Female Genital Cutting and Infertility in Marriage: A Cross-Sectional Study among Women in Nigeria

By

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Abstract
Thirty percent of the risk factor of infertility are unexplainable/unidentified. This study examined the association between female genital circumcision and infertility in Nigeria. Data on women who gave valid responses to circumcision status, number of total children ever born, whether or not currently pregnant and married/living with partner for at least two years preceding the survey were extracted from 2013 Nigeria Demographic and Health Survey. Descriptive bivariate and a three-model binary logistic regression were used to examine net impact of female genital cutting on infertility experience in Nigeria. Out of the total weighted sample size 16,922, 3.1% of the respondents experienced infertility with 2.8% and 3.3% of them belonging to circumcised and not circumcised group respectively. The results show that "unexplained" risk factors of female infertility are not significantly traceable to female genital cutting**.** Conclusively, preventing infertility requires comprehensive approach rather than focusing on a single factor.

Keywords: Female genital cutting, Infertility, Barren women, Circumcision, Nigeria

Introduction

In most typical African society marriages or marital unions are performed to fulfill one of the dictates of God "Be fruitful and multiply; fill the earth and subdue it; …" (AlQuran, Surah 25:74; Bible, Genesis 1:28). Marriage and childbearing are seen as human preservation, propagation and perpetuation (Kyalo, 2012), thereby, immediate or not-too-long childbearing and childbirth after marriage is seen as a thing of joy and as an answer to prayers. Childbearing, which is regarded as a religious duty to God also validates marriage among many ethnic groups in Nigeria (Kaufman, 2009; Ibisomi & Mudege, 2013). Furthermore, it is seen as a good sign of lineage furtherance and as a guarantee for old age security. The Yoruba says "Bi ina ba ku afii eru boju, bi ogede ku afii omo re ropo", translated as "when fire is quenched there is ash to replace it, when banana tree dies, another stems from it for replacement". However, "unfruitful marriage" or "marital union without seed" which is otherwise known as infertility or childlessness is regarded as unfortunate occurrence

that no married woman or couple wants. This is evident among the three major ethnic groups in Nigeria.

The Yoruba says that "Eniti o bimo ko raye wa" meaning that "a woman without a child is not worth living" and from the Northern region which is dominant of Hausa people they call childless woman "Juya" referring to them as "useless" "one who eat and defecate the pits only" while in the Eastern part of Nigeria, the Igbo derogatorily refer to childless woman as "Nwanyi aga turime okwu onu" meaning "Barren/unfruitful woman gets pregnant of spite (negative words)". Whenever it happens, the woman involved is the first suspect of the problem, most often; female bear the burden of infertility than their male counterparts. At times, in this African setting it is regarded as punishment of some sins in the life of the woman (Dasaolu, 2004). Even though this sexual and reproductive dysfunction has to do with couple, that is, having both male and female counterparts accounting for appreciable or almost the same proportion of the reproductive abnormalities and inadequacies (Chowdhury, 2009; Ali, Sophie, Iman, Khan, *et al.*, 2011; Owolabi, Fasubaa & Ogunniyi, 2013; Scarneciu, Lupu & Scarneciu, 2014) yet most often than not, women in such union bear the sole blame and brunt (Boyacioglu & Turkmen, 2008; Odinga, 2011; Mital, Shefali, Dinesh, *et. al.*, 2012; Yakubu, 2016; Loto, 2017). To overcome this "problem" childless women go ahead visiting different places ranging from traditional to modern spiritualists (Erinosho, 2006; Jegede, 2010; Aluko-Arowolo & Ayodele, 2014).

Infertility is operationally defined by World Health Organization (WHO) as the inability of couples to achieve conception despite frequent, unprotected sexual intercourse for at least one year duration or inability of a woman to carry a pregnancy to the delivery of a live baby (Sule, Erigbali and Eruom, 2008; World Health Organization, 2014). Out of the world total incidence of infertility, close to 9% are found in developing countries and over 20% of these are domicile in Nigeria (Boivin, Bunting, Collins & Nygren, 2007; Ghana Statistical Service, 2011; Chimbatata & Malimba, 2016). The African traditional belief system recognizes childbearing in marriage as the primary function of women and thereby sees any woman that fails to bring forth children as an outcast. They are stigmatized, faced with open ridicule and dehumanized in the home and often by the general public. Studies have shown women with this condition having aggravated depression and lowered self-esteem due to physical violence, threats, rejection and the likes suffered from the male partners and the family members (Mogobe, 2005; Hollos & Larsen, 2008; Van Balen & Bos, 2009; Fledderjohan, 2012; Ibisomi & Mudege, 2013).

Considering the problem of infertility in any pro-natalist and patriarchy society cannot be overemphasized. Most often than not, infertile or childless women are left to suffer in silence (Nwosu & Friday, 2015) despite the fact that either male or female partners can be responsible for infertility in 30% cases, or in some cases both couples are involved in about 25 to 30% while the remaining 10 to 15% cases could neither be traced to any actual or definite factor in men or women [unexplained infertility] (Kollie, 2009; Hasina, Meerjady & Sonia, 2011). Previous studies on impaired human fertility have identified diverse risk factors ranging from genetic abnormalities, infections, aging, life style and some environmental agents which could be from either or both spouses (Howe, Westhoff, Vessey, & Yeates, 1985; Augood, Duckitt & Templeton, 1998; Mital, Shefali, Dinesh, *et. al.*, 2012). Though the etiology of infertility in Africa is fairly well understood, but given that the health care provision, health facilities and resources are limited in the region, infertility treatment becomes difficult and costly (Larsen, 1995). So therefore, further effort to trace the risk factor in order to prevent infertility is still crucial in Nigeria.

Despite criticism and condemnation from various national and international arenas against female genital cutting (FGC), the prevalence of the practice even though declining still stands at a very high level in many African countries (including Nigeria) (WHO, 2013). The social cum cultural motivation and support for FGC has been with humanities for a very long time. Historically, record has it that Egyptian mummies were found to have been circumcised as far back as 200 B.C. (Dine & Lindmark, 1992). FGC has been a persistence worrying practice to some missionaries who recognized it as an inhuman act as far back as 1906 (Thomas, 2000). But despite all efforts to put a check to this gender-confined act, the menace continues despite pains, fatal complications and other health consequences traceable to the practice of FGC.

It is more prevalent in Africa and some Asia countries but it has been extended to the developed nations due to migration (UNICEF, 2013). FGC, which is generally referred to as special form of gender-based abuse and violence against womanhood (WHO, 2015) is a partial or total removal of the external female genital, or other injury to the female organs for non-medical reasons (WHO, 2013). It is an act being practiced in more than 30 countries of the world with more than three-quarter concentration in North-East and West African nations (Almroth, Elmusharaf, El Hadi, Obeid, *et al.,* 2005), where more than 140 million women have undergone FGC and many more young girls and grown up ladies are still at greater risk of this experience every year (UNICEF, 2005; WHO, 2013).

Rationale behind FGC has been shrouded in so much controversy and myth. Some people engage in it in order to abide and conform to social tradition and culture, as one of the yardsticks for "marriageability" and for promoting beauty of their daughters (Carr, 1997; WHO, 2007; Van Rossem & Gage, 2009; Sipsma, Chen, Ofori-Atta, *et al.* 2012; Oyefara, 2014). Other practitioners understand it from their various "religion" perspectives, even though no known religion categorically subscribe to the practice (Titilayo, Palamuleni & Anuodo, 2015). Islam and Christianity unambiguously stand against inflicting harm on others (von der Osten-Sacken & Uwer, 2007; El-Damanhoury, 2013; Gomaa, 2013). Many believed that FGC checks sexual excessiveness, hyper-sexuality and infidelity; promote chastity and virginity before marriage thereby securing family honour (Onidek, 2010; Ankomah, Mamman-Daura, Omoregie, Anyanti, 2011; Sipsma, Chen, Ofori-Atta, *et al.* 2012; Oyefara, 2014).

The campaign against FGC has been trending in many nations of the world for several decades. Many countries like Egypt, Somalia among others with high prevalence of FGC, international organizations and some Western nations like United Kingdom, France and Canada are in support of the eradication of FGC. They referred to it as an act that violates human rights (Human Rights Watch, 2010). Though, investigation into the consequences and impact of FGC has revealed some adverse effect on women's reproductive, sexual, mental and general health (Odoi, Brody & Elkins, 1997; Orji & Babalola, 2006; Elnashar & Abdelhady, 2007; Okeke, Anyaehie & Ezenyeaku, 2012;) but the details anatomical extent and long term reproductive consequences are yet to be totally ascertained (Almroth, Elmusharaf, El Hadi, Obeid, *et al.,* 2005) and research still stands insufficient in this area (Berg & Denison, 2012a; 2012b; Iavazzo, Sardi, & Gkegkes, 2013; Berg, Underland, Odgaard-Jensen, Fretheim & Vist, 2014). Furthermore, there have been some contractions in findings from the studies on the association of FGC with infertility. While some studies (Inhorn & Buss, 1993; Almroth, Elmusharaf, El Hadi, Obeid, *et al.,* 2005) could not really established association between FGC and infertility due to methodological flaws in research strategies, some researchers came up with varied reports both in unadjusted and adjusted analyses (Morison, Scherf, Ekpo*et al.,* 2001; Klouman, Manongi & Klepp, 2005).

This present study thus attempts to fill this gap in knowledge by using a nationally representative retrospective, cross-sectional case-control data set among women in Nigeria.

Data Source and Methodology

Data and Sample

The 2013 Nigeria Demographic and Health Survey (NDHS) is the fifth Demographic and Health Survey (DHS) and the latest follow-up in the series (1990, 1999, 2003 and 2008) for the country. It is a richly nationally representative data that provide up-to-date information on the population health and socio-economic situation across the six geo-political zones of the country. The sampling procedure for the survey involved a multi-stage probability technique in selecting 38,948 women of reproductive age. The survey procedure and instruments were ethically approved by Ethics Committee of the ICF Macro International, Inc., Calverton, Maryland and the National Ethics Committee in Nigeria. Further detailed report of the methodologies involved in the survey can be obtained from the 2013 NDHS final report (NPC [Nigeria] and ICF International, 2014). The present study chose to utilize 2013 NDHS data for two reasons 1. It is the latest of the DHS series in Nigeria, and 2. It is the second in the series that investigate on FGC (2008 being the first). Originally, 38,948 respondents were involved in 2013 NDHS but the present survey covers a total weighted sample size of 16,922 respondents. The inclusion and exclusion criteria run thus: Respondent must be currently married or living with a partner as at the time of the survey, must have been in the marital union for a minimum duration of two years, must provide valid responses to the following questions: number of children ever born; whether currently pregnant; if no child and not currently pregnant, must not be currently using contraceptive, and finally must provide a valid answer to female genital cutting status.

Variables (Dependent and Independent)

Dependent Variable

The dependent variable for the study is infertility experience among married women of reproductive age. Measured in this study as defined by WHO (2014); Infertility, which is usually classified into two (primary and secondary) is operationally defined by World Health Organization (WHO) as the inability of couples to achieve conception despite frequent, unprotected sexual intercourse for at least one-year duration or inability to carry a pregnancy to the delivery of a live baby (Sule, Erigbali and Eruom, 2008; World Health Organization, 2014). We conceptualized a minimum period of two years in this study because of the self-report nature of the data. That is, to be selected for this study, a woman must be married and currently living with a partner for a minimum period of two years preceding the 2013 survey. Married or living with partner was taking as a proxy for active sexual intercourse, since no such direct question was asked in the survey. Women who reported 0 (zero) as the total number of children ever born, who were not pregnant as at the time of the survey and were not presently using contraceptive were regarded as infertile in this study, while those who reported at least 1 child or who were presently pregnant were regarded as being fertile in the study.

Independent and co-founding variables

The main independent variable was the genital cutting status of women. Whether women were circumcised or not? This variable was a Yes=1 or No=0 question. Every “Yes” response was regarded as circumcised while “No” response was taken as not circumcised women. Respondents who answered “Don’t know” were regarded as system missing respondents, thereby were excluded from the analysis. Some co-founding variables (age, residence, region, educational level, duration in marriage, ever had sexually transmitted disease, and ever tried to delay or avoid pregnancy) were examined in the study as intervening variables.

Methods

The study utilized a weighted sample size of the respondents who were currently married, have lived with partner for at least two years and had a valid response to circumcision status. All these reduced the original sample size to 16,922 (43.4% of the total sampled population). The analyses of the study were executed with the aid of SPSS version 20. Chi-square tests of independence were conducted for categorical variables here. Significant differences were determined using Chi-square at $p<0.05$; and a three-model binary logistic regression was used to examine the net impact of socio-economic and demographic factors on the interaction between FGC and infertility experience among married women in Nigeria. The use of the binary logistic regression was based on the fact that the dependent variable was dichotomous.

Ethical approval

Ethical approval was obtained by Measure DHS from National Ethics Committee in Nigeria. After describing the issues relating to the study to the eligible respondents, an informed consent was equally obtained from all the study participants before the commencement of the interview.

Results

Percentage distributions of socio-economic and demographic characteristics of respondents by their genital cutting status were presented in Table 1. It was found in the study that 16,922 weighted samples/respondents had valid responses to the question on circumcision status, whether currently pregnant or not, married and living with partner for at least two years preceding the survey. Out of this total, 6,769 (40.0%) respondents experienced female genital circumcision. Those respondents who experienced FGC served as the case-group while their counterparts who did not experience FGC served as the control-group in the study. Incidence of FGC declined among the young generation when compared with the older generations, the proportion which was 47% among the 45-49 years age group significantly dropped to 30% among the youngest age group 15-19 years. Educational level had a mixed relationship with FGC. The relationship was significantly at its lowest (30%) among the "no education" group and rose to its peak (50%) with respondents who had secondary education but dropped again (39%) among respondents with higher education ($P<0.001$). Occurrence of FGC was significantly higher among urban residence than respondents who reside in rural areas (49% and 34% respectively).

Table 1: Association between Socio-Economic and Demographic Characteristics of Respondents and Female Genital Cutting Experience

	Female Genital Cutting Status				
Characteristics	**Case Group (Circumcised)**		**Control Group (Not Circumcised)**		**P-Value**
	No	**%**	**No**	**%**	
Age (years)					
15-19	200	30.0	466	70.0	0.000
20-24	705	32.4	1469	67.6	
25-29	1251	36.0	2225	64.0	
30-34	1289	40.3	1911	59.7	
35-39	1274	42.4	1732	57.6	
40-44	1039	46.6	1193	53.4	
45-49	1011	46.7	1156	53.3	

Educational Level					
No education	2266	30.1	5257	69.6	0.000
Primary	1660	49.1	1718	50.9	
Secondary	2250	49.9	2260	50.1	
Higher	593	39.2	918	60.8	
Residence					
Urban	3462	48.6	3660	51.4	0.000
Rural	3307	33.7	6492	66.3	
Region					
North Central	377	32.0	802	68.0	0.000
North East	135	5.5	2305	94.5	
North West	2143	33.3	4286	66.7	
South East	1215	66.9	602	33.1	
South South	837	41.8	1164	58.2	
South West	2062	67.5	993	32.5	
Years in Marriage					
Less 5	865	37.8	1421	62.2	0.001
5-10	1627	38.5	2596	61.5	
More than 10	4278	41.1	6135	58.9	
Respondent ever had STI					
No	167	32.9	341	67.1	0.001
Yes	6599	40.2	9808	59.8	
Respondent ever used anything or tried to delay or avoid pregnancy					
No	4319	35.6	7810	64.4	0.000
Yes	2450	51.1	2342	48.9	

There exist a significantly higher proportion of circumcised women in the southern part than the northern region. The South West and South East residences take the lead with average of 67% while the lowest proportion (6%) of circumcised women was found among respondents who reside in the North-East, Nigeria. As shown in Table 1, prevalence of FGC was significantly lower (38%) among younger generation married women than their older married counterparts (41%). Ever had sexually transmitted disease and ever tried to delay or avoid pregnancy were significantly higher among circumcised women (40% and 51% respectively) than their other respective counterparts in the study location (Table 1).

Table 2 presents the bi-relationship between fertility status (fertile and infertile) and some interesting socio-demographic and other characteristics of the respondents. Fertility status had a significant relationship with current age, educational level, residence, region and years in marriage of respondents. As shown in Table 2, the highest proportion of infertility occurred among the youngest age group (15-19 years) is 15%), among the rural (4%) and women who had spent less than 5 years in marriage (10%). North Eastern residents had the highest proportion of infertility (5%) while the lowest infertility occurrence was among South Western (2%). Educational level had mixed significant relationship with fertility status. The highest proportion was found among women

with higher level of education followed by those with no education and the least proportion was within primary educational level group. Women whose partners drink alcohol are slightly less likely to experience infertility than their counterparts whose partners do not consume alcohol (3.3% and 2.5% respectively). Contrary to literature opinion, respondents who had ever used anything or tried to delay or avoid pregnancy were significantly less likely to experience infertility than their counterparts who never attempted to delay or avoid pregnancy.

Table 2: Association between Socio-Economic and Demographic Characteristics of Respondents and Fertility Status

	Fertility Status				
	Fertile		Infertile		P-Value
Characteristics	**No**	**%**	**No**	**%**	
Age (years)					
15-19	570	85.5	97	14.5	0.000
20-24	2086	96.0	88	4.0	
25-29	3387	97.4	89	2.6	
30-34	3117	97.4	84	2.6	
35-39	2944	97.9	62	2.1	
40-44	2170	97.2	62	2.8	
45-49	2124	98.1	42	1.9	
Educational Level					
No education	7233	96.1	290	3.9	0.000
Primary	3315	98.2	62	1.8	
Secondary	4404	97.6	106	2.4	
Higher	1446	95.7	65	4.3	
Residence					
Urban	6944	97.5	178	2.5	0.000
Rural	9455	96.5	345	3.5	
Region					
North Central	1158	98.1	22	1.9	0.000
North East	2327	95.4	113	4.6	
North West	6193	96.3	236	3.7	
South East	1764	97.0	54	3.0	
South South	1949	97.4	52	2.6	
South West	3008	98.5	47	1.5	
Years in Marriage (years)					
Less 5	2061	90.2	225	9.8	0.000
5-10	4108	97.3	116	2.7	
More than 10	10230	98.2	183	1.8	
Husband/Partner drinks Alcohol					
No	10127	96.7	344	3.3	0.032
Yes	2487	97.5	65	2.5	
Respondent ever had STI					
No	490	96.6	17	3.4	0.412
Yes	15902	96.9	505	3.1	

Respondent ever used anything or tried to delay or avoid pregnancy					
No	11645	96.0	485	4.0	0.000
Yes	4754	99.2	38	0.8	
Circumcision Status					
Not circumcised	9818	96.7	335	3.3	0.034
Circumcised	6580	97.2	189	2.8	

Table 3: Odds Ratios of Infertility among Ever-Married Women in Nigeria by selected Socio-economic, Demographic and Respondents' Experience

Variables/Categories	Model 1		Model 2		Model 3	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
FGM/C Status						
Not Circumcised	**1.189**^{ns}	**0.992-1.426**	**0.855** ^{ns}	**0.697-1.048**	**0.831**^{ns}	**0.658-1.050**
Circumcised ^{RC}	**1.000**		**1.000**		**1.000**	
Age						
15-19			**0.608**^{ns}	**0.354-1.045**	**0.430**^{s}	**0.235-0.786**
20-24			**0.303** ^{s}	**0.183-0.502**	**0.227**^{s}	**0.130-0.397**
25-29			**0.390**^{s}	**0.247-0.614**	**0.288**^{s}	**0.174-0.477**
30-34			**0.704** ^{ns}	**0.466-1.064**	**0.644** ^{ns}	**0.410-1.012**
35-39			**0.866** ^{ns}	**0.577-1.301**	**0.696** ^{ns}	**0.439-1.103**
40-44			**1.444** ^{ns}	**0.969-2.152**	**1.250** ^{ns}	**0.800-1.955**
45-49 ^{RC}			**1.000**		**1.000**	
Educational Level						
No Education			**0.837**^{ns}	**0.571-1.227**	**0.716** ^{ns}	**0.462-1.109**
Primary			**0.563**^{s}	**0.379-0.836**	**0.489**^{s}	**0.312-0.768**
Secondary			**0.628**^{s}	**0.449-0.878**	**0.581**^{s}	**0.399-0.845**
Higher ^{RC}			**1.000**		**1.000**	
Residence						
Urban			**0.898** ^{ns}	**0.718-1.123**	**1.019** ^{ns}	**0.794-1.308**
Rural ^{RC}			**1.000**		**1.000**	
Region						
North Central			**1.333** ^{ns}	**0.782-2.272**	**0.965** ^{ns}	**0.522-1.784**
North East			**4.043**^{s}	**2.636-6.198**	**2.955**^{s}	**1.835-4.759**
North West			**2.900**^{s}	**1.952-4.307**	**1.809**^{s}	**1.159-2.824**
South East			**2.006**^{s}	**1.337-3.011**	**1.729**^{s}	**1.102-2.714**
South South			**1.816**^{ns}	**1.196-2.757**	**1.804**^{s}	**1.145-2.843**
South West ^{RC}			**1.000**		**1.000**	
Years in Marriage						
Less than 5 years			**12.779**^{s}	**8.840-18.475**	**13.545**^{s}	**8.981-20.430**
5-10 years			**3.336**^{s}	**2.399-4.640**	**3.200**^{s}	**2.210-4.633**
More than 10 years ^{RC}			**1.000**		**1.000**	

Husband/Partner drinks Alcohol		
No	**0.953 ns**	**0.686-1.325**
Yes **RC**	**1.000**	
Respondent ever used anything or tried to delay or avoid pregnancy		
No	**4.516 s**	**3.090-6.600**
Yes **RC**	**1.000**	

RC = Reference Category; ns=(not significant) (p>0.005); s=(significant) (p<0.005)

Table 3 presented multivariate analysis of a 3-model binary logistic regression. Model 1 considered the unadjusted binary logistic regression between circumcision status and fertility status of women. It revealed a non-significant higher (19%) likelihood of infertility occurrence among uncircumcised women than their circumcised counterparts (OR=1.189; CI: 0.992-1.426). With the consideration of socio-demographic variables in Model 2, the adjusted binary logistic regression revealed slightly not significant lower odds of infertility among uncircumcised women than their circumcised counterparts (15%; CI: 0.697-1.048). Still in Model 2, the likelihood of infertility was 44.4% (CI: 0.969-2.152) higher among women aged 40-44 years when compared with those aged 45-49 years. All other younger age groups revealed a much less likelihood of infertility in reference to 45-49years age group. The odds of infertility were lesser among women of all categories of educational level when compared with women of higher education. The relationship was statistically significant among primary and secondary education attainment. Women who were urban residents were 10.2% less likely to experience infertility compared with rural residents (OR=0.898; CI: 0.718-1.123). There exist higher odds of infertility among women of all regions compared to reference category (south west). The highest occurrence was among northeastern women, which was significantly four times more likely to experience infertility compared to their southwestern counterparts (OR=4.043; CI: 2.636-6.198; P<0.001). A statistical significant higher odds ratio of infertility existed among women who had spent 10 years or less in marriage. Women who had spent less than 5 years in marriage were significantly thirteen times more likely to experience infertility (OR=12.779; CI: 8.840-18.475; P<0.001) than their counterparts who had spent more than 10 years.

In the last model as presented in Table 3, the odds of infertility remained consistently lower among the uncircumcised married women in Nigeria compared to the circumcised women (OR=0.831; CI: 0.658-1.050). After controlling for all the socio-economic and other intervening variables, the odds of infertility flow the same dimensions almost for all the variables except in few cases. For instance, odds of infertility among urban residents were almost 2% higher than rural residents (OR=1.019; CI: 0.794-1.308) unlike what the picture was in Model 2 (OR=0.898; CI: 0.718-1.123). Women who never used anything or tried to delay or avoid pregnancy were almost five time more likely to experience infertility compared with those who ever tried to delay pregnancy (OR=4.516; CI: 3.090-6.600; p>0.005).

Discussion and conclusion

Our study attempted to find out the direction of relationship between female genital cutting and fertility status concentrating on infertility. Although previous studies have revealed both short- and long-term negative consequences and adverse effects of FGM/C on women's reproductive, sexual,

mental and general health (Odoi, Brody & Elkins, 1997; Orji & Babalola, 2006; Elnashar & Abdelhady, 2007; Okeke, Anyaehie & Ezenyeaku, 2012) yet epidemiological and biosocial claims still believes that there is more to be done in this regards (Almroth, Elmusharaf, El Hadi, Obeid, *et al.*, 2005) and research still stands insufficient in this area (Berg & Denison, 2012a; 2012b; Iavazzo, Sardi, & Gkegkes, 2013; Berg, Underland, Odgaard-Jensen, Fretheim & Vist, 2014).

We employed a weighted sample size of 16,922 (43.4%) of the total 38,948 respondents selected for 2013 Nigeria Demographic and Health Survey (NDHS). The selected weighted sample for this present study were those women who were currently married and living with husband/partner for a minimum of 2 years preceding the nationally representative 2013 NDHS, must provide valid responses to the following variables: Number of children ever born; whether currently pregnant or not; if no child and not currently pregnant, must not be currently using contraceptive; ever had a terminated pregnancy; and female genital status. Providing a valid response to each of the above listed questions helped us to determine the respondents' fertility status (fertile and infertile) as defined by World Health Organization (2014) in relation to FGC status.

The study revealed a declining trend in FGC among the older and younger generations though 40% (6,769) of the weighted sample respondents in this study still experienced FGC. The prevalence of FGC estimated in this study was in line with the national data among adult women as reported by Okeke, Anyaehie & Ezenyeaku, (2012) in their study titled "An overview of female genital cutting in Nigeria". The decline in FGC as observed in this study was consistent with previous findings in Nigeria (UNICEF, 2001; NPC and Macro, 2013). Estimated prevalence of infertility (3.1%) in this study looks rather too low when compared with other studies (Kollie, 2009; Hasina, Meerjady & Sonia, 2011; Nwosu & Friday, 2015). The variation in the estimated infertility in this study from the past record could be as a result of the peculiar group (must give a valid response YES or NO to circumcision status) that the study focused on. The other inclusion criteria (as mentioned above) while most of these other studies were based on all women, not self-report as the case in this study. Some of them (Okonofua, 1996; Sule, Erigbali & Eruom, 2008) were actually carried out in the clinic. The unadjusted predictive power in the study showed that having experienced circumcision did not make a woman significantly more vulnerable to infertility than their uncircumcised counterparts. In actual fact, the unadjusted odds ratio in Model 1 revealed a higher likelihood of (unadjust OR = 1.189; CI: 0.992-1.426; P=0.061) infertility among the uncircumcised respondents (control group) than the circumcised (case) group. Further analysis in the study showed a different dimension of results with the introduction of some socio-economic and demographic covariate variables. The retrospective cross-sectional data showed a relatively slight lower predictive power of infertility for the uncircumcised women (adjusted OR =0.855; CI: 0.697-1.048; P=0.131). All these results were in line with some previous studies (Inhorn & Buss, 1993; Almroth, Elmusharaf, El Hadi, Obeid, *et al.*, 2005). The study could not really establish a significant positive association between FGC and infertility. Our study was not the only one in this realm, the difficulty of establishing association between FGC and infertility was in consonant with bodies of literature as highlighted by Berg, Underland, Odgaard-Jensen, Fretheim & Vist (2014). This does not mean that FGC does not have a negative impact on fertility status of women but that it could be minimal for this analysis to discover. Then the limitations embedded in the data could also be responsible for the lack of association between the variables.

Limitation of the study

It is paramount to note that there are some limitations attributed to our study. Firstly, the dataset employed being a cross-sectional survey could not be used to establish causality relationship among the dependent and independent variables. Also, the fact that the responses in the data were self-

reported could lessen the accuracy level of our analyses and reports. Furthermore, our study was not able to establish different types or levels of FGC and thereby, was not able to distinguish the implications as regards infertility.

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