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Trend analysis of teenage pregnancy in Nigeria (1961-2013): how effective is the contraceptive use campaign

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ABSTRACT

Teenage pregnancy (TP) is a recurrent global and public health problem. It poses both social and health challenges. Considering the massive campaign on the use of modern contraceptives to prevent TP in recent decades, we assessed trends in TP in Nigeria between 1961 and 2013. Pregnancy and contraception history of 70,811 women who were at least 20 years old when the Nigerian DHS was conducted in 1990, 2003, 2008, and 2013 respectively were used for the study, and descriptive statistics, time analysis techniques and multiple logistic regression were used to analyze the data at 5% significance level. The overall prevalence of TP between 1961 and 2013 was 49.5% which fluctuated insignificantly during the studied period. The TP prevalence among women who entered adulthood in 1961 was 39.2%, it peaked in 1978 at 58.9% before its unsteady decline to 39.6% in 2012, and then rose sharply to 55.6% in 2013. We predicted TP prevalence as 49.0%, 49.9% and 51.0% in 2014, 2015 and 2016 respectively. The odds of TP were over 4 times higher in the North East and 5 times higher in the North West than in the South West. Teenagers with no education had higher odds of TP and it was higher among teenagers from the poorest households (OR=5.64, 95% CI=5.36-5.94). Rather than reducing with the worldwide acknowledged increase in contraceptive campaigns, TP increased over the years studied. As far as TP is concerned in Nigeria, the impact of the campaign on MC use is far from being effective. To achieve the objective of fewer TPs, fewer resources should be spent on access to contraception and instead diverted to areas more likely to achieve results such as improvements in educational achievement amongst girls.

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1. INTRODUCTION

Literature is replete with the fact that Teenage Pregnancy (TP) constitutes both health and social problems [1–3] and it is a public health challenge facing both developed and developing countries [4-5]. The challenges are irrespective of the teenager's marital status or legality of marriage [1], besides, pregnancy and childbirth-related complications are among the leading causes of mortality among persons aged 15-22 years in many parts of the world [6–9]. Teenage pregnancy is a major health challenge in every health care system because it could result in untoward effects on girls' physical, psychological, economic and social status [5]. That is why the health, social and developmental needs of young people are among the most

important investments a country can make for both the individual girl's future and for the economic wellbeing of the country. Also, consequential effects of early pregnancy, early childbirth, and early marriage, limit the chances of attaining sound education and the likelihood of acquiring resourceful skills necessary to secure a good livelihood [9–11].

Several studies have identified many predictive factors of TP. Some of them include poor socio-economic background, peer pressure, early onset of menarche, poor education and poor reproductive health knowledge and practice [8, 12–14]. A recent study in Peru found that the rate of early childbearing is nearly six times greater among teenagers from the poorest households compared to those from wealthiest households [15]. Peer pressure has been identified as another major cause of TP [16-17]. Teenagers often engage in unwholesome and unhealthy activities just to "belong"; hence, they are influenced by their peers to engage in an unsafe sexual activity. In support of this assertion, Rudd et al. stated that teenage girls undergo a lot of pressure to have sex, to look sexy and to conform to stereotypes of what the opposite sex sees as being attractive [18].

Also, rural-urban differentials have been reported to influence TP [19] with higher rates in rural areas [4, 12, 15, 20]. Literature is at disagreement that sex education affects TP [3, 8]. Previous studies have established that many teenagers are not educated on methods of birth control [21], as sex education is a "no-go-area" in many cultures. Even where it exists, school-based sex education programmes only cater to in-school youths but not for out-of-school youths. Whereas, Mason-Jones et al found that sex education has little or no effect on TP [22]. Contraceptive use remains a big challenge among youths as inequalities, guardian consent, availability, and affordability, as well as poor bargaining power, are major barriers to contraceptive use in developing and developed nations alike [12].

TP rates vary across the globe. For instance, Romania recorded 61 TP per 1,000 teen-girls in 2011, the US had 72.2 per 1,000 in 2002-2005 [23] which later reduced to 57 per 1,000 in 2010, while England had 47 in 2011 [12]. In sub-Sahara Africa, birth rates were in the neighbourhood 150 per 1,000 women of ages 15 to 19 years [24] and Kenya had a TP rate of 174 per 1,000 teen girls aged 15–19 in 2012 [24]. In the US, 80% of TP are unintended, with about 58% resulting in live births, 14% in miscarriage and about 28% in abortion [25-26]. Early childbearing, the most prominent outcome of TP, has remained very prevalent in most regions of the world. In developing countries, adolescent girls aged 15–19 years had over 14 million births and 3 million abortions in 2008 alone [12]. About 16 million women aged 15–19 years give birth each year in the developing countries of which an estimated 3.9 million undergo unsafe abortions and are exposed to pregnancy complications including obstetric fistula, illness, injury, and death. These women account for 11% of all global annual births [27]. With 95% share of global births, the TP rates in middle income and low-income countries are twice and 500% of the rate in high-income nations respectively [27]. Specifically, 10% of girls become mothers by age 16 years in low- and middle-income countries, highest rates are found in sub-Saharan Africa with 12.2% in Mozambique [27].

A 2013 Population Reference Bureau (PRB) report shows that more than one-quarter of teen-girls aged 15 to 19 years from households in poorest wealth quintiles in Zimbabwe, Senegal, Colombia, and Peru have begun childbearing [15]. It is worth noting that half of all annual global births occur in just seven countries: Nigeria, Ethiopia, Democratic Republic of Congo, Bangladesh, Brazil and the United States of America [27]. This finding demonstrates the high rate of TP in both developing and developed countries [6, 28]. However, a decline in the trend of TP has been documented. A report on TP prevention shows a historical decline between 1991 and 2005. This finding was attributed to a significant increase in the use of contraceptives among sexually active female teenagers[29]. Also, the number of births by teenagers in the US has generally declined, with some variations around 62% between 1970 and 2014 [25]. Increased global attention to the prevention of TP worldwide is showing considerable positive results. These global trends in the decline of TP rates are viewed as a direct pointer to increasing opportunities and capacity of teenage girls to manage their sexual activities as well as their reproductive health [30]. This finding might be attributed to the significant increase recorded in contraceptive use and age at first marriage among adolescents, accompanied by a significant decrease in rates of adolescent childbearing in many countries and regions in recent years [12, 27]. It is striking that while only a little difference exists in levels of sexual activity among adolescents in most nations, there is substantial variation in levels of contraceptive use and TP worldwide [12].

According to the 2006 Nigeria population census, 22% of the total population are teenagers [31] and Nigeria is one of the 21 countries recording highest rates of adolescent marriage before the 18th birthday [32]. The National Population Commission (NPC) of Nigeria estimated that occurrence of TP in Nigeria might have passed 60 million by 2015 compared with the recorded 44.5 million in 2006 [33]. Teenage Pregnancy has, therefore, remained a major health and social concern in Nigeria, coupled with its likely association with high child and maternal morbidity and mortality [34]. In 2008, the adolescent fertility rate in Nigeria was 121 live births per 1,000 [34], the highest rate in Africa, compared with 24.2 in

the United States [25]. The large size of the incoming generation of youths is likely to cause an escalation in the absolute number of teenage births [35-36] as a result of likely high TP. Therefore, the TP rate is not only a social and health concern but also an undeniably powerful indicator of population dynamics and overall well-being of the Nigerian populace.

A major way to reduce TP is provision of a policy on the use of contraceptives. The Federal Government of Nigeria (FGN) is committed to achieving 36% Contraceptive Prevalence Rate (CPR) by 2018 as a strategy for reducing unwanted pregnancy especially TP. As a matter of fact, Nigeria's annual vote for the procurement of reproductive health commodities in 2015 was $3 million. The commodities include all materials needed by women to prevent unwanted pregnancy and practice safe sexual and reproductive health. There is a commitment to an additional annual boost of $8.35 million over the next four years, an increase of almost 300%. The FGN has agreed to work with the state and local governments to secure complementary budgets and also partner with other stakeholders to ensure family planning and reproductive health service delivery [37]. Similar commitments have been consistently made in recent past decades. Nonetheless, contraceptive use has its unintended consequences. While reducing TP, access to emergency contraception increases risky sexual activities which in turn increases [38–40].

However, the unanswered big question remains "to what extent has these budgetary allocations and mass contraceptive campaign impacted on TP in Nigeria?" Prevention of TP should be a priority for the public, policymakers, and nations because of its high economic, social, and health costs for teen-parents and their families [25]. However, without evidence and up-to-date review of what has been done and what was achieved, this goal may be difficult to achieve. The fact that TP is still prevalent globally [18, 24], especially in developing countries such as Nigeria with a huge contribution to the pool of the world TP, has necessitated the need to assess the trend in TP and the underlying factors. Therefore, in this study, we assessed the trends in TP from 1961 to 2013 and argued that the magnitude of TP is much larger than what is available in the literature. Most studies have estimated TP using numbers of "ever-had-a-birth female teenagers" or "currently pregnant female teenagers" in cross-sectional studies irrespective of the teen ages. In the current study, we used the date of the first occurrence of pregnancy among all women who have passed the teenage years to determine the rate of TP. We estimated and monitored the trend in TP and identified its risk factors.

2. RESEARCH METHOD

2.1. Data sources

In this study, data was utilized from four consecutive Nigerian Demographic Health Surveys conducted in 1990, 2003, 2008, and 2013 [34, 41]. The surveys were cross-sectional and nationally representative. They provided data about demographics and reproductive behavior of women of child-bearing age in Nigeria. In the 1990 survey, 299 sample clusters correspond to the Enumeration Areas (EA) of the National Integrated Survey of Households (NISH) master sample. A sample of 10,000 households was designed with twofold oversampling of the urban stratum, yielding 132 urban EAs and 167 rural EAs. In the 2003 survey, the 1991 census was used to select the sample using a stratified, two-stage cluster design. A total of 365 clusters were selected, 165 in urban and 200 in rural areas. Four-stage sampling procedures were adopted in the 2008 and 2013 surveys. The stages were a selection of local government areas on the rural-urban basis from every state and the Federal Capital Territory (FCT), selection of clusters and households, and finally the selection of individuals. Well-trained interviewers administered the pre-tested, semi-structured questionnaire on the individual women during face-to-face interviews.

2.2. Data

A total of 8,781, 7,620, 33,385 and 38,948 women participated in the surveys held in 1990, 2003, 2008, and 2013 respectively. The effective sample size included in this study was 70,811 consisting of 7,103, 5,871, 26,794 and 31,043 women who had attained age 20 years as at the respective date of the surveys. The outcome of interest in this study was TP. We defined TP to be conception by a woman before attaining age 20 years [10, 42] irrespective of whether the pregnancy resulted in childbirth or was terminated voluntarily or not. We, therefore, considered responses of women who had already completed the teen years. Three variables: "Age of respondent at 1st birth", "Have you ever had a pregnancy that miscarried, was aborted, or ended in a stillbirth?" and "When did the last such pregnancy end?" in the dataset were used in determining women who were pregnant before age 20 years. The variables were used to determine those who reported pregnancy before age 20 years, those who had any childbirth before attaining age 20 years, and those who had used anything to terminate a pregnancy before they (women) attained age 20 years. The outcome variable was dummy coded (Yes/No) with the aim of interpreting all associative findings as 'having had TP'. However, dominant responses came from teenagers who were at nodal ages such as 15 and

20; some teenagers who reported exact age 20 years to any of the three variables might have been pregnant before or shortly after age 20 years. We envisaged that this would have minimal effect on our findings. Therefore, for the purpose of this study, teenagers are young women between the ages of 13 and 20 years.

On the significance of the variables associated with TP in public health literature, the explanatory variables included in the current study are the basic socio-demographic variables such as residence (urban/rural); region of residence (North Central, North East, North West, South East, South South & South West), wealth quintiles (Poorest, Poorer, Middle, Richer and Richest) and education (No formal education, Primary/Quranic, secondary and higher level). Others are cultural factors such as ethnicity (Hausa/Fulani, Yoruba, Igbo, and Others) and religion (Catholics, Other Christian, Islam and Others), fertility indicators such as marital status (married before age 20 years or later) and age at first marriage (<15 years, 15 to 19 years & >19 years) and awareness of contraceptives (Yes/No), current use of contraceptives (Yes/No), and years since adulthood calculated as number of years between when the respondents turned 20 and 2013 (the date of the last survey).

2.3. Data analysis

We used descriptive statistics and time analysis techniques, including trend lines and moving averages, to illustrate variations and trends in TP. The time series analysis involved computation of autocorrelation and partial autocorrelation using ARIMA models. Given a series of observations y_i at different time points i, autocorrelation is a measure of linear dependence of a variable with itself at two different points in time. The autocorrelation between two consecutive observations depends basically on the time lag h between them in a stationary process. If $y_h = \mathrm{Cov}(y_t, y_{t-h})$ then the autocorrelation for *lag-h* is given by:

$$p_h = \mathrm{Corr}(y_t, y_{t-h}) = \frac{y_h}{y_0}, \quad (1)$$

where y_0 is the unconditional variance attributed to the process. The partial autocorrelation, $\phi_{h,h_{h.h}}$, is the autocorrelation between y_t and y_{t-h} after removing any linear dependence on $y_1, y_{2,} \ldots \ldots \ldots y_{t-h+1}$.

We fitted both linear and polynomial regression models to the yearly rates of TP and predicted TP prevalence in Nigeria for years 2014, 2015 and 2016. Chi-square tests and binary logistic regression models were used to investigate the association between the explanatory and outcome variables. For ease of analysis, we categorized the women into 5-year cohorts, starting from 1961, according to the years they exited teen ages. All analyses were conducted using Stata version 13 at 5% significance level and data were weighed and adjusted for survey design and sampling errors.

3. RESULTS AND DISCUSSIONS

3.1. Result

Among the 70,811 women involved in the analysis, 65.3% were rural dwellers, 44.1% had no formal education and 20.5% had primary or Quranic education, while 26.4% had secondary school or higher education. Also, 62.2% had married as teenagers while 24.0% were married before age 15 years, it is presented in Table 1. In all, 56.4% of rural teenagers compared to 36.9% of their urban counterparts were pregnant before attaining age 20 years. TP reduced gradually among urban women from 43.4% in 1990 to 35.0% in 2013. Over the same period, TP increased from 56.7% to 58.8% among rural women. While TP fell among women belonging to households in the richest quintiles from 41.6% to 23.2% between 1990 and 2013, it increased from 58.4% to 71.2% among those in poorest households' category. Other noticeable wide gaps existed in marital status, age at first marriage, religion, ethnicity and geographical zone of residence. All the factors considered were significantly associated with TP both in the overall and at each year of surveys.

The yearly prevalence of TP in Nigeria by 5-year cohorts is shown in Table 2. It seemed to be lower among women that exited the teen ages between 1961 and 1964 and then rose to about 58% among those that exited the teen ages during the 1974-1978 period, before declining over the years to 48% among those that exited the teen ages in 2009-2013. The overall prevalence of TP between 1961 and 2013 was 49.6%. The time plot of TP prevalence by years when the respondents exited teen years is shown in Figure 1. It shows that the prevalence of TP among the studied women who have passed the teen ages fluctuated during the period. While the TP hovered around 50% between 1961 and 1970, it went up as high as 60% in certain years between 1975 and 1985 and reduced gradually thereafter though it seemed to be increasing by 2013. We explored the time analysis of the yearly prevalence of TP in Nigeria using a 2-period moving average method. The method showed a clearer peak in the trend. Generally, TP began to rise in 1962,

started declining from 1967 to 1972, rose to the highest rate of 58.9% in 1979, then reduced gradually till 1995 and thereafter had a seemingly stable rate till 2013. It, however, peaked in 1979 is shown in Figure 1.

Table 1. Distribution of respondents and prevalence of teenage pregnancy by socio-demographic factors

Variables	Distribution of respondents	Proportion (%) ever pregnant before age 20 years 1990 n=7103	2003 n=5871	2008 n=26794	2013 n=31043	All n=70811
Residence						
Urban	34.7	43.4	42.3	35.5	35.0	36.9
Rural	65.3	56.7	57.1	55.0	58.8	56.4
Zone						
North Central	17.3	54.5	49.2	46.5	40.9	46.0
North East	17.3	61.0	68.5	65.3	63.7	64.8
North West	25.0	61.7	70.1	67.4	70.2	67.6
South East	11.2	45.6	29.0	27.7	26.6	29.5
South South	13.5	52.3	44.6	40.4	41.8	42.0
South West	15.8	35.1	26.3	28.1	28.8	29.3
Education						
None	44.1	59.2	69.4	67.3	69.5	66.7
Primary/Quranic	20.5	53.8	56.2	55.4	57.7	55.9
Secondary	26.4	26.3	28.0	28.3	31.6	29.3
Higher	9.1	10.0	15.8	11.0	11.7	11.5
Wealth Status						
Poorest	20.7	58.4	64.5	64.3	71.2	65.5
Poorer	20.1	58.0	61.1	62.0	63.2	61.8
Middle	19.0	55.2	57.5	52.0	52.8	52.9
Richer	19.8	50.4	49.2	39.7	41.0	42.0
Richest	20.5	41.6	28.5	22.9	23.2	26.1
Tribe						
Hausa/Fulani	29.9	na	74.0	69.5	70.7	70.2
Yoruba	14.4		27.8	27.7	26.5	27.0
Igbo	13.9		29.6	26.1	25.9	26.4
Others	41.8		56.2	49.5	48.2	49.7
Religion						
Catholics	12.6	43.9	38.5	36.2	31.7	37.3
Other Christian	34.9	44.6	38.5	35.2	35.6	35.8
Islam	46.5	57.8	34.3	63.1	63.7	61.7
Others	6.0	52.7	65.1	57.5	55.2	61.9
Marriage Time						
Before Age 2- Years	62.2	75.3	70.1	77.1	75.3	77.2
Age 20 or After	37.8	7.4	5.9	6.8	7.8	7.4
Age at 1st Marriage						
B4 15	24.0	84.6	74.6	87.1	84.2	89.8
15-19	38.2	69.5	66.7	69.0	70.0	70.0
Unmarried b4 20	37.8	7.4	5.9	6.8	7.8	7.4
Total	100.0	51.6	51.4	48.9	49.5	49.6

[a]insignificant at 5%

Table 2. Prevalence of teenage pregnancy by years of survey and 5-year cohorts in Nigeria: 1961-2013

5 Year Cohort	Prevalence by Years of Survey 1990	2003	2008	2013	Overall
1961-1964	42.1				42.1
1966-1970	46.4				46.4
1971-1975	47.8				47.8
1974-1978	57.1	58.0			57.4
1979-1985	55.7	57.1	53.5		54.7
1986-1990	53.3	58.6	52.0	54.1	53.6
1991-1994		54.8	48.9	49.7	49.9
1995-1998		47.0	49.5	49.6	49.2
1999-2003		44.3	47.7	49.2	47.9
2004-2008			45.9	48.6	47.3
2009-2013				47.9	47.9
Total	51.6	51.4	48.9	49.5	49.6

We estimated autocorrelations (AC) and partial correlation from lag 1 to lag 8 representing the last eight years of the study period. The AC between 2013 and 2012 series was 0.283, while it was 0.433 between 2013 and 2011. Actually, we expected these autocorrelations to gradually decrease to zero, but due to nonlinearity existing in the data, we observed an abnormal pattern. In essence, the AC results showed that TP

is not a random process, but follows a particular distribution or model which is likely to be nonlinear (not shown in the tables).

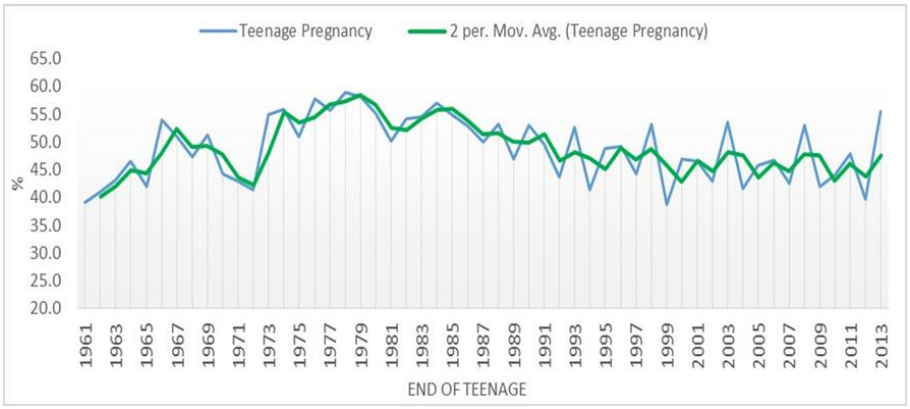

Figure 1. Time analysis of TP in Nigeria, 1961-2013

Estimating and predicting the pattern of TP in Nigeria

We explored two models to determine the pattern and estimate the trend of TP in Nigeria. The resultant linear model shows that TP fell gradually in Nigeria between 1961 and 2013. However, the polynomial model shows that the trend of TP in Nigeria was not linear but cyclical. The polynomial curve also shows some periodical fluctuations in the prevalence of TP in Nigeria. A sharp increase between 1973 and 1983 and decline from 1985 to 2005 are obvious. The polynomial model (R^2=0.4232) was found to have accounted for more variability in the data than the linear model (R^2=0.0167) as shown in Figure 2. Going by the polynomial model, we predicted that prevalence of TP would be 49.0%, 49.9% and 51.0% among women transiting from the teen ages to adulthood in the years 2014, 2015 and 2016 respectively.

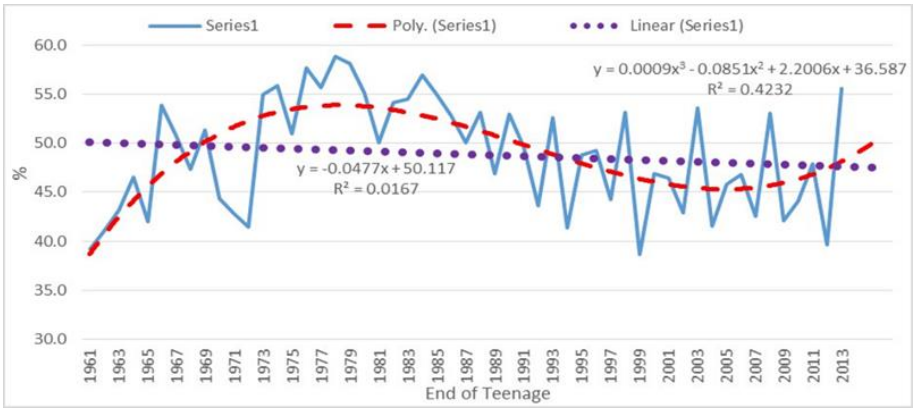

Figure 2. Modelling prevalence of teenage pregnancy 1961-2013

We monitored the exact ages at which the women had first pregnancy and computed the separate probabilities of first pregnancy at the exact ages among ever-pregnant women and also among all women. The exact age with the highest probability of first pregnancy was 15 years in the 1990 and 2003 surveys, 17 years in 2008 and 2013, and 17 years on the average across the survey years. Also, 58% of the ever-pregnant women had their first pregnancy before age 20 years compared to 49.5% recorded among all women as shown in Table 3.

The unadjusted logistic regression carried out to determine the risk factors of TP in Nigeria showed that odds of TP increased by 0.6% for every additional year since a woman exited teen years between 1961 and 2013. Our analysis also revealed that the odds of TP were 17% and 11% higher in 1990 and 2003

respectively than in 2013. The odds of TP were over 4 times higher in the North East and 5 times higher in the North West than in the South-West. As expected, odds of TP was about 38 times (aOR=38.2 95% CI=36.3-40.1) among women that got married before age 20 years. Educational attainment of the teenagers was also significant with higher odds among those without any formal education as shown in Table 4. However, the adjusted odds ratios from the multiple logistic regression revealed that the years since adulthood (since exiting teen ages) did not significantly predict TP while controlling for other factors. Education, region of residence, religion, ethnicity and age at first marriage significantly predicted TP in Nigeria.

Table 3. Distribution of probabilities of age at first pregnancy by survey year, ever pregnant and all women: 1961-2013

Age	Among ever pregnant women					Cumulative among pregnant					Among all women					Cumulative among all women				
	All	1990	2003	2008	2013	All	1990	2003	2008	2013	All	1990	2003	2008	2013	All	1990	2003	2008	2013
10	0.1	0.8	0.0	0.1	0.0	0.1	0.8	0.0	0.1	0.0	0.1	0.7	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0
11	0.2	1.0	0.1	0.1	0.0	0.3	1.8	0.1	0.2	0.0	0.2	0.8	0.1	0.1	0.0	0.3	1.5	0.1	0.2	0.0
12	1.7	2.1	1.8	1.8	1.2	2.0	3.9	1.9	2.0	1.3	1.4	1.8	1.5	1.5	1.1	1.7	3.4	1.6	1.7	1.1
13	2.6	3.4	3.6	2.6	2.2	4.6	7.4	5.5	4.5	3.5	2.3	3.0	3.0	2.2	1.9	3.9	6.3	4.6	3.9	3.0
14	5.3	5.0	7.0	5.2	5.1	9.9	12.4	12.5	9.7	8.6	4.5	4.3	5.9	4.4	4.4	8.5	10.6	10.4	8.3	7.3
15	9.1	10.0	10.4	8.9	8.7	19.0	22.4	22.9	18.6	17.3	7.7	8.6	8.6	7.6	7.4	16.2	19.3	19.1	15.9	14.8
16	9.5	8.8	10.0	9.4	9.9	28.5	31.2	32.9	28.0	27.1	8.1	7.6	8.3	8.0	8.5	24.3	26.8	27.4	23.9	23.2
17	10.4	10.3	9.8	10.2	10.8	38.9	41.6	42.6	38.2	37.9	8.8	8.9	8.2	8.7	9.2	33.2	35.7	35.6	32.6	32.5
18	9.8	9.1	9.7	9.9	10.0	48.7	50.6	52.3	48.1	47.9	8.4	7.8	8.1	8.4	8.6	41.6	43.5	43.6	41.1	41.1
19	9.4	9.3	9.3	9.2	9.7	58.0	59.9	61.6	57.3	57.6	8.0	8.0	7.8	7.8	8.3	49.5	51.6	51.4	48.9	49.3
20+	42.0	40.0	38.4	42.7	42.4	100	100	100	100	100	35.8	34.5	32.0	36.4	36.3	85.4	86.0	83.4	85.3	85.7
Never											14.6	14.0	16.6	14.7	14.3	100	100	100	100	100

Table 4. Unadjusted and adjusted odds of predicting TP among women in Nigeria: 1961-2013

Variable	OR (95%-CI)	ρ- value	OR (95%-CI)	ρ- value
Years since adulthood	1.006 (1.004-1.008)	0.000	0.981 (0.978-1.000)	0.235
Year of Survey				
1990	1.07 (1.01-1.12)	0.014	a	
2003	1.11 (1.05-1.17)	<0.001		
2008	1.01 (0.98-1.04)	0.525		
2013				
Zone				
North Central	1..98 (1.88-2.09)	<0.001	0.94 (0.84-1.05)	0.282
North East	4.34 (4.11-4.59)	<0.001	1.14(1.01-1.29)	0.026
North West	5.23 (4.97-5.51)	<0.001	0.90 (0.89-1.18)	0.113
South East	1.02 (0.96-1.08)	0.567	1.19 (1.01-1.44)	0.042
South South	1.76 (1.66-1.86)	<0.001	1.55 (1.37-1.71)	<0.001
South West				
Education				
None	4.82 (4.63-5.01)	<0.001	1.55 (1.44-1.67)	<0.001
Primary/Quranic	3.02 (2.89-3.16)	<0.001	1.60 (1.50-1.71)	<0.001
Secondary+				
Tribe				
Hausa/Fulani	6.65 (6.28-7.03)	<0.001	1.40 (1.17-1.67)	<0.001
Yoruba	1.03 (0.96-1.10)	0.413	1.27 (1.06-1.51)	0.008
Igbo				
Others	2.73 (2.59-2.87)	<0.001	1.42 (1.29-1.67)	<0.001
Religion				
Catholics	1.03 (0.98-1.08)	0.26	0.94 (0.86-1.03)	0.216
Other Christian				
Islam	2.85 (2.75-2.95)	<0.001	0.83 (0.85-1.03)	<0.001
Others	2.89 (2.70-3.08)	<0.001	0.93 (0.82-1.05)	0.250
Marriage Time (After 19)				
Before age 20 years	38.2 (36.3-40.1)	<0.001	a	
Age at 1st Marriage				
<15 years	71.1 (66.4-76.2)	<0.001	a	
15-19	27.2 (25.6-28.9)	<0.001		
20+years				

[a]Omitted due to collinearity with Age at first marriage

3.2. Discussions

In this study, TP prevalence within the studied period in Nigeria was 49.6% on the average. The TP prevalence found in this study was in agreement with about 50% teenage pregnancies of which the majority were not desired in an early study in Nigeria [43]. While the lower TP prevalence among 1961–1964 cohort could be due to concealment of pregnancy cases, the higher prevalence reported among 1975-1979 cohort might be a product of poor knowledge and non-use of contraceptive earlier identified as a risk factor [36].

In contrast to most previous studies, the present study used the date of the first occurrence of pregnancy during teenage years among all women who had passed the teenage years as at the time of survey to estimate the prevalence of TP in Nigeria. We included all possible forms as well as outcomes of pregnancy before the respondents attained the age of 20 years. Hitherto, most studies have estimated TP using prevalence of pregnancy among teenagers in cross-sectional studies [19-20, 41, 44-45] and this has grossly underestimated TP in Nigeria and in some other places. Estimation of TP among current teenagers would seriously underestimate the burden of TP, undermine the findings and affect the effectiveness of intervention programmes. TP is better calculated among those who have completed teenage years [42] and should cover all forms of pregnancy endpoints among those who ever conceived, whether delivered, miscarried or aborted.

The strength of the current study was its ability to follow the pregnancy history of current adults during their teenage years in a large pooled nationally representative data conducted over a space of 23 years to arrive at TP levels. This approach overcomes the problem of under-reporting usually associated with the estimation of TP only among current teenagers. However, the secondary nature of the data limited our choices of explanatory variables. For instance, it would have been more desirable to have included the usage and knowledge of MC among the respondents when they were teenagers rather than comparisons with responses by current teenagers. Also, we relied solely on the self-reported dates of pregnancies by the respondents without any means of verification. This might have been affected by recall bias and be responsible for the observed heaping of responses at nodal ages. In addition, the data might also have been affected by the respondents' preference for socially desirable answers. We were unable to address male barriers to contraceptives, such as partner/spouse not allowing the girl to access contraceptives as such data was not part of the retrospective data studied. This might warrant further studies.

However, a review of the NDHS reports over the periods we studied shows that on the average, MC awareness and utilization among teenagers were 62.3% and 4.3% respectively [34, 41] but with a gradual increase between 1985 and 2013. In particular, the use of MC among teenagers rose from 2.2% in 1985-1990 to 4.5% between 1990 and 1997, fell between 2003 and 2007 and shot up to 5.3% between 2008 and 2013. Similarly, there was a gradual increase in the awareness of MC among teenagers over the studied period. For instance, MC awareness surged from 39.3% in 1990 to 74.3% in 2013, although there was a decline in the trend between 2003 and 2007 at 59.3%. It is striking that the reduction observed in the awareness of MC during the 2008 survey was accompanied by a decline in MC use during the same period. Despite Nigeria government's intensified efforts to improve MC utilization as well as local and international stakeholders' enlarged and enhanced programs on MC utilization, TP has not buckled in Nigeria. Our finding is in agreement with one of the notable findings of a systemic review conducted in the US [46] where the authors asserted that emergency contraceptive use has not changed the rate of TP in the US. The gradual increments in MC awareness and usage among teenagers in Nigeria between 1985 and 2013 did not produce a significant reduction in TP during the same period.

The TP trend in Nigeria fluctuated throughout the study period and seemed to have ended on an increasing note. This finding is further attested to by the predicted trend of TP prevalence of slightly above 50% by the year 2016. This result is a clear cut from what is obtainable elsewhere, where a significant reduction in TP has been recorded [25]. The Nigeria situation is worrisome, bearing in mind that TP is one of the major global public health and social problems [8-9]. While adequate and effective usage of MC will reduce STDs [8], it might not impact on TP [22, 38–40]. In other climes, reduction in TP has been attributed to significant uptake of contraceptives among the sexually active female teenagers [29]. Already, the significant decrease in TP in the US over time has been tied to an increase in contraceptive use as a result of enhanced sexual education [25, 47-48]. Intervention should, therefore, focus on contraceptive use and not only on awareness.

Socio-demographic factors such as age at first marriage, education, wealth status and the zone of residence are known to influence TP [20, 36]. Also, age at first marriage, which has been reported as a risk factor for adolescent pregnancy in previous studies[11, 49-50] significantly influenced TP in the current study. Girls who married before attaining age 20 years have higher odds of TP than others. The situation is worse among teenagers that got married before age 15 years. Adequate enlightenment and community efforts will be necessary to discourage the popular practice of girl-child betrothal especially in Northern Nigeria [49-51]. Delay of age at first marriage among girls opens doors of opportunities as it allows the girl to have better education, enhances future empowerment and job opportunities, delays sexual initiation, minimizes TP and reduces negative health consequences of TP [48, 50].

Educational attainment and wealth quintile which are direct links between characteristics of parents and children are major risk factors for TP. Teenagers from households in poorer wealth quintiles and those with no formal education, Qur'anic or primary education are more susceptible to TP. This is in consonance with literature that low education and poor empowerment could cause TP [19-20, 30, 36]. Also, earlier studies found TP to be higher in economically poorer households [8-9, 13-14, 19-20, 30] since

economic and social disadvantages, which are offshoots of poverty and weak education, are bi-directional to TP. They are among the leading causes and consequences of TP [16, 20, 48] and they could give rise to chains of intergenerational poverty and low educational attainment if left unabated. There is a need to ensure that the girl-child is equipped with a timely and qualitative education, as well as accessible, affordable and socially acceptable contraceptives.

Geographical differences existed in the likelihood of TP. For instance, TP is much higher in the Northern zones of Nigeria than in the Southern zones just as TP is about a third more likely in South-South than in the South-West. Specifically, almost half of the respondents from the South-South zone of Nigeria were pregnant before age 20 years. Again, the higher rate of TP in these zones could be attributed to poor knowledge and non-use of contraceptives in the areas. Fagbamigbe et al had already established that poverty was much higher in Northern Nigeria than in the southern parts [52]. This could have affected the propensity of women in such regions to use MC. Also, the high rate of TP in areas where Islam is prevalent and in the Hausa/Fulani dominated northern Nigeria could be linked to lower economic status, lower level of education and early marriage which has a direct link to higher-fertility preferences.

4. CONCLUSION

As evidenced by our study, one of every two girls exiting the teen years is likely to have experienced at least one episode of pregnancy in Nigeria, supporting earlier findings. This finding is despite Nigeria's huge financial commitment to achieving CPR of 36% by 2018. As far as TP is concerned in Nigeria, the impact of the massive campaign on MC use is far from being adequately felt. Although our study revealed increments in the prevalence of both MC awareness and usage, the usage was abysmally low. We opined that contraceptive use had a bi-directional influence on TP and was responsible for the no-effect status of MC usage on TP. On one hand, pregnancy rates might have decreased among those who would have had sex with or without contraceptives. On the other hand, there might have been an increase in TP among those who would have abstained from sex if not for their reliance on contraceptives. Earlier studies have shown that "unintended consequences" of contraceptive use. Access to emergency contraception not only did not reduce teenage/unwanted pregnancy rates but led to an increase in risky sexual activity and, as a result, increases in STIs. Also, Paton et al provided further evidence that cuts in spending on contraceptive services can result in lower teenage pregnancy rates. However, the consistency of our results with these more formal empirical studies is an affirmation that our findings, which were based on detection of association and not causality, that more contraception does not reduce TP holds.

While we strongly agree that adolescents should delay sexual activities until they are fully ready to bear its health, social, emotional, physical, and financial consequences, there must be an effective TP prevention strategy for those who cannot stay away from sexual intercourse. Already, about 60% of unmarried teenagers in Nigeria have reportedly had sex before age 20 years. To reduce the risks of TP and untoward health consequences of teenage sexual activities, teen pregnancy prevention initiatives must be re-strategized and strengthened. To achieve the objective of fewer teenage pregnancies, fewer resources should be spent on access to contraception and instead diverted to areas more likely to achieve results such as improvements in educational achievement amongst girls. The initiative should focus on sex education, and access to contraceptives and youth development since the adequate, correct and consistent use of effective contraceptives lowers pregnancy risks. As suggested in an earlier study, abstinence or education alone cannot prevent TP, rather a mixture of both, as well as a dire realization of the possibility of being infected with HIV and other STDs, will help curb the menace of TP. Also, the issue of early marriage must be squarely addressed at the individual, community, and national levels. We recommend that TP should be estimated using the pregnancy history of women who had already exited teen years rather than among "current" teenagers so as to correctly capture the menace.

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