TOO YOUNG TO SAFELY BEAR CHILDREN: THE INTERSECTION OF EARLY CHILD BIRTH AND MATERNAL MORTALITY IN NIGERIA

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ABSTRACT

Pregnancy related deaths is a major problem facing most developing countries especially Nigeria. In fact, Nigeria is reported to be among the worst performing in maternal health globally. The number of women who die during childbirth is alarming and keeps increasing despite advances in health care and technologies. Nigeria accounts for about 34% of global maternal mortality in 2022 with the life time risk of women dying during pregnancy being 1 in 22 people. The suspected role of child marriage in worsening maternal deaths have continued to generate great concerns among researchers and civil organisations. The idea of children having children is high risk and over 60 girls are reported to die daily in Nigeria from pregnancy related issues; aggregating to about 22,000 deaths annually. This is a huge burden and must not be ignored. This study therefore seeks to empirically evaluate the effects of early child birth on maternal mortality in Nigeria. This study uses the non-parametric regression model with data drawn from UNICEF Multiple Indicators Cluster Survey to evaluate the effect of early child birth on maternal mortality in Nigeria. The study show that early marriage has a weak positive relationship with maternal mortality rate in Nigeria. It is therefore recommended that the government should be more prudent in educating young mothers about basic health care during early and late stages of pregnancy. This could be conducted through the sensitization programs across the six geo-political zones of the country.

Key words: Mortality, Children, Marriage, Pregnancy

1. INTRODUCTION

Maternal mortality has become a global concern and a public health burden in Nigeria. This is because, one in seven global maternal deaths occur in Nigeria (United Nations Economic Commission for Africa, 2018). The World Health Organisation reports that Nigeria records over 34% of global maternal deaths (Ope, 2020; Aderinto, 2022). This figure places Nigeria as fourth in global maternal mortality ranking [United National International Children Emergency Fund (UNICEF), 2018]. It is shocking that one in every twenty- two women are estimated to die during child birth in Nigeria (WHO, 2019; Ope, 2020), with a corresponding low survival rate for their children. This is a huge problem to Nigeria (Meh, Thind, Ryan & Terry, 2019) and worrisome because, maternal mortality in all its forms are preventable (Olonade,Olawande,Alabi & Imhonopi,2019).

The sustainable Development Goal (SDG) 3.1 is targeted at addressing the challenges of global maternal mortality. To achieve this goal, efforts are being intensified by governments across the world, to reduce drastically, the maternal mortality rates. Although, progresses towards arresting this problem have been largely stalled and inefficient especially in Nigeria (Meh, Thind, Ryan &Terry, 2019). Undoubtedly, maternal mortality in Nigeria has deleterious effects on the women, their family and the economy at large and has been attributed in public health literature, to a lot of factors: poor access to health care in pregnancy, low socio economic development and poor health care system, poverty, cultural beliefs, age, education, domestic violence et cetra (Meh,Thind,Ryan &Terry,2019; Olonade, Olawande, Alabi & Imhonopi,2019; Ope,2020). However, a little attention has been paid to the contributions of early or child marriage to maternal mortality in public health literature.

While Africa shares the highest prevalence of child marriage— plays host to about 130 million child brides, Nigeria has the highest number of child brides in Africa (UNICEF, 2022). Child marriage is a harmful practice, it amounts to a gross violation of children's rights and limits the health and overall wellbeing of girls and women. It poses as a social, health and economic challenge and is captured in SDG goal 5.3 (eliminate all harmful practices by 2030). It is definitely not out of place, when we hold claims that addressing child marriage in Nigeria is like "passing a camel in needles eyes". This is because, child marriage is deeply rooted in cultural and religious beliefs (Nmadu,Joshua,Onyemocho,Mohammad-idris & Adiri,2018; Adeniyi,2021), whose attempts at modifications and change is met with fierce resistance. One

of such beliefs, is that marrying girls out at early age, shields them from promiscuity (Nigerian Health Watch, 2021) and possibility of pregnancies outside wedlock (Braimah, 2014a).

Child marriage has negative consequences such as recorded cases of domestic violence against children who are victims of child marriage for refusing to engage in sex. There are also cases where the child hurts or kills the supposed husband like the case of Rahma Hussein a 16 year old child bride from Kano state, Nigeria, who killed her husband in 2014 as a protest to her forced marriage. Salma Hassan, an 18 year old child bride from Bauchi state, Nigeria was also reported to have stabbed her husband to death in May 2020 for fear of first sex. She claims she is unaware that sexual intercourse was part of the marital obligations and requested that she be returned to her parents during interrogation. In Septembre 2021 a teenage girl Rumasa'ú Muhammed was also arrested in Adamawa state, Nigeria for killing her husband days after forced marriage. These and many more cases of child / forced marriage have caused and will continue to cause untold harm to the society.

In addition to all of these, child marriage is closely knitted with early childbearing. Thoughts from extant literature suggests, that child marriage contributes reasonably, to the incessant increases in maternal mortality. A study conducted by Obaje, Okengwu, Uwimana, Sebineza & Okorie (2020) posit that reduction in child marriage is highly correlated with a reduction in maternal mortality. This is corroborated by Raj & Boehmer (2013) who suggests a 10% reduction in child marriage, amounts to about 70% reduction in maternal mortality. Despite the valuable efforts and evidence-based interventions made, to drastically reduce and possibly end maternal mortality in Nigeria, the figures are still very high (Ogu & Ephraim-Emmanuel, 2018). So many of these young girls in Nigeria are married off before age 15, for some, the age is as low as 7 years (Osakinle & Tayo-olajubutu, 2017). According to Braimah (2014b) and Osakinle & Tayo-olajubutu (2017) these young girls have higher risk (five times higher) of dying during delivery than older women. They appear to be ill informed and care less about their health during the pregnancy periods.

The UNICEF child marriage country profile suggests that child brides have less access to reproductive health services in Nigeria. Two countries in South and East Africa appear in top ten countries with high prevalence of child marriage while 7 out of ten countries of West Africa are in the Top ten, with Nigeria leading in this group (UNICEF, 2022). The death of young girls in pregnancy erodes the possibility of achieving SDG goals 3(Quality health and wellbeing) and goal 4(Quality education). That is why, the country appears not to be anywhere, on track to achieving SGD goal 3.1(ending maternal mortality) and goal 5.3 (ending

child/forced marriage). Literature on the relationship between child marriage and maternal mortality is very little. Only few studies to the best of our knowledge have been done in this regard. Those studies like that conducted by Adedokun, Adeyemi, Dauda (2016); Agege et al. (2020) Bolarinwa, Ahinkorah, Okyere, Seiduand Olagunju (2022); Obaje et al(2022) which tried to study the impacts of child marriage and maternal mortality, employed qualitative methods which are less robust in performing impact analysis. More so, most of the similar studies like Adedini et al. (2022); Ahinkorah, Budu, Seidu and Bolarinwa (2022); Li, Cheng and Shi (2021) ; Raj and Boehmer (2013); focused on access to health care facilities by victims of child marriage but this does not translate to maternal mortality for young children engaged in child marriage. It is based on all these that this study strives to fill these existing research gaps in public health literature by embarking on this research and also utilizing the logistic regression model. This will be suitable for analysing the effects of child marriage on maternal mortality in Nigeria. The research evidence generated, will contribute to literature on child marriage and maternal mortality. It will also lead to a better understanding of strategies and policies needed to tackle the problems of maternal mortality in Nigeria.

2. Literature Review

To give credence to our earlier arguments and suggestions on the effects of child marriage on maternal mortality in Nigeria, this study reviews the following theoretical and empirical literature:

The theory of change in child marriage

This theory of change in child marriage was developed by "The Girl Not Bride" partnership in 2014. The model strives to ensure that girls who are not within marriageable age according to the 1948 Universal Declaration of Human Rights, are discouraged and prevented from engaging in early marriage. Those who are victims are not neglected in this model, rather, they are supported, as well as, protected from all kinds of exploitation and abuse which leaves them entangled in domestic and sexual subservience to their partners. In most cases, these men are twice or thrice the age of these girls, this makes them vulnerable after marriage as much as before marriage. The theory is disproportionately focused on early girl marriage because the girls are more exposed to early marriage than boys. The theory identifies the problem of early marriage and outlines four strategies for ending child marriage: i) Girls empowerment (ii) Family and community mobilization, (iii) Service provision to girls at risk of early marriage

(iv)Laws and policy establishment and implementation. Another theory of relevance is the theory of planned behaviour (TPB).

Theory of Planned Behaviour (TPB)

The theory of planned behaviour (TPB) was developed in the year 1991 by Icek Ajzen. The theory links beliefs to behaviour. Hence, it is often time seen as a psychological theory. It is built on three core principles (attitude, subjective norms, and perceived behavioural control) which together shape an individual's behavioural intentions. TPB states that an individual's intention to start certain behaviour enables the practice of the behaviour. Individuals have a greater chance to practice healthy behaviours (attend antenatal and use health facility for childbirth) if - they have positive attitudes about the behaviours (antenatal and health facility; believe that perceived societal view (perceived norms) are positive towards those behaviours; and believe they are able to perform those behaviours correctly. In addition, an individual's intention would be greater when they have all of the above three than when they have just one. Literature indicates that intentions are of great essence – since the greater a person's intentions to utilise health services for childbirth, the most likely the person will perform that behaviour (Moshi, Kibusi & Fabian, 2018).

Empirical literature

Raj and Boehmer (2013) employed regression analysis to examine the association of girl child marriage with national rates of HIV, maternal health, and infant mortality across 97 countries using 2009 national indicator data. It was observed that Countries with more girl child marriage are associated more with higher rates of maternal and infant mortality as a result of poor maternal health services utilization. The study carried out by Ahinkorah, Budu, Seidu and Bolarinwa (2022) revealed that young women who experienced child marriage are less likely to utilise antenatal care service during pregnancy unlike those who did not witness child marriage. They investigated the relationship between child marriage and the utilization of maternal healthcare services in sub-Saharan Africa using Demographic and Health Surveys data from 29 sub-Saharan African countries'. A total of 36,215 young mothers between the ages of 20-24 years made-up the sample size and a multilevel binary logistic regression analysis was employed.

Adedokun, Adeyemi, Dauda (2016) analysed the effects of early marriage on maternal health of mothers using multistage sampling technique and obtained data from 200 young mothers

aged 15-24 years who married before aged 16 years. The analysis showed that greater than 60% of them only have primary education while above 70% had witnessed complications before, during or after childbirth. The research work by Bolarinwa, Ahinkorah, Okyere, Seiduand Olagunju (2022) supports this finding. They employed descriptive, chi-square and multi-level analyses with the aid of data from Nigeria Demographic and Health Survey (NDHS) to study the occurrence drivers of female child marriage in Nigeria. The result showed that residents of North East and North West Nigeria are more likely to practice female child marriage. While women with secondary education and above, those who are within the wealth index of the rich, and Young girls residing among the literates have a lesser chance to be married before 18 years of age.

Agege et al. (2020) studied the health consequences of early marriage in Nigeria by doing a narrative review of available literature on early marriage. The review revealed that the occurrence rate of child marriage in Nigeria is 88% and this accounts for 90% of maternal mortality in the country. It was further observed that the major health consequence of child marriage is the annual report of about 500,000–1,000,000 Vesicovaginal Fistulous (VVF), which can only be corrected through surgery. Using qualitative analysis Obaje et al. (2022) analysed the effect of child marriage in Nigeria and how to put an end to the practice. It was observed that 10% reduction in child marriage can lead to about 70% reduction of maternal deaths. It further revealed that decrease in child marriage can also significantly reduce violence against women and enhance their educational attainment. Hence, avoid the annual loss of $7.6 billion in human capital earning and output as a result of child marriage in Nigeria as stated in (World Bank, 2017).

Li, Cheng and Shi (2021) employed data from Demographic and Health Surveys (DHS) to analyse the consequences of early marriage on the utilisation of maternal health services in five sub-Saharan countries: Burkina Faso, Guinea, Mali, Niger and Chad. The recursive bivariate probit (RBVP) model was used for this analysis and it was revealed that girls who marry before the age 15 have 17% point lower chance of using prenatal services; and marrying between the age of 15 and 16 increased that likelihood of using prenatal services by 9.6% points. Women who marry at age 17 and above do not have any statistical significant increase or reduction in maternal health care utilisation. The assessment by Adedini et al. (2022) support this finding. They performed binary logistic regression analysis on young women (total of 33,630 women) in 20 SSA using data from Demographic and Health Surveys. The analysis established that

women who married before age 15 have significantly lower likelihood of using health facilities in pregnancy, while those who married at ages 15-17 are more likely to use health facilities.

Doctor, Findley and Afenyadu (2012), estimated the lifetime risk of maternal death and maternal mortality ratio (MMR) in 4 Northern states in Nigeria. Household survey data conducted in the year 2011 were employed for the estimate using the "sisterhood method" for estimating maternal mortality. 15–49 years females were interviewed thereby creating a retrospective cohort of their sisters who reached the reproductive age of 15 years. 3,080 respondents reported 7,731 maternal sisters of which 593 were reported dead and 298 of those dead were maternal-related deaths. This suggests 1,271 maternal deaths per 100,000 live births; 95% CI was 1,152–1,445 maternal deaths per 100,000 live births. The study suggests the need to enhance the health system focusing on strategies that will foster reduction in MMR. An accelerated reduction in MMR in the region will contribute towards the attainment of the Millennium Development Goal of maternal mortality reduction in Nigeria.

Ope (2020) assessed avenues to reduce maternal mortality in Nigeria using qualitative approach. He identified women perceptions and experiences in utilization of health centres to be a hindrance in hospital usage during pregnancy. Hence, the paper addressed the need to understand and tackle the idea and experiences of maternal services specifically at delivery point, as this is essential towards increasing the usage of maternal health services/facilities in a multicultural setting like Nigeria.

Njabili (2016) examined the access of rural women to information on maternal health and its impact health service utilization. A qualitative study using Health Belief Model and Theory of Planned Behaviour to develop interview questions and focus group guides as well as the interpretation of the findings for a period of 6 months was employed in Chamwino District in Dodoma Region, Tanzania for a. The study involved 5 Traditional Birth Attendants, 25 pregnant women, and 5 health workers. The 6-stage guide to thematic data analysis with the aid of NVIvo Software was used for the analysis. It was observed that the poor condition of health services and facilities and limited access to information on maternal health led expecting women to seek health advice and service from mother in law, Traditional Birth Attendants and other women in the society.

Some other empirical works also identified age, education level, availability and access to media and women's social status as important factors that determine women's utilisation of

healthcare facilities (LaVeist, Keith & Gutierrez 1995; Perloff & Jaffee 1999; Navaneetham and Dharmalingam, 2002; Tsawe, Netshivhera, Ralesego, Nyathi, & Susuman, 2015). In addition, some other literatures revealed that older women were more likely to access and utilise maternal health care than the younger ones which may be due to the experience and knowledge they have on the essence of maternal health care services or because they have greater family decision making power than younger ones (Reynolds, Wong & Tucker, 2006; Bell, Sian, Curtis & Siliva, 2003; Elo, 1992; Leslie & Gupta, 1989; Navaneetham & Dharmalingam, 2002; Glei, Goldman & Rodriguez, 2003; Burgard, 2004; Mesfin & Farrow, 1996; Reynolds et al, 2006; Tsawe et al, 2015).

Tasneem, Nnaji and Ozdal (2019) investigated the causes of maternal mortality in Nigeria by reviewing the retrospective maternal mortality reviews and autopsies post 2000 in the PubMed and BioMed Central databases. From the 69 articles available, 11 articles were reviewed and 6 of them were included in the study. Eclampsia, pre-eclampsia, and hemorrhage were reported to be the most related triggers of maternal mortality. They stated that these conditions can be prevented by keeping to antenatal appointments, early detection, availability of trained birth attendants, easy access to health care services, et cetera.

3.0 Methodology and Result

The data for this study was sourced from UNICEF Multiple Indicators Cluster Survey, which provides data on maternal health and child protection. The data on early child birth was extracted from the Maternal and New-born Health Coverage Database of the MICS and is captured by the percentage of women aged 20-24 who gave birth before age 18. The data on maternal mortality ratio shows the number of maternal deaths during a given time period per 100 000 live births during the same time period. Since these data are survey data and are unfit for Ordinary Least Squares estimation due to the small data set, this study employs yearly percentages and non-parametric regression method.

This regression technique does not require specific parametric form for the relationship between the variables. The model estimates the regression function locally, using only the data points within a specified point of interest. A kernel function is used to assign weights to the nearby data points, with closer points receiving more weight. The model is usually denoted as:

$$A(x) = E(Y/X = x)$$

Where A(x) is the regression function, X is the predictor variable, and Y is the response variable.

Following this model, the econometric form of the model is specified as follows:

$$MMR = m(birth18) + ancv + \varepsilon$$

where MMR(the maternal mortality rate) is the response variable

birth18 is the predictor variable ,m(birth18) is the non-parametric regression function

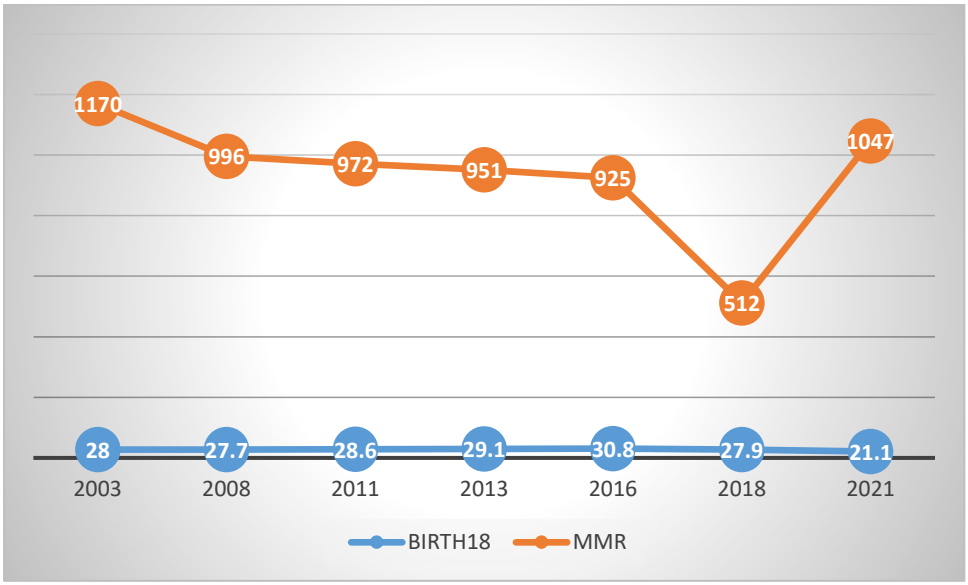
ancv is the percentage of pregnant women who engaged in antenatal care

ε is the error term.

The model was estimated using Stata 15 software.

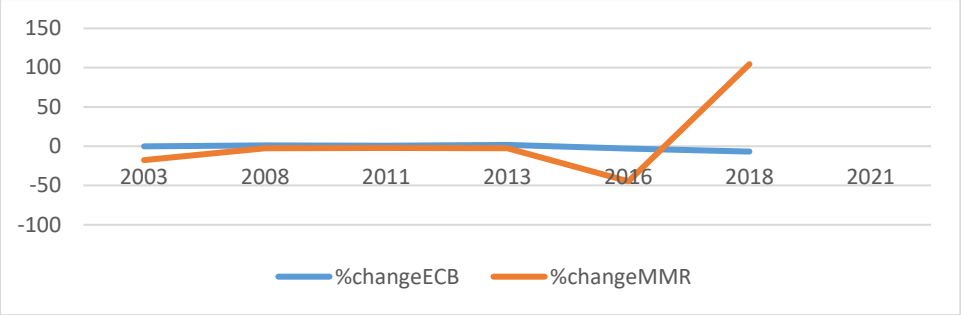
First, the descriptive analysis of the data shows the trends in early childbirth and maternal mortality rate for the periods: 2003, 2008, 2011,2013,2016,2018 and 2021, which are the periods that the Survey took place.

Figure 1: Trend of early childbirth and maternal mortality rate in Nigeria



The figure shows that early child marriage demonstrated a cyclical trend, displaying a recurring pattern of growth and declines, within the specified periods. Maternal mortality rate, however showed a constant decline from year to year until 2021, where it had the highest increase so far. This is demonstrated clearly in figure 2.

Figure 2: Percentage changes of early childbirth and maternal mortality rate in Nigeria



The non-parametric regression result

Computing mean function
Computing mean function
Minimizing cross-validation function:
Iteration 0: Cross-validation criterion = 44.419799
Iteration 1: Cross-validation criterion = 44.419799
warning: 1 observation was not used to compute the mean function because it violated the model identification assumptions. This observation is marked as 1 in the system variable _unident_sample. You
may use the unidentsample() option to use a different variable name.
Computing optimal derivative bandwidth
Iteration 0: Cross-validation criterion = 1170
Iteration 1: Cross-validation criterion = 1170
Bandwidth

	Mean	Effect
birth18	2.209	2.380
ancv	4.135	4.456

Local-linear regression	Number of obs	=	6
Kernel : epanechnikov	E(Kernel obs)	=	6
Bandwidth: cross validation	R-squared	=	0.7927

mmr	Estimate
Mean	
mmr	911.897
Effect	
birth18	9.557
ancv	-17.421

Note: Effect estimates are averages of derivatives.
Note: You may compute standard errors using vce(bootstrap) or reps().

The non-parametric regression result suggests that there is a relatively weak positive relationship between early child birth and maternal mortality. The effect size is moderate, but not substantial. The mean value is relatively high, which indicates a ceiling effect. The result also shows that early child birth might not be the most relevant or accurate predictor of maternal

mortality rates, but has a recognisable effect on maternal mortality rates in Nigeria. It is therefore recommended that the government should be more prudent in educating young mothers about the negative consequences of early marriage and by extension early pregnancy. In situations where this menace is yet to be curbed, adequate information about maternal health should be provided to these young girls during early and late stages of pregnancy. This could be conducted through the sensitization programs across the six geo-political zones of the country.

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