



HIGH-RISK FERTILITY BEHAVIOUR AND SOCIO-ECONOMIC ATTRIBUTES OF WOMEN OF REPRODUCTIVE AGE IN A RURAL COMMUNITY, KADUNA STATE, NIGERIA

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ABSTRACT

High-risk fertility behaviour (HRFB) such as early or late childbearing, high parity and short inter-birth interval have adverse effect on health, as such; they are risk factors for maternal mortality. Women from low resource settings are affected disproportionately by maternal morbidity and death as they lack adequate sexual and reproductive health information and services as per international recommendations. In Nigeria, the persistence of HRFB is a critical public health concern, worsened by socioeconomic inequalities. An understanding of socioeconomic inequalities is needed to design effective interventions to reduce maternal morbidity and mortality due to HRFB, and to contribute to achieving the Sustainable Development Goals (SDGs). This study examined the socioeconomic attributes associated with HRFB among women in Jaja, a rural community of Kaduna State, Nigeria. This was a cross-sectional descriptive study of 264 women aged 15 to 49 years. Data was collected, using a semi-structured interviewer administered questionnaire after obtaining informed consent. Women who were too ill to participate were excluded. The outcome variable was high-risk fertility behaviour (HRFB), measured as either early age at first pregnancy, early or late age at childbearing and high parity. Data was analysed, using IBM SPSS version 26 with associations assessed at the $p < 0.05$ level of significance, and binary logistic regression was done to identify independent predictors of HRFB. The mean age of respondents was 28.6 ± 7.8 years, all were Muslims and of the Hausa/Fulani ethnic group. Among the women 260 (98.5%), 185 (70.1%), and 193 (73.1%) were married, had formal education, and were employed, respectively. The prevalence of HRFB was high 199 (75.4%). Respondents' current age ($\chi^2 = 21.034$, $p \leq 0.001$), educational status ($\chi^2 = 10.630$, $p = 0.001$), and employment status ($\chi^2 = 7.534$, $p = 0.006$) had statistically significant association with HRFB. A woman's current age (AOR = 11.065, 95% CI = 2.800-47.466, $p = 0.001$) and educational status (AOR = 0.349, 95% CI = 0.163-0.779, $p = 0.011$) were significant predictors of HRFB. The prevalence of HRFB was high and found to be associated with socioeconomic factors. There is a need for targeted interventions to significantly influence women's health outcomes.

Keywords: Childbearing, high parity, High Risk Fertility Behaviour, Nigeria

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INTRODUCTION

As of 2020, nearly 800 women died daily due to pregnancy-related causes globally, with about 95% of these deaths occurring in low- and middle-income countries, and sub-Saharan Africa accounting for approximately 70% of the burden [1]. This pattern is the same for Nigeria which burden accounts for over one-fourth (28.5%) of the global maternal deaths in 2020 [2], with 512 maternal deaths per 100,000 live births [3], one of the highest maternal mortality ratios in the world. These deaths are unacceptable tragedies driven largely by preventable factors operating at multiple levels as described by McCarthy & Maine [1, 4]; one of such factors is a woman's reproductive characteristics, referred to as her fertility behaviour.

Fertility behaviour refers to the pregnancy and childbirth patterns of women or couples [5]. These patterns may include the age at marriage, age at child birth, and the frequency and timing of births. When a woman has her first child birth early (< 18 years) or late (> 34 years), has a high number of

births (> 4 deliveries) or has a short interval between births (< 24 months), she is regarded as having high-risk fertility behaviour (HRFB) [4, 6] thus, at increased risk of experiencing adverse outcomes during pregnancy, childbirth and postpartum. Women with HRFB are more likely to experience poor child outcomes, as revealed in Bangladesh where women with HRFB had 2 times the odds of experiencing a perinatal mortality when compared with those with none [7]. Similarly, HRFB was seen to be associated with the occurrence of under-five mortality, as observed in Asia and Africa, where children of mothers with multiple risks had as high as a 39% chance of dying [8].

These fertility behaviours are determined by marriage patterns, contraceptive use, lactation amenorrhea, and induced abortion which in turn are driven by broader social and economic factors such as education, culture and income [9–11]. An understanding of these determinants is needed for the design of effective interventions targeted at reducing maternal morbidity and mortality due to HRFB, and

ultimately the attainment of Sustainable Development Goals (SDGs). This study examined the socioeconomic attributes associated with HRFB among women of reproductive age in Jaja, a rural community of Kaduna State, Nigeria.

MATERIALS AND METHODS

Study area

The study was conducted in Jaja, a rural community in Kudan Local Government Area (LGA) of Kaduna State, north-west Nigeria. The community has six sub-units (Unguwas) namely: Unguwan Sarki, Unguwan Makada, Tashan Icce/Matasa, Unguwan Waziri, Unguwan Mu'azu and Unguwan Zubairu. The estimated population was 1,924 people with approximately 325 households following a pre-survey household listing. It is a predominantly Muslim and Hausa community. Most of the community members are farmers, petty traders, tailors and weavers. The community has a functional primary health care (PHC) facility which offers maternal and child health care and other basic outpatient care, there is also a patent medicine store, a private nursery school and government owned primary and secondary schools. The community has access to secondary health care at the General Hospital, Makarfi, as well as tertiary health care from Ahmadu Bello University Teaching Hospital, Zaria which is 15 kilometres away.

Ethical clearance

This research was approved and conducted as a part of a larger community diagnosis by the Department of Community Medicine of the Ahmadu Bello University Zaria. Appropriate entry permissions to conduct the study were obtained from the Local Government Area council, community leaders and heads of households. Informed verbal consent was obtained from each respondent prior to interview. Confidentiality of the information collected was ensured by storing de-identified data in a password protected computer accessible to the researchers.

Study design, study population and sampling technique

This was a cross-sectional descriptive study, involving women of reproductive age 15-49 years. An estimated proportion of 77.7% high-risk fertility behaviour from a previous study was used to estimate the sample size [12]. A total of 264 women were enrolled in the study, eligible participants per household were selected through a multistage

sampling technique and women found to be acutely ill and unable to participate were excluded.

Data collection and analysis

Data was collected, using a semi-structured interviewer administered questionnaire adapted from the Nigeria Demographic and Health Survey (NDHS) questionnaire [3]. The questionnaire was deployed on the KoboCollect application on Android devices, following which the completed questionnaires were uploaded to a secure online Server. Data were collected by research assistants who were trained on the research protocol. The outcome variable of high-risk fertility behaviour (HRFB) was defined as a woman having any/multiples of age <18 years at first pregnancy, age < 18 years at childbirth, age > 34 years at childbirth, and high parity (>4 births) [13]. The socioeconomic attributes (age of respondent in years, tribe, marital status, religion, level of education and occupation) as well as awareness of contraception served as the independent variables.

Data were analysed using IBM® SPSS version 26 statistical software. Descriptive statistics using frequencies and percentages for categorical variables while mean and standard deviation (SD) or median and interquartile range (IQR) where appropriate were calculated for quantitative variables. Association between socioeconomic attributes and the presence of high-risk fertility behaviour was assessed using Chi-square test or Fisher's Exact test where appropriate with statistical significance set at $p < 0.05$. Binary logistic regression was done to identify independent predictors of high-risk fertility behaviour using adjusted odds ratios (AOR), all socioeconomic variables were included and analysed using the enter method. The age at first marriage and awareness of contraception were not included in the final binary logistic regression model due to potential multicollinearity with current age and marital status. Findings were presented using tables prepared using Microsoft Excel 365 software.

RESULTS

Respondent characteristics

Findings from this study reveal that 200(75.8%) of the respondents were aged 15-34 years with a mean age $\pm$ SD being 28.6 ± 7.8 years, all were Muslims, and 260(98.5%) were of the Hausa ethnic group. Majority were married 260(98.5%), had formal education 185(70.1%), and were gainfully employed 193(73.1%) (Table 1).

Table 1: Sociodemographic characteristics of women in Jaja community (n=264)

Sociodemographic characteristics	Frequency (f)	Percent (%)
Age (years)		
15 – 24	86	32.6
25 – 34	114	43.2
35 – 44	47	17.8
45 – 49	17	6.4
Level of Education Attained		
No formal	79	29.9
Primary	75	28.4
Secondary	106	40.2
Tertiary	4	1.5
Current Occupation		
Artisans	25	9.5
Farming	3	1.1
None	70	26.5
Petty trading	166	62.9
Marital status		
Married	260	98.5
Not married	4	1.5

Fertility behaviour of respondents

The median age (IQR) at first marriage was 16.0(2.5%) years. Most 204(77.3%) were aware of contraception. Over half of the respondents 151(57.2%) had early first pregnancies and child birth age (<18 years), 130(49.2%) had five or more

deliveries, and none had late first childbirth (age >34 years). There were 199 (75.4%) women with at least one high-risk fertility behaviour, 69(26.1%) had only a single risk while 130(49.2%) had multiple high-risk fertility behaviours (Table 2).

Table 2: High-Risk Fertility Behaviour of women in Jaja community (n=264)

Variable	Frequency (f)	Percent (%)
Any high-risk fertility behaviours		
No	65	24.6
Yes	199	75.4
Number of risky fertility behaviours		
Women with no risk	65	24.6
Women with only one risk	69	26.1
Women with multiple (≥ 2) risks	130	49.3
Risky behaviours		
Age at first pregnancy (<18 years)	151	57.2
Age at first childbirth (<18 years)	114	43.2
High parity	130	49.2
Awareness of contraception		
Yes	60	22.7
No	204	77.3

HRFB and Socioeconomic attributes

Respondent's current age ($\chi^2=21.034$, $p\leq 0.001$), age at first marriage ($\chi^2=62.396$, <0.001), educational level attained ($\chi^2=10.630$, $p=0.001$), and

employment status ($\chi^2=7.534$, $p=0.006$) had a statistically significant association with HRFB (Table 3).

Table 3: Factors associated with high-risk fertility behaviour among women of Jaja

	High-risk fertility behaviours f (%)				
Variable	Yes	No	Total	Test statistics	p-value
Age in years					
<35	137(68.8)	63(96.9)	200(75.8)	$\chi^2=21.034$	<0.001
≥35	62(31.2)	2(3.1)	64(24.2)		
Ethnicity					
Fulani	3(1.5)	1(1.5)	4(1.5)	FE=0.000	1.000
Hausa	196(98.5)	64(98.5)	260(98.5)		
Marital status					
Not married	3(1.5)	1(1.5)	4(1.5)	FE=0.000	1.000
Married	196(98.5)	64(98.5)	260(98.5)		
Educational status					
No formal	70(35.2)	9(13.8)	79(29.9)	$\chi^2=10.630$	0.001
Formal	129(64.8)	56(86.2)	185(70.1)		
Occupation					
Not employed	45(22.6)	26(40)	71(26.9)	$\chi^2=7.534$	0.006
Employed	154(77.4)	39(60)	193(73.1)		
Age at first marriage					
<18	171	24	195	$\chi^2=62.396$	<0.001
≥18	27	41	68		
Awareness of contraception					
No	43(21.9)	16(25)	59(22.7)	$\chi^2=0.258$	0.612
Yes	153(78.1)	48(75)	201(77.3)		

FE= Fisher's exact test, χ^2 = Chi-squared test**Predictors of HRFB**

The woman's current age and the level of education attained were significant predictors of HRFB. Women who were aged 35 years and above had 11 times the odds (95%CI = 2.80-47.466, p=0.001) of having

an HRFB, while the reverse was the case for women with any form of formal education as they had 0.349 times the odds (AOR=0.349, 95%CI = 0.163-0.779, p=0.010) of having an HRFB (Table 4).

Table 4: Predictors of high-risk fertility behaviours among women of Jaja community

Variable	COR (95%CI)	p-value	AOR (95%CI)	p-value
Age in years				
<34	1		1	
≥35	14.255(3.380-60.128)	<0.001	11.065 (2.80-47.466)	0.001
Ethnicity				
Fulani	1		1	
Hausa	1.021(0.104-9.987)	0.986	0.891(0.087-9.134)	0.923
Marital status				
Not married	1		1	
Married	1.021(0.104-9.987)	0.986	2.259(0.163-31.270)	0.543

Education

No formal	1		1	
Formal	0.296(0.138-0.634)	0.002	0.349 (0.163-0.779)	0.010

Occupation

Not employed	1		1	
Employed	2.281(1.256-4.145)	0.007	1.835 (0.974-3.457)	0.060

Age at first marriage in years

<18	1			
≥18	0.092(0.048-0.177)	<0.001		

Awareness of contraception

Yes	1			
No	0.843(0.436-1.630)	0.612		

COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio, *Model summary $X^2=38.600$ $p<0.001$, $R^2=0.202$

DISCUSSION

This study found that most respondents were young, all were Muslims, most were married, and nearly all were of Hausa ethnicity, reflecting the socio-demographic characteristics of rural communities in northern Kaduna State, Nigeria. Although a considerable proportion of respondents reported being gainfully employed through trading, the nature of such employment may not necessarily confer financial independence, particularly where women's economic activities provide limited control over resources and autonomy in reproductive decision-making [12].

The prevalence of HRFB in this study was high (75.4%), which is consistent with findings from other African studies reporting prevalence estimates ranging from 72.8 to 77.7% among women in low- and middle-income settings [12, 14-15]. However, this estimate is substantially higher than the 46% reported in the Bangladesh Demographic Health Survey [7]. Differences in prevalence across settings may reflect variations in sociocultural norms, access to reproductive health services, female educational attainment, and study population characteristics. The high burden of HRFB observed in this study may be partly explained by the rural residence of respondents. Rural women have consistently been shown to be at greater risk of HRFB, with a multilevel mixed-effects analysis of nationally representative data from 35 sub-Saharan African countries demonstrating that rural women were approximately 86% more likely to exhibit HRFB compared with urban women [12, 15]. This disparity may be attributable to structural and contextual disadvantages associated with rural residence,

including limited access to reproductive health information, poor healthcare infrastructure, and sociocultural norms that promote early marriage and repeated childbearing [15].

This study further found that 26.1% and 49.2% of respondents had single and multiple HRFBs, respectively. These findings are comparable to previous reports showing that 31.4-32.0% of women had single HRFB and 40.8-45.1% had multiple HRFBs [14-15]. However, the prevalence of multiple HRFBs in this study was markedly higher than the 8% reported in Bangladesh [7], suggesting a potentially greater clustering of fertility-related risk

factors within this population. The predominance of early age at first pregnancy (57.2%) as the most common HRFB highlights the persistence of adolescent childbearing within the study setting and suggests that interventions addressing delayed sexual debut and delayed marriage remain insufficient. This finding is concerning given the documented association between HRFB and adverse maternal and child health outcomes, including perinatal, very early neonatal, and under-five mortality [7-8]. Persistently high levels of HRFB may therefore constitute a barrier to achieving Sustainable Development Goal (SDG) 3 targets relating to maternal and child survival [7].

Among the socioeconomic factors examined, respondents' current age, educational status, age at first marriage, and employment status were significantly associated with HRFB at the bivariate level. However, after adjustment, only age above 35 years and lack of formal education remained independent predictors. The association

between older age and HRFB may reflect cumulative fertility exposure, as older women are more likely to have had repeated pregnancies over time and may therefore be more likely to meet criteria for parity- or age-related fertility risk. Similarly, early age at first marriage may increase the reproductive lifespan and prolong exposure to pregnancy risk, particularly in settings where contraceptive uptake is suboptimal. These findings are consistent with previous studies conducted among women in sub-Saharan Africa [12]. Although ethnicity and marital status were not significantly associated with HRFB in this study, these variables remain theoretically relevant determinants of fertility behaviour. Cultural and ethnic norms have been shown to shape fertility preferences and reproductive practices [16], including through marriage patterns, which are recognised as proximate determinants of fertility in Bongaarts' framework [17]. The lack of statistical significance observed may reflect homogeneity within the study population, given that nearly all respondents shared similar ethnic and religious backgrounds.

Educational attainment emerged as a key determinant of HRFB, with women lacking formal education demonstrating threefold higher odds of engaging in HRFB. This finding corroborates previous studies showing that women with primary and secondary education have significantly reduced the odds of HRFB [12, 15, 18]. Education likely exerts a protective effect through multiple pathways, including delayed age at marriage, improved health literacy, greater awareness of reproductive health options, and enhanced decision-making autonomy [14]. These findings reinforce the role of female education as a critical social determinant of reproductive health outcomes. Although contraceptive awareness was high among respondents, no statistically significant association was observed with HRFB. This may suggest that awareness alone is insufficient to influence reproductive behaviour in the absence of accessibility, affordability, partner support, or sociocultural acceptance of contraceptive use. Thus, awareness of contraception may not necessarily translate into utilisation.

A key strength of this study is its focus on women in a rural and underserved setting, thereby contributing context-specific evidence to the limited literature on HRFB in northern Nigeria. However, the findings should be interpreted in light of certain limitations. The cross-sectional design precludes causal inference, and associations identified cannot establish temporality. Additionally, self-reported reproductive histories may be subject to recall bias and social desirability bias, potentially affecting the accuracy of responses. Despite these limitations, the

study provides important insights into the burden and determinants of HRFB within a high-risk population.

CONCLUSION

HRFB remains highly prevalent among women in this study population, with older age and lack of formal education identified as significant predictors. These findings highlight the need for targeted interventions using multiple sector approach that will address the underlying social determinants of reproductive health. Strengthening implementation of girl-child education policies may help delay age at marriage and reduce women's cumulative exposure to fertility-related risks. In addition, improving access to comprehensive reproductive and maternal health services, alongside culturally appropriate public health education, may contribute to reducing HRFB and its associated adverse maternal and child health outcomes.

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