Child Marriage and High-Risk Fertility Behaviour in Nigeria:
Findings from a Cross-Sectional Survey

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Abstract: In Nigeria, despite laws aimed at protecting girls from early marriage the practice remains prevalent; the resistance of forced marriage by a 14 years old who poisoned her husband within days of the marriage has brought the issue to the fore of public discourse. Also, indicators of maternal health outcomes in the country remain very poor and most of the MDG goals were not met at the end of 2015. This study examined the relationships between 2 variables with implications for maternal health outcomes-child marriage and high-risk fertility. Using the 2013 Nigeria Demographic and Health Survey, analysis was based on women's individual recode dataset among women who were married/cohabiting and aged 20-24 at the time of the survey. High-risk fertility was generated from the kids recode dataset and merged to the women's dataset. Only 6011 women who met the inclusion criteria were analysed. We use binary logistic regression to predict the odds of exposure to high-risk fertility. We estimate that among ever married women, currently aged 20-24 with at least one live birth, three-quarters (74%) were married as children and above a third (35%) of all births in the last 5 years were avoidable high-risk births. Higher educational attainment and household wealth were both found to be inversely related to child marriage. The adjusted odds of avoidable high-risk births for marriage before age 15 is 4.66 (p<0.001, CI = 3.74-5.80) and 3.25 (p<0.001, CI = 2.70-3.93) for marriage between ages 15-17, compared to marriage at 18-24 years. Increased odds of avoidable high-risk births are also, significantly associated with having 4 or more births while education and four or more antenatal visits during pregnancy are significant predictors of reduced odds of high risk fertility. This study concluded that the high level of child marriage in Nigeria is significantly associated with high-risk fertility among the women. This implies that the increasing risks of adverse maternal health outcomes in Nigeria is partly the consequence of child marriage practices. Female education, poverty reduction and use of antenatal services are viable options to address the malaise.

Key words: Child marriage, early marriage, age at first marriage, high-risk fertility, high-risk birth, Nigeria

INTRODUCTION

Child marriage, defined as "a formal marriage or informal union before age 18" (UNICEF., 2009) is a practice that has persisted through generations and has deprived many young girls of their basic fundamental rights. Estimates by the World Health Organisation (WHO., 2013) indicates that about 39,000 child marriages take place daily and that 140 million child marriages will occur between 2011 and 2020 (WHO., 2013). Child marriage has consequences for child health and women's exposure to violence and physical abuse. It undermines most millennium development goals and denies women of access to education, good health and

freedom (Hervish and Feldman-Jacobs, 2011). High-risk fertility on the other hand is defined by the Demographic and Health Surveys (DHS) as exposure of women to any of four demographic risks at their last childbirth (age <18, more than three births, birth interval <24 months and age 35 or higher). These four factors have adverse implications for maternal and child health. Estimates from the 2013 Nigerian Demographic and Health Surveys (NDHS) show that about three-quarters of currently married women aged 20-24 were married before age 18 and that 77% of births to women of reproductive age (15-49) in the 5 years preceding the survey were high-risk births, 63% of all births were estimated as avoidable high-risk births (NPC and ICF., 2014).

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The prevalence of child marriage in this country has had several consequences, especially for girls, many of whom are forced into such marriage. The story of a 14 years old girl who in April 2014 poisoned the man she was forced to marry in order to escape from her unhappy marriage still resonates in Nigeria and internationally (BBC Africa, 2014; Stein, 2014; Vanguard, 2014). Her trial where prosecutors in the conservative and Sharia-implementing Kano State in Northern Nigeria had asked for the death penalty for the girl came to a conclusion after the state, under pressure from Nigerian and international child right activists, withdrew the case and the minor was discharged and acquitted (Nigerian Watch, 2015; Abubakar, 2015). However, this case is just a peek into the agony that millions of helpless girls in the country, especially in the Northern regions, must endure over their lifetime through forced and underage marriage.

Maternal and child health indicators for Nigeria and India rank among the worst globally, both countries are estimated to jointly account for a third of all maternal deaths in 2013 (WHO and UNICEF, 2014). India and Nigeria are first and third globally on the list of countries ranked in terms of absolute numbers of child marriage (defined as marriage before age 15) and Nigeria ranks 14th on the overall list of countries with child marriage (i.e., marriage before age 18) (Vogelstein, 2013). India and Nigeria's poor ranking suggests that poor maternal health outcomes in these countries might be correlated with child marriage, studies have actually established that pregnancy and child birth are leading causes of death among teenagers (Nasrullah *et al.*, 2013; Nour, 2009; Raj *et al.*, 2010).

The objective of this study is to examine the relationships between child marriage and poor maternal health outcome (measured by high-risk fertility behaviour) in the country and its 6 geographical regions. Though Nigeria has failed to meet the targets set for promoting gender equality and improving maternal health in the MDGs 3 and 5 it is still imperative to keep issues that bother on the rights and health of women and children in firm focus as the fates of many in the country still hangs on attaining these objectives irrespective of the failure to meet internationally set targets.

Several factors have been attributed to child marriage in many countries where it is practiced including Nigeria. Evidences showed low educational level (Adebowale *et al.*, 2012) poverty and economic gains for family (Nour, 2006) cultural and religious norms (Boyden *et al.*, 2012; Dhital, 2007) are among the many reasons contributing to the continuous upsurge in child marriage in the country. The negative impact of child marriage cannot be underscored as it has debilitating effect on women, especially, young girls who are forced into premature exposure to childbearing. Women who marry early are exposed to longer years of childbearing and its many negative associated outcomes such as poverty (Moore *et al.*, 1993; Otoo-Oyortey and Pobi, 2003) school drop-out (Chata and Quentine, 2016) pregnancy complications and poor reproductive health outcomes for mother and child (Godha *et al.*, 2013; Raj *et al.*, 2010). Other attendant risks caused by early marriage involves marital rape (Ouattara *et al.*, 1998) vesicovaginal fistulae (Akpan, 2003) HIV and other STDs (Nour, 2006).

Issues around child marriage remains at the fore of research and is human rights issue (Raj, 2010), especially in the wake of achieving the new Sustainable Development Goals (SDG's) where by every country is mandated to promote the wellbeing and ensure the maintenance of all rights of citizens (Sachs, 2012). Like many other countries plagued with this phenomenon, Nigeria has a large share of global and African child marriage with over 23 million cases of child marriages (UNICEF., 2016; Walker *et al.*, 2013) although with marked differences among the regions of the country. Early marriage was more pronounced in all the regions of the North than in the South. This is also, vividly presented in many findings that showed the girl child in the Northern part of the country had the least education compared to those from other regions due to early child marriage (Kyari and Ayodele, 2014; Simbine *et al.*, 2016). The North West region has a mean age at first marriage of 15.3 while it is 20.9 in South East (Adebowale *et al.*, 2012). Another study, also, reported huge disparities in median age at first marriage within the country from 14.7 (North East) to 20.2 (South East and South West). Also is rural-urban differentials on age at first marriage within the country. While 17.3 was reported in rural area, 19.4 was reported for the urban area. Also, young women aged 10-14 and 15-19 reported 15.9 and 38.2, respectively as age at first marriage while the double proportion was reported for urban area for each age group of 10-14-31.7 and 15-19-45.5 (Feyisetan and Bankole, 2009; Chata and Quentine, 2016).

MATERIALS AND METHODS

The data for this analysis come from the 2013 Nigeria Demographic and Health Survey (NDHS). The survey is a nationally representative sample of 38.522 households, covering the entire population residing in

non-institutional dwelling units. The survey was a three-stage stratified cluster sample, designed to provide population and health indicator estimates at the national, zonal and state levels. The sample design allowed specific indicators to be calculated for each of the 6 zones, 36 states and the Federal Capital Territory. The 2013 NDHS sample was selected using a stratified three-stage cluster design consisting of 904 clusters, 372 in urban areas and 532 in rural areas. All women of reproductive age (15-49 years) in these households were interviewed and all men age 15-59 in half of the sampled households were also, interviewed (note: for full details of the methodology for the 2013 NDHS (NPC and ICF., 2014).

For ease of use and international comparability, the DHS generated six recode datasets-each for use with specific analysis. The recode datasets for the 2013 NDHS are the women individual recode (NGIR6AFL) the male recode (NGMR6AFL) the births recode (NGBR6AFL) the kids recode (NGKR6AFL) the households recode (NGHR6AFL) and the persons recode (NGPR6AFL). This analysis uses both the kids recode (to generate high-risk fertility based on all births (0-59 months) in the last 5 years preceding the survey) and the women's individual recode (which is the appropriate dataset to use if interviewed women are the unit of analysis). The women individual recode comprises 38.948 women (age 15-49) with completed interviews while the kids recode comprises information on 31,828 live births in the last 5 years (0-59 month) to women who were interviewed during the survey. Both datasets were merged, every child in the recode dataset was linked to its mother in the women's individual recode using unique identifiers caseid, v001, v002 and v003 and also, keeping the high-risk fertility variable generated. Only 6011 women who met the inclusion criteria were included in our focal subpopulation (coded 1 while others were coded 0).

We used the survey subpopulation command in Stata (2013) to focus our analysis on our target subpopulation to avoid a pitfall in survey data analysis that could result in an incorrect standard error computation (Heeringa *et al.*, 2010; Kreuter and Valliant, 2007; West *et al.*, 2008). We checked the predictors for possible multicollinearity by examining the Variance Inflation Factors (VIF) there was no VIF that was equal to or >5.

Variables and measurements: We identified 2 key variables, high-risk fertility and child marriage. To ascertain the accuracy of our generated high-risk fertility variable among the subpopulation of interest, we first applied our Stata codes to the entire kids recode dataset to match the published national figures for Nigeria on Page 124 of the 2013 Final Report (NPC and ICF., 2014). The initial high-risk fertility variable is a categorical variable with seven categories. The DHS high-fertility variable was based on all women age 15-49 with at least one live birth and has 11 categories in this study, the variable has 7 categories due to the age restriction to women currently aged 20-24 years and exclusion of never-married women; (a) not at risk, last birth was not a high-risk birth; (b) unavoidable risk; first birth to women age 18-34 (18-24 in this analysis); (c) too young at birth of last child (age <18 at last birth); (d) too close, birth interval <24 months; (e) too many, parity more than 3; (f) too young and too close; (g) Too close and too many. We recoded the 7 categories into 2 whether last birth was an avoidable high-risk or not, i.e., (a) and (b) collapsed into one category and (c) to (g) collapsed into the other. This is coded 1 if it is an avoidable high-risk birth, 0 otherwise.

Our main predictor variable, child marriage among women currently age 20-24 is generated from the variable on age at first marriage in the individual recode dataset. The variable is recoded into 3 categories; <15 years; Married before age 15, 15-17 years; Married between ages 15 and 17 years and 18-24 years; Married between ages 18-24 years. The main outcome variable, high-risk fertility is a binary variable (avoidable high-risk or otherwise), we therefore used binary logistic regression to predict the odds of exposure to high-risk fertility in the country.

To account for the complex sampling design of the 2013 NDHS, account for differences in the probability of selection and also to adjust for non-response, the appropriate weight for this analysis (v005) the cluster variable (v021) and the Strata variable (v022) were applied using Stata's survey command (svyset) to ensure that the software treats the data as a survey data and correctly estimate the population parameters. We used the Taylor series linearisation as our variance estimation technique, however, due to one stratum having a single sampling unit in the original women's recode data (South-South, Akwa Ibom, Urban (v022 = 60)) the default Stata approach of declaring single units as "missing" was changed to "centred" to allow for the variance estimation. The measurement of the variables (outcome and predictors) are summarised (Table 1).

Table 1: The measurement of the variables (outcome and predictors) are summarised

Variables	Measurement
High-risk births	Generated from the kids recode, since, we are interested in a subpopulation analysis, we verified the accuracy of our codes by applying it to the overall dataset and comparing the values with the national percentages published in the 2013 NDHS final report (NPC and ICF., 2014)
Age at first marriage (v511)	Recoded into 3 categories: <15, 15-17, 18+, the first two categories is internationally recognised as child marriage
Age (v013)	Age in 5 years groups (this analysis is restricted to the subpopulation currently aged 20-24)
Religion (v130)	Recoded to merge all Christians into a single category
Residence (v025)	Rural or urban
Region (v024)	Nigeria has 6 geographic regions, the North Central, North East, North West, South East, South-South and South West
Educational attainment (v106)	We merged secondary and higher education categories, <2% of the subpopulation (ever married women currently aged 20-24 with at least one birth, n = 6011) have attained higher education, retaining this as a category will create insufficient observations for inferential analysis
Household wealth quintile	We used the DHS provided index (v190) categorising the women into lowest, second lowest, middle, second highest and highest categories
Number of antenatal visits a health facility (anc)	The continuous variable (m14) is recoded into (none, 1-3, 4+) while using WHO recommendation of a minimum of 4 antenatal visits as criteria, we also, sought to distinguish between women who made no single antenatal visit from those who made 1-3 visit.
Contraceptive use	Categorised into (no method, modern method, other methods)
Frequency of news usage	The frequency of "listening to radio", media "watching television" or "reading newspapers" were assigned numeric values (0 if respondent does not use the medium, 1 if less than once a week and 2 if at least once a week). The sum of the values across the three variables range from 0 (not using any of the three media) to 6 (using all three frequently) and is recoded into 3 categories

RESULTS AND DISCUSSION

Overall for the country as shown in Table 1, we estimate that about three in four married women (74%) currently aged 20-24 with at least one live birth were married before age 18 years (the percentage that had married before age 15 years was about 31%-almost a third of the study population while 43% married between ages 15-17). Disaggregated by educational attainment, the findings show that about 90% of the women without any education were married before age 18 (45% each before age 15 and between ages 15-17 years). The level of child

Table 2: Age at first marriage and socio-demographic characteristics

	Age at first marriage			Total	No. of
Variables	<15	15-17	18-24	(%)	Women
Total (%)	30.91	43.1	25.99	100	6011
Educational attainment					
None	44.67	44.55	10.78	100	3171
Primary	24.90	50.88	24.22	100	987
Secondary/higher	10.58	36.48	52.94	100	1853
Wealth index					
Poorest	53.10	39.46	7.43	100	1476
Poorer	35.72	48.63	15.65	100	1624
Middle	24.45	44.63	30.93	100	1237
Richer	13.66	42.03	44.31	100	1061
Richest	7.61	36.01	56.38	100	612
Religion					
Christians	14.16	38.54	47.30	100	1714
Islam	37.84	44.84	17.32	100	4208
Others	26.02	48.57	25.41	100	89
Ethnicity					
Hausa/Fulani	43.92	44.68	11.40	100	2972
Igbo/Ibo	10.44	28.78	60.78	100	438
Yoruba	6.07	26.71	67.22	100	406
Others	21.98	46.86	31.16	100	2194
Type of place of residence					
Urban	15.48	38.87	45.65	100	1711
Rural	37.05	44.79	18.16	100	4300
Region					
North Central	18.92	45.06	36.02	100	901
North East	35.80	47.99	16.21	100	1292
North West	43.18	44.85	11.97	100	2498
South East	10.80	27.32	61.88	100	360
South South	15.21	41.33	43.47	100	425
South West	8.08	31.91	60.01	100	536

Analysis based on the 2013 Nigerian Demographic and Health Surveys (Percentages are row percentages). Adjusted Wald test; $F_{(3.92, 3229.63)}$ = 119.4111 p<0.001; $F_{(7.54, 6208.70)}$ = 50.9276 p<0.001; $F_{(3.89, 3200.38)}$ = 55.5029 p<0.001; $F_{(5.59, 4599.81)}$ = 74.9895 p<0.001; $F_{(1.95, 1607.74)}$ = 87.2025 p<0.001; $F_{(9.21, 7575.79)}$ = 42.0208 p<0.001

marriage reduced to 76% among women with primary education (25% before age 15 while 51% were married at ages 15-17). This further reduced to 47% among women with secondary or higher education (only 11% married before age 15 and 36% married between ages 15-17). This shows that higher educational attainment is inversely related to child marriage and an adjusted wald test of the bivariate association between education and child marriage is statistically significant (p<0.001).

Also, household wealth status is inversely related to child marriage. As shown in Table 2, the level of child marriage consistently decline with increasing household wealth index. Less than half (44%) of women in the highest wealth quintile were married before age 18 (8% before age 15 and 36% between ages 15-17) compared to just 93% of women in the lowest wealth quintile (53% before age 15 years and about 40% were married between ages 15-17). This suggests that child marriage is poverty driven. The adjusted wald test of the bivariate association showing decreasing levels of child marriage as household wealth status increases is statistically significant (p<0.001).

Table 3: Age at first marriage and selected socio-demographic characteristics (contd)

Variables	<15	15-17	18-24	Total (%)
Marriage to first birth interval				
Before/within year of marriage	53.89	73.58	92.43	72.39
2 years after marriage	21.06	15.65	6.20	14.87
3 years after marriage	10.19	6.97	0.91	6.39
4+ years after marriage	14.87	3.80	0.46	
Woman's age difference to partner's				
Same age or woman older	0.54	0.50	2.06	0.92
Partner older, 1-9 years	43.47	49.43	63.53	51.24
Partner older, 10 years+	56.00	50.07	34.41	47.85
High-risk fertility				
No risk	41.20	38.84	17.50	34.02
Unavoidable risk	6.46	24.90	68.41	30.50
Too young	21.69	17.27	1.271	14.48
Too close	10.20	14.59	11.54	12.44
Too many	9.93	1.95	0.74	4.10
Too young and too close	5.13	0.94	0.04	2.00
Too close and too many	5.40	1.52	0.49	2.45
Total (%)	100.0	100.0	100.0	100.0
Total (No.)	1858	2591	1562	6011

Analysis based on the 2013 Nigerian Demographic and Health Surveys (percentages are column percentages). The high-risk fertility variable in this table has seven categories compared to eleven typically generated in DHS reports, due to restriction of this analysis to the subpopulation aged 20-24 years, the 4 categories associated with age higher than 34 years are not applicable to this analysis. Adjested Wald test; $F (5.59, 4600.21) = 62.4136$ $p<0.001$; $F (3.55, 2923.48) = 15.0993$ $p<0.001$; $F (9.99, 8224.87) = 117.8992$ $p<0.001$

Other statistically significant bivariate associations between child marriage and socio-demographic variables include religion, showing a higher percentage of child marriage among Muslims (73% overall-38% married before age 15 and 45% between 15 and 17) ethnicity, showing almost 90% of Hausa/Fulani were married before age 18 (44% before age 15 and 45% between ages 15-17) compared to the 2 other main ethnicities (Igbo/Ibo with 39% child marriage and Yoruba with 33% child marriage). Also, child marriage is more prevalent in the rural areas vs. urban areas (82 vs. 54%) and in the Northern regions generally where child marriage is higher, relative to the Southern regions. The percentage of women currently aged 20-24 that were married before age 18 in the North Central, North East and North West regions were 64, 84 and 88%, respectively, compared to 38, 57 and 40% in the South East, South-South and South West regions, respectively (Table 1).

Also, in Table 3, we looked at the difference in the age of the women and the man they married and found that generally, women are married to older males, irrespective of the age at marriage. However, the percentage of marriages to men who were 10 or more years older was higher among women married before age 18. While only about a third (34%) of women married between age 18-24 were married to men 10 or more years older, more than half of those married before age 15 or between

Table 4: Avoidable high-risk fertility by socioeconomic and demographic variables

Variables	Yes (%)	SE	95% CI	Total (%)	No. of women
Total	35.47	0.79	[33.93, 37.04]	100	6011
Educational attainment					
None	42.38	1.07	[40.29, 44.50]	100	3171
Primary	35.47	1.78	[32.05, 39.03]	100	987
Secondary/higher	23.66	1.29	[21.23, 26.28]	100	1853
Wealth index					
Poorest	42.82	1.57	[39.77, 45.93]	100	1476
Poorer	39.16	1.41	[36.44, 41.95]	100	1624
Middle	35.92	1.84	[32.40, 39.59]	100	1237
Richer	26.11	1.78	[22.77, 29.76]	100	1061
Richest	23.3	2.39	[18.94, 28.31]	100	612
Religion					
Christians	28.45	1.44	[25.70, 31.36]	100	1714
Islam	38.43	0.94	[36.61, 40.28]	100	4208
Others	30.9	5.83	[20.74, 43.32]	100	89
Ethnicity					
Hausa/Fulani	40.19	1.09	[38.07, 42.35]	100	2972
Igbo/Ibo	29.44	2.64	[24.53, 34.88]	100	438
Yoruba	17	2.48	[12.66, 22.44]	100	406
Others	33.71	1.34	[31.13, 36.38]	100	2194
Age at first marriage					
<15	52.35	1.3	[49.78, 54.90]	100	1858
15-17	36.27	1.11	[34.11, 38.48]	100	2591
18-24	14.09	1.01	[12.22, 16.18]	100	1562
Type of place of residence					
Urban	29.81	1.44	[27.07, 32.71]	100	1711
Rural	37.72	0.94	[35.90, 39.59]	100	4300
Region					
North Central	30.28	1.96	[26.58, 34.25]	100	901
North East	41.97	1.65	[38.76, 45.25]	100	1292
North West	39	1.23	[36.62, 41.44]	100	2498
South East	31.78	3.02	[26.17, 37.97]	100	360
South South	27.97	2.91	[22.64, 34.02]	100	425
South West	20.52	2.13	[16.65, 25.01]	100	536

Analysis based on the 2013 Nigerian Demographic and Health Surveys (n = 6011, SE = linearised standard error, CI = confidence interval). Adjusted Wald test; $F(1.97, 1624.91) = 58.6513$ $p<0.001$; $F (3.88, 3192.60) = 18.4542$ $p<0.001$; $F (1.98, 1629.45) = 17.1877$ $p<0.001$; $F (2.98, 2454.77) = 20.5006$ $p<0.001$; $F (1.99, 1641.06) = 217.3187$ $p<0.001$: $F (1.00, 823.00) = 20.0410$ $p<0.001$; $F (4.98, 4095.72) = 14.3088$ $p<0.001$

15-17 were in this category (56 and 50%, respectively). An examination of the bivariate association between age at marriage and high-risk births show that a higher percentage of those married below age 18 years are exposed to avoidable risks compared to those married at age 18 or above. Disaggregating the specific risks, the findings presented in Table 3 show that the overall percentage giving birth at too young age was 14.5%, too close birth intervals was 12, 4% were having too many births; the others involve multiple risks of giving birth at too young age and having too close intervals (2%) and having too many births and having them at too close intervals (2.5%).

In Table 4, examining the bivariate association between avoidable high-risk births and socio-demographic variables among women currently aged 20-24 who had at least one birth in the last 5 years, we

Table 5: Adjusted binary logistic regression odds of high-risk fertility by selected socio-demographic predictors

Predictor	Odds ratio	SE	95% CI	DEFT
Age at first marriage				
<15	4.656***	0.112	3.738-5.798	1.053
15-17	3.253***	0.096	2.694-3.928	1.021
18-24	RC	RC	RC	RC
Education				
None	1.463*	0.172	1.044-2.051	1.133
Primary	1.267	0.129	0.984-1.632	1.200
Secondary/higher	RC	RC	RC	RC
Household wealth quintile				
Lowest	0.889	0.202	0.598-1.322	1.190
Second lowest	0.960	0.187	0.665-1.388	1.173
Middle	1.131	0.162	0.822-1.555	1.104
Second highest	0.934	0.177	0.660-1.323	1.303
Highest	RC	RC	RC	RC
Religion				
Christians	RC	RC	RC	RC
Islam	0.933	0.128	0.725-1.199	1.165
Others	0.714	0.257	0.431-1.183	0.931
Place of residence				
Urban	RC	RC	RC	RC
Rural	0.816*	0.102	0.668-0.996	1.127
CEB				
1-3	RC	RC	RC	RC
4+	5.655***	0.101	4.639-6.893	0.995
Number of ANC visits				
No visit	1.202*	0.080	1.029-1.406	1.028
1-3 visits	1.166	0.101	0.957-1.421	1.085
4+ visits	RC	RC	RC	
RC region of residence				
North Central	1.034	0.179	0.727-1.471	1.214
North East	1.084	0.186	0.752-1.563	1.237
North West	0.991	0.191	0.681-1.442	1.304
South East	1.758**	0.201	1.184-2.609	1.125
South South	1.114	0.208	0.740-1.676	1.194
South West	RC	RC	RC	RC
Contraceptive use				
No method	1.167	0.277	0.678-2.009	1.404
Modern method	1.464	0.315	0.788-2.719	1.403
Other methods	RC	RC	RC	RC
Frequency of news media use				
None	RC	RC	RC	RC
Occasionally	0.952	0.082	0.811-1.117	1.147
Often	0.884	0.130	0.685-1.142	1.201
Had premarital sex				
No	RC	RC	RC	RC
Yes	0.925	0.133	0.712-1.201	1.199
Type of marital union				
Monogamy	RC	RC	RC	RC
Polygyny	0.884	0.081	0.755-1.036	1.188
Education of spouse				
Both no education	RC	RC	RC	RC
Same level of education	0.923	0.162	0.672-1.269	1.114
Husband more educated	1.122	0.101	0.920-1.369	1.100
Wife more educated	1.271	0.172	0.907-1.781	1.079

Analysis based on the 2013 Nigerian Demographic and Health Surveys * = $p<0.05$; ** = $p<0.01$; *** = $p<0.001$. (n = 6011, SE = Linearised Standard Error, CI = Confidence Interval, DEFT = Design Effects, RC = Reference Category, CEB = Children Ever Born, ANC = Antenatal Care (at a health facility))

estimated that about 35% of the births to this subpopulation in the last 5 years preceding the survey were avoidable high-risk births. We also, examined the percentage of the women who are exposed to avoidable high-risk fertility in relation to specific socio-economic and demographic variables including education, household wealth index, religion, ethnicity, age at first marriage, residence and region. We also, present the bivariate association these variables and high-risk fertility, the adjusted Wald test, examining the null hypotheses that there is no relationship between each of the variables and avoidable high-risk fertility show that education, household wealth index, religion, ethnicity, age at first marriage, residence and region are all significantly associated with avoidable high-risk births.

In Table 5, we present the of avoidable high-risk fertility in the country among women currently aged 20-24 as it relates to child marriage, adjusting for education, household wealth index, religion, ethnicity, residence, region and age difference of woman to her partner's. The analysis shows that the adjusted odds of having an avoidable high-risk birth is significantly associated with child marriage, education, household wealth, residence, children ever born and number of antenatal visits. For instance, the odds of having an avoidable high-risk birth among women who married before their 15th birthday, compared to those who married after age 18 is 4.66 (p<0.001, CI = 3.74-5.80) while the adjusted odds of marrying between ages 15-17 years, relative to those married after 18 years is 3.25 (p<0.001, CI = 2.70-3.93). Having four or more children is also, significantly associated with increased odds of avoidable high-risk fertility. On the other hand, having no education is significantly associated with an increased odd of avoidable high-risk births relative to those with secondary or higher education (OR = 1.46, p<0.01, CI = 1.044-2.051) and similarly, those who made no antenatal visits to a health facility are at increased odds of high-risk fertility (OR = 1.20, p<0.01, CI = 1.03-1.41) relative to those who made four or more antenatal visits during pregnancy.

CONCLUSION

This study contributes to existing literature on child marriage and high-risk fertility. It shows that the prevalence of child marriage among married women currently age 20-24 with at least one live birth is quite high in the country as about three-quarters of their marriages were child marriages. Given that the denominator used in this study requires that the woman must have had at least a live birth (for estimating high-risk births) the extent is obviously underestimated. Nevertheless, it highlights a problem that has dominated debates in the country in recent years and the need for the government to both strengthen and enforce existing legislation on minimum age of consent to protect girls from exploitation. For instance, the sexual offences bill passed in 2015 stipulates

life imprisonment for sexual intercourse with minors (below age 18) nevertheless, it leaves a loophole by including a section that exonerates the offender if "It is proved that such child deceived the accused person into believing that he or she was over the age of eighteen years at the time of the alleged commission of the offence; and the accused person reasonably believed that the child was over the age of 18 years" (Ezeamalu, 2015). The law is virtually neutralised by these clauses.

The findings, also, show that the child marriage in the country may be poverty driven given that most of the marriages among women in the lowest wealth quintile (93%) were child marriages. A situation that is not replicated in the highest wealth quintiles, thus, suggesting the poverty in the lower wealth categories is playing a role in the decision of parents to reduce the mouths they must feed by marrying out girls at the earliest opportunity and/or cash in on the bride price to make ends meet. This reinforces previous findings (Nour, 2006) that show that poverty and income inequality are drivers of child marriage. It is also, important for policy purposes to note that the Hausa/Fulani ethnicity accounts for most of child marriages in the country. The finding that some 90% of Hausa/Fulani marriages among the subpopulation of interest were child marriages compared to <40% in each of the other 2 main ethnicities show that the ethnicity concentrated in the northern part of the country must be targeted. The ethnicities where girls are vulnerable to child marriage are concentrated in the Northern part of the country making it feasible to design state or region-based interventions. Such intervention would includead vocacy and specific women empowerment policies, including compulsory secondary education for girls as education has been severally established in literature as a factor that increases age at marriage (Adedokun, 1999; Nag and Singhal, 2013; Palamuleni, 2011; Westoff, 1992). Attaining secondary or higher education was also, found to be a significant predictor of reduced odds of exposure to high-riskfertility behaviour, again reinforcing the important role that education of girls could play in addressing both child marriage and high-risk fertility.

Also, after examining the association between age at marriage and high-risk births, we found that women who married below the age of 18 years are more at risk, relative to those married after attaining age 18. This is not surprising as early marriage has been shown to be consistent with increased reproductive health risks for women (Akinlo *et al.*, 2016; Ampofo *et al.*, 1990; Pathfinder International Ethiopia, 2006; UNICEF., 2005).

We should also, note that certain variables that has been established in literature as significantly associated with increased or decreased odds of high-risk fertility behaviour were insignificant in this study. This include contraceptive use, frequency of news media usage, premarital sex, polygyny and spousal education. However, the restriction of this analysis to only women in the younger age groups could have accounted for the non-significance in association of the variables in our study. For instance, contraceptive use has been consistently shown to be higher among women in the older reproductive age groups 24-49 (Jones *et al.*, 2012; NBS, 2015; NPC and ICF., 2014) relative to the younger age groups that this study is focusing on.

LIMITATIONS

This study is based on a cross-sectional data and thus, shares the limitation of cross-sectional studies-mainly that it is impossible to infer causality. Also, the NDHS was collected using multi-stage cluster sampling, partly as a trade-off between cost and precision, thus, it is less accurate than Simple Random Sampling (SRS) as the population is not evenly covered as SRS might do. In the last column of Table 2-5 we showed the squared roots of the Design Effects (DEFT) ("the ratio of the actual variance of a sample to the variance of a simple random sample of the same number of elements" (Kish, 1965)). The design effect has 2 main uses-in sample size determination and in appraising the efficiency of more complex plans (Cochran, 1977). We include the design effects for the second reason which is to show the possible loss of precision (effectiveness) as a result of the use of cluster sampling in the NDHS (instead of simple random sampling-which hypothetically would have been more accurate but in reality is not feasible for large national surveys due to cost implications). The DEFT of 1.127 for rural residence in Table 4 for instance, indicates that the standard error (0.082) was 1.13 times as large as it would have been had we obtained this sample from a simple random sampling. The DEFT show that generally for this sample, the loss of precision because of the complex design is minimal.

This study did not consider miscarriages and stillbirths in estimating the high-risk births. The DHS lumped abortions, miscarriages and stillbirths together in one variable, separating them would have put women with stillbirths in a higher-parity category, thus, there is the possibility that risks might have been underestimated for women with a history of stillbirths.

Our restriction of the sample to women currently age 20-24 is informed by standard international practice of estimating child marriage among that age group as

younger women who are not yet, married remains at risk of child marriage till they reach the age of consent and hence, a conclusion cannot be reached regarding their status. Nevertheless, we acknowledge that our estimation of child marriage should be treated with caution as the selection of the sample excludes women who have not given birth; their exclusion is informed by the outcome variable (high-risk fertility) which is measurable only among women that has been exposed to childbirth.

RECOMMENDATIONS

We conclude that a strong association exists between child marriage in Nigeria and exposure to avoidable high-risk fertility. Reduction in high-risk fertility is possible if policies that can yield a positive outcome in any of the following are in place and implemented. These include ending child marriage, raising education of women (secondary or higher) reducing overall fertility and ensuring that women make at least the recommended four antenatal care visits to a health facility during pregnancy. In reality, all these factors are interdependent and policy-makers could thus literally kill multiple birds with one stone for instance, achieving secondary or higher education for girls would automatically raise the age at marriage due to the increased number of years that girls have to stay in school it also, reduces high fertility rates as the years of exposure to childbearing is reduced and higher education takes them into the organised formal sector of the economy where success is often not compatible with multiple childbirths.

ACKNOWLEDGEMENT

ABBREVIATIONS

DHS = Demographic and Health Surveys
HIV = Human Immuno-Deficiency Virus
MDG = Millennium Development Goals
SDG = Sustainable Development Goals
STD = Sexually Transmitted Disease
WHO = World Health Organisation

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