0.81)	0.01
Consistent Hospital Treatment of STI	47(23.0)	17(23.0)	30(23.1)	0.99(0.50-1.96)	1.00
Health professional First consultation	178(87.3)	65(87.8)	113(86.9)	1.09(0.46-2.58)	1.00
Hospital Treatment of PID	40(18.7)	16(21.6)	24(18.5)	1.22(0.60-2.48)	0.59
Single lifetime sex partners	95(46.6)	29(39.2)	66(50.9)	0.62(0.35-1.11)	0.14,
Non-alcoholic intake	131(64.2)	48(64.9)	83(63.8)	1.0(0.58-1.89)	1.00

Table 8: Level of awareness of acquired reproductive tract factor infertility and preventive behaviors of the participants.

Preventive Behaviors	ARTFI Aware n=101	ARTFI Unaware n=103	OR(95%CI)	p-value
Contraceptive use	60(59.4)	51(49.5)	1.49(0.86-2.60)	0.16
Consistent male condom use	42(41.6)	31(30.1)	1.65(0.93-2.95)	0.11
Previous pelvic/abdominal Surgical	27(26.7)	21(20.4)	1.43(0.74-2.73)	0.32
First consultation of healthcare personnel	90(89.1)	88(85.4)	1.40(0.61-3.20)	0.53
Non-cigarette smoking	100(99.0)	100(98.0)	3.00(0.31-29.3)	0.62
Non-alcohol intake	70(69.3)	61(59.2)	1.60(0.87-2.77)	0.15
Single lifetime sex partner	47(46.5)	48(46.6)	1.00(0.58-1.73)	1.00
Mean lifetime sex partners	2.3±1.8	2.4±1.8	-	0.69
Consistent hospital/skilled attendance at childbirth	30(29.7)	28(27.2)	1.13(0.62-2.1)	0.76
≥1 induced abortion	34(33.7)	45(43.7)	0.65(0.37-1.15)	0.15
Doctor/hospital induced abortion	20(19.8)	22(21.4)	0.91(0.46-1.79)	0.86
hospital/physician treatment of PID	25(24.8)	15(14.6)	1.93(0.95-3.93)	0.08
hospital/physician treatment of STIs	26(25.7)	21(20.4)	1.35(0.70-2.60)	0.41
Lower abdominal pains treatment	48(47.5)	39(37.9)	1.40(0.85-2.60)	0.20

DISCUSSION

This study was designed to investigate the awareness and the preventive practices of acquired reproductive tract factor infertility among women of reproductive age attending gynaecological clinic in a tertiary hospital. The main findings of this study were awareness of acquired reproductive tract factor infertility of 49.5% with a mean awareness score of 17.52 ± 8.12 inconsistent with one other report.¹⁶ Awareness was associated with education, fertility status and employment. Fertile participants more frequently practiced contraception and protected sex. Contraceptive uptake and condom use were associated with lower odds of ARTFI. There was suboptimal prevention practices among the participants.

The median age was 32 years and comparable to other reports,^{1,25-28} but differed from these other findings.^{10,29-31} The majority 59.3% of the participants were in marriage and 62.3% of them attained tertiary level of education unlike the report from Douala Cameroon where the majority were of secondary level of education.¹ About two fifths of the participants were self-employed while a third were government-employed in contrast with a report from another African

country where the leading number of participants were government-employed and self-employed the least.¹ Vast majority 79.9% were either nulliparous 57.4% or low parity 22.5% comparable to the report by Abiodun et al.²⁵

Overall, the participants had low level of awareness of acquired reproductive tract factor infertility with only 49.5% demonstrating good level of awareness. This was however, higher than the report by Osazee et al working on graduate youth corpsers in Benin City on awareness of risk factors of tubal factor infertility.³¹ Interestingly, only 42.6% of them ever heard of reproductive (genital) tract factor infertility while 40.2% ever discussed it with health professionals and supposedly for that reason only a few; 29.4% correctly described it as the inability to conceive pregnancy secondary to damage to fallopian tubes, uterine cavity, cervical canal or vaginal tract. Just about a half of the participants associated tubal block to acquired reproductive tract infertility in contrast to a higher previous report,¹⁶ emphasizing the need for increased organized sex education; reproductive health education to the childbearing age women to improve on their awareness and prevention practices of this silent but common disorder.

To further buttress this poor awareness in this population, only 33.3% apart for fibroid and pelvic inflammatory disease and as low as 17.6% for endometriosis knew that these are risk factors for reproductive tract factor infertility. In Nigeria infertility rates are high and majority are secondary to reproductive tract damage yet only 42.6% of this population knew it is common in Nigeria indicating awareness gap. Again, fibroid is a common disorder in this setting yet only 31.4% knew fibroid as a common cause of tubal block in Nigeria. The majority 65.5% of the participants knew that RTFI can affect both the male and the female partners in disagreement with another report.¹⁶

The participants were fairly quick to correctly suspect an underlying pathology associated with risk of RTFI in cases of irregular or absent menstrual periods (73%) consistent with another report.¹⁶ Submucous fibroids, intrauterine adhesions or pelvic inflammatory disease can present with such menstrual irregularities. About three fifths of them would suspect the possibility of ARTFI in persistent dyspareunia, chronic lower abdominal pain, persistent abnormal vaginal discharge and when conception is delayed up to a year or more of trying to conceive. All these can point to pelvic infection, endometriosis or even fibroids each implicated in genital tract damage and infertility.^{4,32} This underscores the need for timely interventions through health education programs to sensitize women especially reproductive age group to increase their awareness of the risk factors, risk-related behaviors and preventive measures of ARTFI at personal and general levels. If there is adequate awareness about ARTFI and appropriate attitude, the prevalence of infertility in general and ARTFI in particular will be markedly reduced. Infertility is more prevalent in developing countries because of lack of its basic knowledge.¹⁶

In the assessment of awareness of risk-related behavior and prevention practices of ARTFI, about half of the participants knew that self, or patent medicine dealer or traditional birth attendant (TBA) induced abortion is unsafe and not protective of ARTFI consistent with

another report.³² Disappointingly, only 45.6% knew that induced abortion in hospital by medical doctor is safer with reduced risk of genital tract damage and infertility. The implication of these findings is the need for extensive and intensive health education and women empowerment for quality health decisions and practices. In similar vein, only 51.5% of the participants accepted that hospital supervised childbirth unlike home or TBA supervised is associated with reduced risk of complications likely to damage the reproductive tract with consequent ARTFI. The poor awareness of home and TBA home delivery not being protective of ARTFI in this data further highlights the urgent need for the creation of quality reproductive health awareness in this population. Though about three fifths of the participants agreed that miscarriages managed at homes or TBA homes are not protective of complications that can lead to ARTFI, nonetheless only 43.1% agreed that hospital management offers safe option. About half; 55.4% of the participants agreed that cigarette smoking, while 51% agreed that alcohol intake and 52.5% accepted that multiple sex partners are respectively not protective against ARTFI. These findings are suggestive of the need for intensified health education to improve the awareness on infertility and particularly RTFI in this setting. While 67.6% of the participants knew that consistent use of male condom to protect sexual intercourse, the vast majority 72.1-78.4% accepted that none of the oral contraceptive pills, implants, injectable and natural option would protect against STIs and PID with consequent genital tract damage and RTFI. This finding though higher than a previous finding¹⁶, is suggestive of poor contraceptive awareness and utilization in this population highlighting the need for quality contraceptive services. A previous study in Nigeria reported high level of contraceptive awareness among pregnant women but unmatched very low uptake prior to their index pregnancies and the willingness to uptake a method of modern contraception postpartum.³³

The sociodemographic characteristics of the participants were inconsistently impactful on their levels of awareness. For instance, the

fertile participants were comparatively more aware of RTFI than the infertile counterparts. This can explain their disparity in awareness and fertility status as those with quality knowledge were more likely to be circumspect in their reproductive health behaviors. Education was very influential on the awareness of the participants just as employment was after controlling other factors consistent with previous findings.¹⁶ This finding demonstrates education of the woman as the key to empowerment and should be a crucial intervention if level of awareness is to be improved and sustained. Quality education is expected to attract quality employment and in synergy increase the awareness level and the quality of lifestyle of the individual. This corroborated a report in the literature where health care participants were more aware of tubal factor infertility among near educationally homogenous participants with tertiary level of education.³¹ Though the influence of the social class on ARTFI awareness was unremarkably comparable, the higher class seemed more aware with weak evidence for any interventional utilization. The evidence from the participants' age, parity, marital status and arrangement were equally weak from this study and require further investigations to confirm their influence.

Strengths and limitations of the study

Self-reporting of one's behavior is known to be fraught with under reporting bias more so sensitive information on sexual life and reproductive experiences.

This was a hospital-based data that may not be generalizable to the larger public. The findings may be expected to differ in a larger and possibly multicenter data.

Furthermore, a cross sectional study design largely focuses on the characteristics of a study population and hardly addresses the concerns of how, when and why the characteristics occurred. Another strength of this study was derived from its prospective data largely known to be complete and a scientifically determined sample size that improves the power of the study. An analytical cross-sectional design can identify factors

associated with outcome and using regression analysts, determines the independent predictors unlike simple cross-sectional study.

Though analytical cross-sectional study design can establish association between exposure and outcome variables measured at the same point in time, it lacks the capacity to infer causality and establish the temporal sequence of the exposure –outcome relationship.

Implications of the findings of the study

The findings have important public health, clinical, policy and research implications especially for reproductive health programming in low-resource settings like Nigeria. This highlighted a substantial knowledge-practice gap; as awareness did not translate into better preventive behaviors despite nearly half of the participants being aware of ARTFI. This suggests that information alone was insufficient to drive changes in sexual and reproductive health behaviors underscoring the need for interventions beyond awareness creation to behavior-change-oriented strategies like sustained counseling, engagement and skills building.

The strong association between awareness, higher education and employment indicates that ARTFI knowledge is socially patterned, discriminating against women with lower socioeconomic status. This underscores the need for targeted, community-based reproductive health education for women with reduced access to health information like those with limited formal education and unemployed.

Infertile participants were evidently less aware of ARTFI and to practice contraception or protected sex, paradoxically placing them at higher risk of preventable reproductive tract infections and damages that could worsen infertility. This suggests that infertility may drive risk-taking behaviors motivated by a desire to conceive, emphasizing the need for integrated infertility and infection-prevention counseling and services in clinical care.

Additionally, the lower protective sex practices among infertile women also implies

gaps in routine infertility care, necessitating the incorporation of ARTFI prevention, safe sex counseling, STI screening and follow-up into infertility management. Overall poor prevention practices indicates a system-wide gap in reproductive health promotion, not limited to awareness status reinforcing the need for comprehensive sexual and reproductive health programs that integrate contraception, STI prevention, fertility education and culturally sensitive messaging.

Furthermore, policy responses should promote context-specific strategies that integrate infertility prevention into family planning and STI services, prioritize behavior change communication than information dissemination and address socioeconomic inequities in accessibility to reproductive health education. Finally, future research should examine barriers; cultural beliefs, stigma, partner influence and health system factors to translating knowledge into practice and evaluate effective interventions through longitudinal and interventional studies.

CONCLUSION

This study demonstrated inadequate prevention of ARTFI driven not only by suboptimal awareness but also by socioeconomic inequities and behavioral factors. This underscores the need for organized multifaceted, equity-based reproductive health intervention incorporated early enough in educational and health programmes to improve the awareness and prevention of this disorder.

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