Knowledge, Attitude, and Perception of Nigerians Towards Herbal Contraception: A Questionnaire-Based Study

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ABSTRACT

Aims: With a population of about 222 million, which is expected to rise to 377 million making Nigeria the 3rd largest country in the world by 2050, a well-planned family will improve the quality of life of mother and child.

Methodology: A non-probability online survey was conducted (October 2021 and November 2021), recruiting 1113 participants across Nigeria. Socio-demographic data and information on contraceptives were obtained, and Pearson's chi-squared test of independence at a 95% confidence interval (CI) was computed using R 4.2.1.

Results: Significant associations ($P < .001$) were found between age, marital status, education, and profession of respondents. About 44.65% were 15-29 years, while 41.2% were 30-34 years. No significant association was observed between the age group, gender, and the need for population control. Females (50.04%), 15-29 years old (66.48%) are more likely to approve of the need for population control. Likewise, females (22.01%), with tertiary education (18.78%) are well-informed about contraceptive use ($P < .001$). Only 19.38% (n = 184; $P < .001$) of participants used herbal contraceptives, in the form of liquid mixtures (55.98%), teas (17.93%), pills (12.50%), and powders (10.87%), with 26.63% > 7.61% > 6.52% > 5.98% = 5.98% = 5.98% > 4.89% > 3.80% who took Moringa, Alligator Pepper, Neem Plant, Castor Beans, African Star apple Momordica, Rosary Pea, and Horse-eye Bean respectively as contraceptives. Aged parents (32.07%), friends (31.52%), doctors (15.76%), herbalists (5.98%), pharmacists (5.43%), and nurses (3.80%) played a significant ($P < .001$) role in recommending these herbs. Furthermore, 76.37% recommended the development of indigenous herbal contraceptives in Nigeria, while 23.63% did not.

Conclusion: Although participants have expressed a preference for herbal contraceptives, knowledge of them is lacking, which calls for more awareness campaigns and policy formulations for their promotion, development, and adoption in Nigeria.

1. INTRODUCTION

According to the United Nations, Nigeria has the largest population in Africa, with 222,266,236 people (as of 3/17/2023), and is expected to grow to more than 377 million people by the year 2050 [1,2]. Managing the population is an essential part of the Sustainable Development Goals (SDGs). The negative impacts of rapid growth on a country are manifested in employment, species extinction, deforestation, desertification, climate change, destruction of ecosystems, and pressure on housing [3]. Hence, accessible and cost-effective family planning (FP) programs are needed to boost Nigeria's economic development [4].

Family planning programs play an important role in reducing the number of children born and thus improving their quality of life [5]. Couples who choose FP freely space, and time, and limit the number of children they want [6]. It has been reported [7] that about 50% of pregnancies are unintended, with 50% of undesirable outcomes such as risky abortions, deaths, and unwanted children who bear the burden of poverty and neglect. Nigeria utilizes only 16% of contraceptives when compared to what is obtainable globally [7]. Even though contraceptives provide many benefits, some contraceptive methods are associated with undesirable side effects, including heart attacks, hypertension, migraines, strokes, blood clots, headaches, depression, obesity, increased risk of breast cancer, cervical cancers, and suicide attempts [8]. It is against this backdrop that, many countries are turning to the use of herbs to control fertility [9], resulting in natural product researchers re-focusing their interest on the use of herbs with potential contraceptive effects [10]. In Nigeria, herbs have been used as contraceptives due to their availability, cost-effectiveness, minimal side effects, and popularity [11]. According to the World Health

Organization (WHO), about 80% of the population relies on herbal medicines (HMs) for their primary healthcare needs [12]. About 133 plants have been identified to possess contraceptive ability [13], these possess sterilizing, contraceptive, or abortifacient properties by either inhibiting the implantation of the ova, influencing sperm count, motility/viability, or causing early expulsion of the fetus, and termed as antifertility, anti-ovulatory, anti-implantation, or abortifacient herbs [14,15]. A recent survey conducted by members of our group [11] confirmed that the preference for HMs has continued to increase, however, our study did not look at the specific disease areas, nor are there substantial studies in recorded literature in this area. It is therefore of high critical priority to assess the knowledge, attitude, and perception of Nigerians about herbal contraceptives (HCs) to not only inform evidence-based regulatory policies but also to direct efforts towards Research and Development (R&D) of therapeutics for population control towards national socio-economic development.

2. METHODOLOGY

2.1 Study Setting

Nigeria is situated in the West Africa region, and lies between longitudes 3° and 14° and latitudes 4° and 14°, between the Sahel to the North and the Gulf of Guinea to the South in the Atlantic Ocean and has a landmass of 923,769 km^2 [16].

2.2 Sampling Method

To recruit participants in Nigeria, an online survey (October to November 2021) was conducted by sharing the link to the questionnaire on social media platforms, using the snowball sampling technique. Participation was completely consensual, anonymous, and voluntary. Socio-demographic data and information on contraceptives were obtained. A descriptive statistical analysis was conducted on the data obtained, and Pearson's chi-squared test of independence at 95% confidence interval (CI) was computed using R 4.2.1 statistical package.

3. RESULTS

3.1 State of Origin of Respondents

A total of 1113 participants were recruited from the six (6) geographical zones of Nigeria (Fig. 1). Results show that 27.67% (n = 308) of the respondents were from North-Central Nigeria and 8.63% (n = 96) from the Northeast. About 6.38% of respondents live in Kogi state; 6.20% in Benue, and 5.57% live in Delta state.
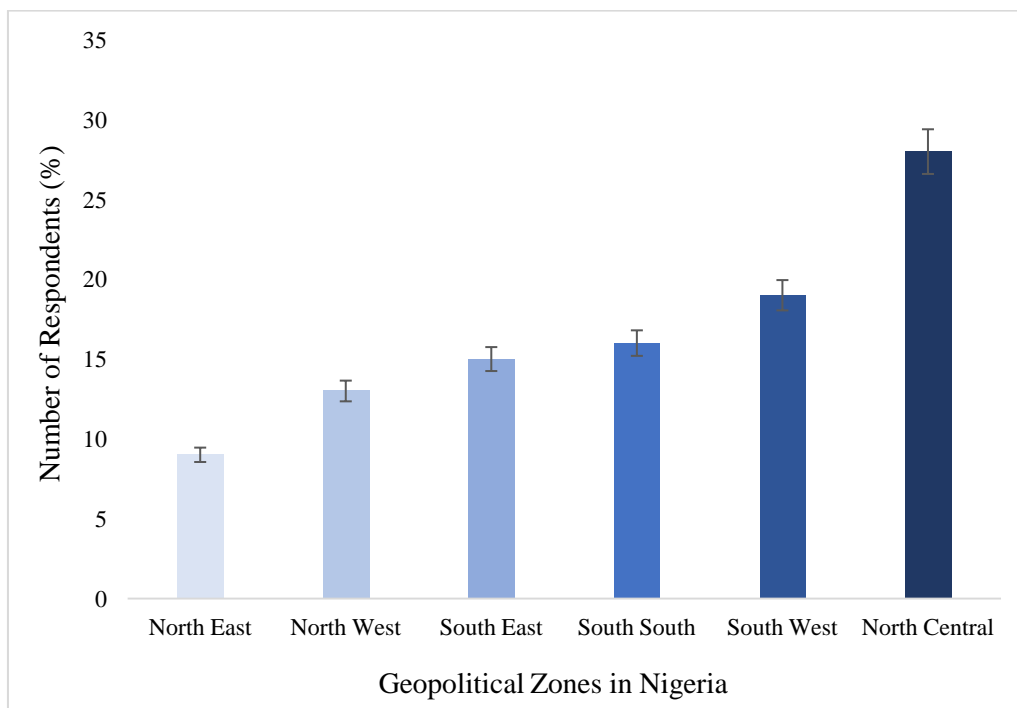

Fig. 1. Respondents according to geopolitical zones in Nigeria

3.2 Socio-Demographic Characteristics of Respondents

The results of the demographic information (Age group, gender, marital status, educational qualification, and profession) of the respondents are shown in Table 1. It is observed that there is a significant difference ($P < .001$) in the age, marital status, educational qualification, and profession of the respondents.

3.3 Need for Population Control

Details of the demography of respondents and the need for population control are shown in Table 2. No significant association was observed between the age group and gender of the respondents to their perception of the need for population control. However, there is a significant association ($P < .001$) between the need for population control and marital status, educational qualification, and profession. These parameters show that 41.78% of participants who are married and have obtained their tertiary education (43.86%) indicated the need for population control. However, only 26.06% of the population are healthcare workers.

3.4 Awareness of Respondents on the Use of Contraceptives

Our study found a significant association between the age group ($P = .003$), gender, marital status, educational qualification, and profession ($P < .001$) of the participants, and how informed they are on the use of contraceptives (Table 3). The data presented shows that 22.01% of females and 18.78% of those who have obtained their tertiary education are well-informed about the use of contraceptives.

3.5 Knowledge of Respondents on Types of Contraceptives

Table 4 shows a significant association ($P < .001$) between the demographic information of the participants and the knowledge of the types of contraceptives. Most of the respondents are familiar with conventional contraceptives, compared to HCs.

Table 1. Demographic information of respondents

Variables	Demographic Information (N = 1113)	
	Responses n (%)	**Chi-Squared Test (95% CI)**
Age Group		
15-29	497 (44.65)	x^2 = 1027
30-44	459 (41.24)	df = 4
45-59	135 (12.13)	p-value < .001
60-74	21 (1.89)	
75-89	1 (0.09)	
Gender		
Female	668 (60.02)	x^2 = 616.37
Male	442 (39.71)	df = 2
Others	3 (0.27)	p-value < .001
Marital Status		
Single	475 (42.68)	x^2 = 1344.30
Married	565 (50.76)	df = 4
Divorced	37 (3.32)	p-value < .001
Separated	26 (2.34)	
Others	10 (0.90)	
Education		
Primary	25 (2.25)	x^2 = 731.45
Secondary	119 (10.69)	df = 4
Tertiary	534 (47.98)	p-value < .001
Postgraduate	304 (27.58)	
Others	128 (11.50)	
Profession		
Healthcare	314 (28.21)	x^2 = 221.34
Others	799 (71.79)	df = 1
		p-value < .001

N = Number of observations; n = number of respondents; % = Percentage response; df = Degree of freedom; CI = Confidence Interval

Table 2. Perception of respondents on the need for population control according to demographic information

Demographic Information	Need for population control (N = 1113)		
	No n (%)	Yes n (%)	Chi-Squared Test (95% CI)
Age Group			
15-29	74 (6.65)	423 (66.48)	x^2 = 8.88
30-44	83 (74.57)	376 (38.01)	df = 4
45-59	22 (1.98)	113 (10.15)	*P*-value = .06
60-74	8 (0.72)	13 (1.17)	
75-89	0 (0.00)	1 (0.08)	
Gender			
Female	111 (9.97)	557 (50.04)	x^2 = 5.35
Male	74 (6.65)	368 (33.06)	df = 2
Others	2 (0.18)	1 (0.09)	*P*-value = .07
Marital Status			
Single	60 (5.39)	415 (37.29)	x^2 = 30.64
Married	100 (8.98)	465 (41.78)	df = 4
Divorced	11 (0.99)	26 (2.34	*P*-value < .001
Separated	11 (0.99)	15 (1.35)	
Others	5 (0.45)	5 (0.45)	
Education			
Primary	13 (1.17)	12 (1.08)	x^2 = 68.82
Secondary	36 (3.23)	38 (7.46)	df = 4
Tertiary	57 (5.12)	477 (42.86)	*P*-value < .001
Postgraduate	43 (3.86)	264 (23.72)	
Others	38 (3.41)	90 (8.09)	
Profession			
Healthcare	24 (2.16)	290 (26.06)	x^2 = 25.34
Others	163 (14.65)	636 (57.14)	df = 1
			P-value < .001

N = Number of observations; n = number of respondents; % = Percentage response; df = Degree of freedom; CI = Confidence Interval

3.6 Respondents Who Have Used Herbal Contraceptives

3.6.1 The proportion of respondents who used HCs and the dosage form used

Fig. 2. presents data on respondents who have used one form of HCs or the other. Only 19.38% (n = 184; *P* < .001) of the respondents have used HCs, in the form of herbal liquid mixtures: 55.98% (n = 103); herbal contraceptive teas: 17.93% (n = 33); herbal contraceptive pills: 12.50% (n = 23); and herbal contraceptive powders: 10.87 % (n = 20).

3.6.2 Types of herbal contraceptives used

Interestingly, there is a significant association (*P* < .005) between male participation and females who took HCs, results show that more males

took *Chrysophyllum albidum*, *Aframomum melegueta*, *Moringa oleifera*, and *Azadirachta indica* than females (Table 5).

3.6.3 Who recommended the use of HCs

Furthermore, Fig. 3 shows that aged parents, friends, doctors, herbalists, pharmacists, and nurses played a significant (*P* < .001) role in recommending these herbs to the respondents.

3.7 Recommendation for the Development and Use of an Indigenous Herbal Contraceptive

3.7.1 Recommendation for the development of HCs

Table 6 shows that 76.37% (n = 850) of the respondents recommended the development,

promotion, adoption, and use of indigenous HCs. No significant association between age group, gender, marital status, and profession was observed. Only educational qualification has a significant association ($P < .001$) with the recommendation for the development and use of HCs.

Table 3. Awareness of Respondents on the Use of Contraceptive

Demographic Information	Information on contraceptive use (N = 1113)					
	Very well informed n (%)	Well informed n (%)	Little informed n (%)	Not informed n (%)	Others n (%)	Chi-Squared Test (95% CI)
Age						
15-29	72 (6.47)	154 (13.83)	187 (16.80)	80 (7.18)	4 (0.36)	$x^2 = 35.48$
30-44	82 (7.37)	152 (13.66)	152 (13.65)	65 (5.84)	8 (0.72)	df = 16
45-59	22 (1.98)	58 (5.21)	39 (3.50)	14 (1.26)	2 (1.80)	*P*-value = .003
60-74	0 (0.00)	4 (0.36)	11 (0.99)	4 (0.36)	2 (0.18)	
75-89	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.09)	0 (0.00)	
Gender						
Female	104 (9.34)	245 (22.01)	228 (20.46)	82 (7.37)	9 (0.81)	$x^2 = 104.86$
Male	72 (6.47)	123 (11.05)	160 (14.38)	82 (7.37)	5 (0.45)	df = 8
Others	0 (0.00)	0 (0.00)	1 (0.09)	0 (0.00)	0 (0.00)	*P*-value < .001
Marital Status						
Single	71 (6.38)	137 (12.31)	192 (17.25)	71 (6.38)	4 (0.37)	$x^2 = 82.88$
Married	98 (8.81	215 (19.32)	175 (15.73)	71 (6.38)	6 (0.54)	df = 16
Divorced	6 (0.54)	10 (0.89)	11 (0.99)	7 (0.63)	3 (0.27)	*P*-value < .001
Separated	1 (0.09)	3 (0.27)	10 (0.89)	11 (0.99)	1 (0.09)	
Others	0 (0.00)	3 (0.27)	1 (0.09)	4 (0.36)	2 (0.18)	
Education						
Primary	0 (0.00)	3 (0.27)	8 (0.72)	14 (1.23)	0 (0.00)	$x^2 = 147.46$
Secondary	10 (0.90)	20 (1.80)	61 (5.48)	26 (2.34)	2 (0.18)	df = 16
Tertiary	79 (7.10)	209 (18.78)	198 (17.79)	38 (3.41)	10 (0.90)	*P*-value < .001
Postgraduate	70 (6.29)	110 (9.88)	82 (7.37)	44 (3.95)	1 (0.09)	
Others	17 (1.53)	26 (2.34)	40 (3.59)	42 (3.77)	3 (0.27)	
Profession						
Healthcare	79 (6.83)	146 (1.08)	76 (0.09)	12 (7.10)	1 (0.09)	$x^2 = 101.65$
Others	97 (28.12)	222 (13.66)	313 (1.35)	152 (8.72)	15 (1.35)	df = 4
						P-value < .001

N = Number of observations; n = number of respondents; % = Percentage response; df = Degree of freedom; CI = Confidence Interval
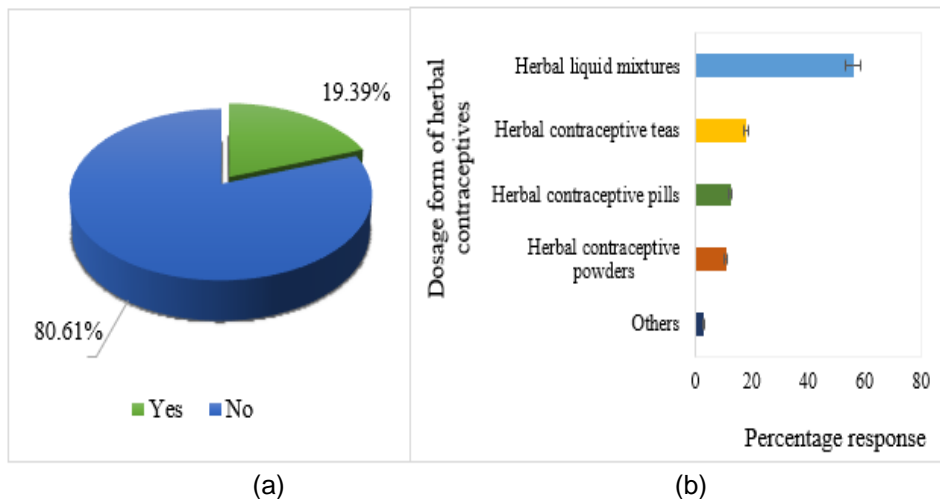

Fig. 2. (a) Proportion of respondents who used herbal contraceptives; (b) Dosage form of herbal contraceptives used by respondents

Table 4. Knowledge of Respondents on Types of Contraceptives

Demographic Information	Knowledge of Types of Contraceptives (N = 949)				
	Conventional Contraceptive n (%)	Herbal Contraceptive n (%)	Both n (%)	None n (%)	Chi-Squared Test (95% CI)
Age					
15-29	293 (30.87)	67 (7.06)	50 (5.27)	7 (0.74)	x^2 = NaN
30-44	279 (29.40)	51 (5.37)	52 (5.48)	12 (1.26)	df = 12
45-59	87 (9.17)	14 (1.48)	18 (1.90)	2 (0.21)	*P*-value =NA
60-74	8 (0.84)	3 (0.32)	4 (0.42)	2 (0.21)	
75-89	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	
Gender					
Female	447 (47.10)	62 (6.53)	66 (6.95)	11 (1.16)	x^2 = 35.88
Male	220 (23.18)	71 (7.59)	56 (5.90)	12 (1.26)	df = 6
Others	0 (0.00)	1 (0.11)	2 (0.21)	0 (0.00)	*P*-value < .001
Marital Status					
Single	383 (29.80)	64 (6.74)	51 (5.37)	6 (0.63)	x^2 = 66.1
Married	366 (38.57)	52 (5.48)	62 (6.53)	14 (1.48)	df = 12
Divorced	11 (1.16)	11 (1.16)	5 (0.53)	3 (0.32)	*P*-value < .001
Separated	5 (0.53)	8 (0.84)	2 (5.37)	0 (0.00)	
Others	2 (0.21)	0 (0.00)	4 (0.42)	0 (0.00)	
Education					
Primary	8 (0.84)	3 (0.32)	0 (0.00)	0 (0.00)	x^2 = 119.47
Secondary	63 (6.64)	27 (2.85)	2 (0.21)	1 (0.11)	df =12
Tertiary	376 (39.62)	54 (5.69)	57 (6.00)	9 (0.95)	*P*-value < .001
Postgraduate	193 (20.34)	18 (1.90)	46 (4.85)	6 (0.63)	
Others	27 (2.84)	33 (3.48)	19 (2.00)	7 (0.74)	
Profession					
Healthcare	238 (25.08)	12 (1.26)	49 (5.16)	3 (0.32)	x^2 = 44.43
Others	429 (45.21)	123 (12.96)	75 (7.90)	20 (2.11)	df = 9
					P-value < .001

N = Number of observations; NaN = Not a Number; NA = Not applicable; n = number of respondents; (%) = Percentage response; df = Degree of freedom; CI = Confidence Interval

Table 5. Proportion of males and females who took herbal contraceptives

Herbs used as contraceptives	Scientific Name	Number of Observations (N = 184)			
		Females n (%)	Males n (%)	Others n (%)	Chi-Squared Test (95% CI)
African Star apple	*Chrysophyllum albidum*	3 (1.63)	8 (4.35)	0 (0.00)	x^2 = 37.14 df = 18
Alligator Pepper	*Aframomum melegueta*	6 (3.26)	8 (4.35)	0 (0.00)	*P*-value = .01
Castor Beans	*Ricinus communis*	8 (4.35)	3 (1.63)	0 (0.00)	
Horse-eye Bean	*Mucuna urens*	7 (3.80)	0 (0.00)	0 (0.00)	
Momordica	*Momordica charantia*	6 (3.26)	4 (2.17)	1 (0.54)	
Moringa	*Moringa oleifera*	23 (12.50)	26 (14.13)	0 (0.00)	
Neem Plant	*Azadirachta indica*	3 (1.63)	9 (4.89)	0 (0.00)	
Rosary Pea	*Abrus precatorius*	5 (2.71)	4 (2.17)	0 (0.00)	
Other	-	16 (8.70)	17 (9.24)	0 (0.00)	
None	-	20 (10.87)	7 (3.80)	0 (0.00)	

N = Number of observations; n = number of respondents; % = Percentage response; df = Degree of freedom; CI = Confidence Interval
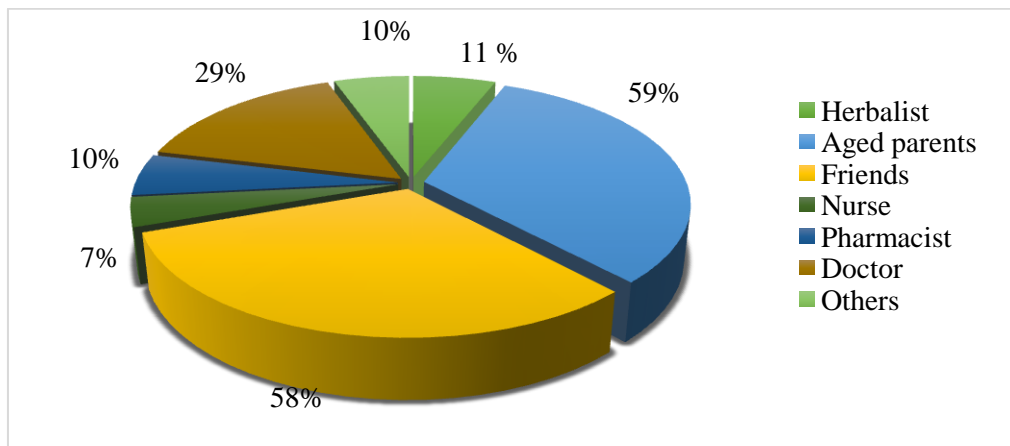
Fig. 3 Proportion of those who were prescribed herbal contraceptives

Table 6. Recommendation for the development and use of HCs

Demographic information	Recommendation for use of herbal contraceptives (N = 1113)		
	No (%)	Yes (%)	Chi-Squared Test (95% CI)
Age			
15-29	119 (10.91)	378 (33.96)	x^2 = 7.28
30-44	111 (99.73)	348 (31.26)	df = 4
45-59	24 (21.56)	111 (9.97)	*P*-value = .12
60-74	9 (0.81)	12 (1.08)	
75-89	0 (0.00)	1 (0.09)	
Gender			
Female	152 (13.66)	516 (46.36)	x^2 = 3.623
Male	109 (9.79)	333 (29.92)	df = 2
Others	2 (0.18)	1 (0.09)	*P*-value = .16
Marital Status			
Single	125 (11.23)	350 (31.45)	x^2 = 7.36
Married	116 (10.42)	449 (40.34)	df = 4
Divorced	10 (0.90)	27 (2.43)	*P*-value = .12
Separated	8 (0.72)	18 (1.62)	
Others	4 (0.36)	6 (0.54)	
Education			
Primary	13 (1.17)	12 (1.08)	x^2 = 19.74
Secondary	39 (3.50)	80 (7.19)	df = 4
Tertiary	109 (9.79)	425 (38.19)	*P*-value < .001
Postgraduate Education	72 (6.47)	235 (21.11)	
Others	30 (2.70)	98 (8.80)	
Profession			
Healthcare	66 (5.93)	248 (22.28)	x^2 = 1.4566
Others	197 (17.70)	602 (54.09)	df = 1
			P-value = .23

N = Number of observations; n = number of respondents; % = Percentage response; df = Degree of freedom; CI = Confidence Interval

3.7.2 Recommended dosage form and frequency of HCs

Fig 4 shows that 48.12% (n = 409) of respondents preferred the development of HC teas; 18.35% (n = 156%) preferred chocolate-based HCs; 22.47% (n = 22.47%) preferred HC pills; 9.65% (n = 82) preferred herbal vaginal tablets; while 1.41% (n = 12) preferred herbal vaginal suppositories (Fig. 4a). Regardless of the dosage form specified, 29.88% (n = 254), 25.53% (n = 217), 17.65% (n = 150), 14.00% (n = 119), and 9.29% (n = 79) of the respondents indicated that the HCs should be taken monthly, every 3 months, 6 months, weekly, and yearly basis respectively (Fig. 4b).
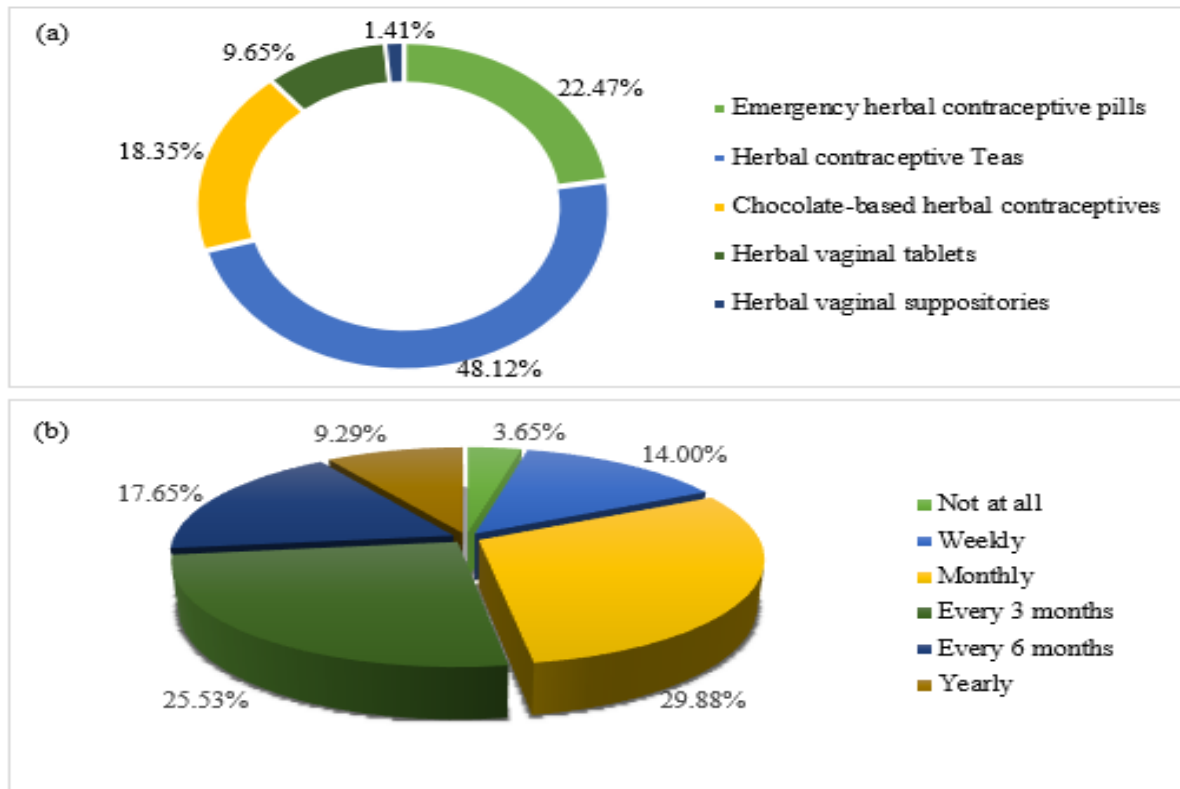
Fig. 4. Development of herbal contraceptives: (a) Dosage form for the development of herbal contraceptives; (b) Duration of herbal contraceptive use
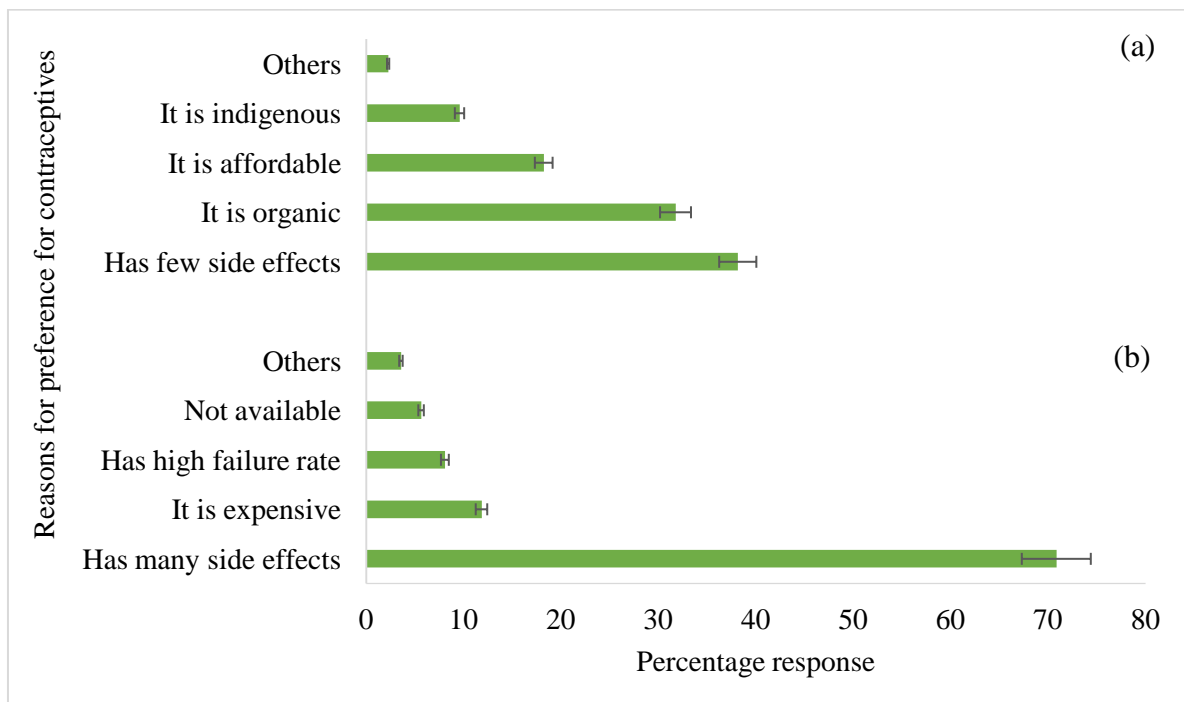

Fig. 5. Respondents who preferred HCs: (a) Reasons for preference for herbal contraceptives; (b) Reasons for non-preference for conventional contraceptives

Table 7. Perception of respondents on whom herbal contraceptives should be developed

Demographic Information	Who should herbal contraceptives be developed for (N = 850)			
	Both	**Men**	**Women**	**Chi-Squared Test (95% CI)**
Age				
15-29	186 (21.88)	26 (3.06)	166 (19.53)	x^2 = 13.22
30-44	185 (21.76)	35 (4.12)	128 (15.06)	df = 8
45-59	61 (7.18)	3 (0.35)	47 (5.53)	*P*-value = .11
60-74	5 (0.59)	0 (0.00)	7 (0.82)	
75-89	0 (0.00)	0 (0.00)	1 (0.12)	
Gender				
Female	260 (30.59)	30 (35.29)	226 (26.59)	x^2 = 9.45
Male	177 (20.82)	34 (4.00)	122 (14.35)	df = 4
Others	0 (0.00)	0 (0.00)	1 (0.12)	*P*-value = .05
Marital Status				
Single	197 (23.18)	29 (3.41)	124 (14.59)	x^2 = 21.64
Married	227 (26.71)	29 (3.41)	193 (22.71)	df = 8
Divorced	8 (0.94)	2 (0.24)	17 (2.00)	*P*-value = .01
Separated	3 (0.35)	3 (0.35)	12 (1.41)	
Others	2 (0.24)	1 (0.12)	3 (0.35)	
Education				
Primary	4 (0.47)	0 (0.00)	8 (0.94)	x^2 = 80.66
Secondary	35 (4.12)	5 (0.59)	40 (4.71)	df = 8
Tertiary	237 (27.88)	21 (2.47)	169 (19.47)	*P*-value < .001
Postgraduate	146 (17.18)	20 (2.35)	69 (8.12)	
Others	15 (1.76)	18 (2.12)	65 (7.65)	
Profession				
Healthcare	170 (20.00)	14 (1.64)	64 (7.53)	x^2 = 41.49
Others	267 (31.41)	50 (5.88)	285 (33.53)	df = 2
				P-value < .001

N = Number of observations; n = number of respondents; % = Percentage response; df = Degree of freedom; CI = Confidence Interval

3.7.3 Who should HCs be developed for?

Table 7 shows respondents' perception of who HCs should be developed for. Although this is not significantly different within gender (*P* = .05), and age group (*P* = .11), more participants think HCs be developed for both males and females (Table 7).

3.7.4 Preference for the type of contraceptives

Table 8 shows that there is a significant association between age (*P* = .01), gender (*P* = .01), marital status (*P* = .003), and educational qualification (*P* < .001) on the preference for HCs. More respondents who preferred the HCs are within the age groups of 15-29 and 30-44 years as seen in the table.

3.7.5 Reasons for preference of HCs

Fig. 5 shows respondents who prefer the HCs with reasons such as they are indigenous (9.59%), they have few side effects (38.16%),

they are organic (31.77%), and are affordable (18.23%) as shown in figure 5a. On the other hand, they do not prefer conventional contraceptives because they think they have so many side effects (70.86%), they are expensive (11.84%), have a high failure rate (8.08%), and are not readily available (5.64%) as shown in Fig. 5b.

4. DISCUSSION

Respondents' state of origin reveals a good representation of the Nigerian populace. It is possible, however, that the low responses recorded in other geographical zones are a result of bias in the sampling method employed, attitudes/perceptions to social media, lack of interest/knowledge of the topic, or reluctance to participate in the survey. While women in Northeastern Nigeria are unlikely to use contraceptives due to religious beliefs, spousal consent, knowledge of contraceptives, and age [17], obstacles to contraception in the Southeast include a lack of knowledge about contraceptives, side effects, barriers to sex

education, and lack of access to contraceptives [18]. In contrast, contraceptives are widely known and accepted in North and Northcentral Nigeria, but actual use has not been demonstrated [19,20]. Furthermore, there was a low rate of contraceptive use in Southern Nigeria [21] and Adebisi, and Bello [22] mentioned male participation in South West Nigeria.

Table 8. Responses on the preference for type of contraceptive

Demographic Information	Preference for Contraceptive (N = 1113)			
	Conventional Contraceptive	Herbal Contraceptive	None	Chi-Squared Test (95% CI)
Age				
15-29	228 (20.49)	231 (20.75)	38 (3.41)	x^2 = 19.27
30-44	213 (19.14)	213 (19.14)	33 (2.96)	df = 8
45-59	52 (4.67)	77 (0.99)	6 (0.18)	*P*-value = .01
60-74	8 (0.72)	11 (0.99)	2 (0.18)	
75-89	0 (0.00)	0 (0.00)	1 (0.09)	
Gender				
Female	279 (25.070	332 (29.83)	57 (5.12)	x^2 = 13.08
Male	222 (19.94)	197 (17.70)	23 (2.07)	df = 4
Others	0 (0.00)	3 (0.00)	0 (0.27)	*P*-value = .01
Marital Status				
Single	249 (22.37)	192 (17.25)	34 (3.05)	x^2 = 23.76
Married	229 (20.58)	294 (26.42)	42 (3.77)	df = 8
Divorced	11 (0.99)	23 (2.07)	3 (0.27)	*P*-value = .003
Separated	9 (0.81)	16 (1.44)	1 (0.09)	
Others	3 (0.27)	16 (0.63)	0 (0.00)	
Education				
Primary	13 (1.17)	12 (1.08)	0 (0.00)	x^2 = 30.66
Secondary	45 (4.04)	69 (6.20)	5 (0.45)	df = 8
Tertiary	241 (21.65)	256 (23.00)	37 (3.32)	*P*-value < .001
Postgraduate	155 (13.93)	118 (10.60)	34 (3.05)	
Others	47 (4.22)	77 (6.92)	4 (0.36)	
Profession				
Healthcare	171 (15.36)	111 (9.97)	32 (2.87)	x^2 = 28.34
Others	330 (29.65)	421 (37.82)	48 (4.31)	df = 2
				P-value < .001

N = Number of observations; n = number of respondents; % = Percentage response; df = Degree of freedom; CI = Confidence Interval

A positive correlation exists between age group and sexual activity. A total of 85.89% of our participants are within the reproductive age group (15-49 years), with 15-29 years being the most sexually active. This age group is particularly knowledgeable due to their disposition towards social media, and have been reported to use one or more forms of contraceptives globally [23]. Moreover, respondents with postgraduate education (75.56%) show a high degree of association with information on contraceptives, which demonstrates their ability to make decisions on FP. This study shows a higher percentage compared to that obtained by Odusina et al. [24] with 60% of participants.

Healthcare providers play a significant role in the acceptance and uptake of contraceptives.

Although, highly intellectual individuals participated in this study, only a handful (28.21%) of them are healthcare professionals. Several reasons such as hesitancy, lack of interest in the topic, and the desire to stay focused on what they believe in could be postulated. There is therefore a need for a mind-shift in these individuals by embracing the current trend and direction of contraceptives, understanding their roles/involvement in healthcare delivery and the urgent need for more contraceptive options in Nigeria, in addition to formulating and implementing policies for adequate inclusion of FP in healthcare delivery system in Nigeria. Studies conducted by Saka et al. [25] also show this trend.

The need for population control is supported by 83.11% of our respondents. Nigeria is currently

(3/17/2023) the 6th largest population in the world, with a total fertility rate of 5.3 live births per woman [26]. This pre-empted the establishment of the National Policy on Population (NPP) in 1988, which was later revised in 2004 to curb the rise in population through FP [27]. Despite this, Nigeria has witnessed a population growth of over 59% due to a lack of political will in implementing the policy, in addition to multi-ethnicity, and fear of side effects of conventional contraceptives among others.

Most of our respondents used herbal liquid mixtures, popularly called "*agbo*" in Nigeria. Traditionally, herbal medicines are prepared as decoctions, infusions, tinctures, or dried herbs formulated as powders. These forms of preparations are easily prepared and administered, moreover, the traditional herbal practitioners (TMPs) lack the expertise and skills to prepare capsules or tablets, including the lack of standardization required for dosage form design. It is therefore not surprising to see that 55.98% of our respondents took herbal liquid mixtures, supporting the study conducted by Okoh et al. [11] who reported that Nigerians prefer taking herbal liquid mixtures. Despite the popularity of HMs in Nigeria, knowledge about HCs (19.39%) is still lacking.

Of the herbs listed in Table 5, *Moringa oleifera* Lam is the most used by both males and females (26.63%). *M. oleifera* is regarded as a multipurpose plant, cultivated in over 80 countries because of its nutritional properties. It has been used in several cultures and communities for its anti-inflammatory, anti-oxidant, anti-spasmodic, anti-hypertensive, and anti-diuretic properties, and its use dates back to 150 B.C. [28]. Like our study, Balamurugan et al. [29] reported the high use of *M. oleifera* for gynecological disorders, while it was used as an abortifacient in other instances [30].

According to WHO [31], 80% of Africans rely on herbal medicines. This has been the practice by TMPs, especially in rural areas due to inaccessible healthcare facilities, limited healthcare professionals, and the high cost of medicines. Therefore, they resort to plants for their healthcare needs. As a result, information is passed down from one generation to another especially within families and associates, demonstrating the recommendations made by aged parents (32.07%), and friends (31.52%) recorded in our study. Conversely, physicians are more knowledgeable about conventional than HMs. However, because of their perceptions about HMs containing impurities, not being prepared by professionals, and the lack of standardization, their recommendation has been limited. Awodele et al. [32] stated that physicians discourage the use of HMs because of their divergent beliefs from those of TMPs. Our results show this low (15.76%) level of approval by doctors, hence, the need for R&D into these HCs, while encouraging the formulation of policies for their inclusion in the healthcare delivery system.

There is a sense of male inclusion in decision-making regarding the use of contraceptives. Our study reveals that 60.02% of females participated in this study compared to males (39.71%), however, more males (33.69%) took HCs than females (33.14%), with the majority of them within 15-29 years. This shows a willingness of male participation in FP, however, most available contraceptive options are centered on women, with few options (condoms and vasectomy) for the male that may not be ideal in some cases, especially the irreversibility of vasectomy [33]. Hence, these men resort to taking these HCs as they have few side effects and are readily available and recommended by families or friends. This prompts the need for more awareness, staging enlightenment campaigns on male inclusion in FP, providing more contraceptive options for male contraception through R&D, and the willingness of pharmaceutical industries to invest in the development of these contraceptives.

While our study showed that 70.28% of respondents are familiar with conventional contraceptives and 14.23% with HCs, 47.80% prefer HCs because they are organic, indigenous, affordable, and have low side effects. To take advantage of Nigeria's limitless HCs, we need to educate the public on safer, and more cost-effective forms of contraception [34], particularly since 80% of Africans use HMs [11]. Since HMs are prone to adulterations, with crude methods of preparation, limited knowledge of the source of raw materials, and unskilled TMPs, HCs must be developed following guidelines provided by NAFDAC (National Agency for Food Administration and Control) and they must maintain proper surveillance of these vendors, and ensure proper standardization of the products for safety, efficacy, and quality [35], while also encouraging the TMPs to follow the guidelines on good agricultural and collection practices [35,36].

5. CONCLUSION

Nigeria is currently the 6th largest population in the world and it is expected to reach a population of 377 million people by 2050. This study found that 83.11% of participants felt the need for population control. A majority (70.28%) are familiar with conventional contraceptives, and few (14.12%) are familiar with HCs, with *M. oleifera* being mostly used. Also, 76.37% recommended that HCs should be developed, promoted, and used. Therefore, HC awareness campaigns and policy formulations are necessary to ensure its inclusion in the healthcare delivery system.

CONSENT

Participation was completely consensual, anonymous, and voluntary.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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