

Research Article

Modelling the Trend and Determinants of Breastfeeding Initiation in Nigeria

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This paper examined the general trend of timing of breastfeeding initiation among nursing mothers in Nigeria. The time of initiating the first breast milk to an infant by his/her mother is measured as whether it is immediate (before the first hour of birth) or delayed (after the first hour of birth), and the impacts of some socioeconomic and maternal factors on this are determined. Results from this study showed that mother's age at birth, her enhanced educational status, mothers' domiciling in urban areas, singleton birth, and mother's frequent antenatal visits among others contributed positively to early initiation of breastfeeding by Nigerian nursing mothers ($P < 0.05$). In the contrary, delivery through caesarean operation, nursing mothers that delivers at homes instead of hospitals, and the current birth being the first from a mother are all found to militate against early initiation of breastfeeding ($P < 0.05$) among others. General results showed that early breastfeeding initiation experience among nursing mothers in Nigeria significantly improves over time between 1990 and 2008 ($P < 0.05$), although following a sinusoidal pattern. Four waves of national data from the Nigerian Demographic and Health Surveys for 1990, 1999, 2003, and 2008 were employed in the study.

1. Introduction

Early introduction of breast milk to newly-born babies immediately after delivery has been shown in many studies to be capable of giving the babies the required immunity to diseases through mother's antibodies, and this in turn, lowers the risks of early childhood deaths [1–6]. This is largely due to the possibility of ingesting maternal colostrum into the babies few hours after parturition. The colostrum is a liquid mixture that is rich in protein, sugar, vitamins, minerals, and antibodies which a child needs to facilitate his/her growth and survivorship. Some other health benefits derivable from feeding a child with early breast milk have been reported by Feachem and Koblinsky [7], Jason et al. [8], and Agunbiade and Ogunleye [9]. In their different studies, they reported, among other things, that early breastfeeding of infants reduces the risk of having diarrhoea which is a major cause of infant and childhood death in sub-Saharan African and other developing countries. In a related study, Clemens

et al. [3] found that early initiation of breast milk actually reduces the risk of diarrhoea among rural Egyptian children.

The literature has it that social support received by mothers during childbirth is a catalyst for early initiation of breastfeeding in Nigeria [10]. Many studies have equally showed that successful timely breastfeeding largely depends on maternal related factors such as mother's age at the birth of the baby, mother's health, and her educational status [11–13], as well as some other socioeconomic factors. However, studies on timing of breastfeeding initiation that monitor the trend and consider the hierarchical nature of data collection are scarcely available, especially for Nigeria. The study here therefore is intended to explore the general trend of timing of initiation of the first breast milk to infants in Nigeria over time and identifying those sociodemographic and maternal factors that are determinants of timing of breastfeeding initiation among Nigerian mothers. The impacts of some of the identified risk factors of timing of breastfeeding initiation shall also be examined.

The data employed for this study are from the four waves of the Nigeria Demographic and Health Surveys (NDHS) for 1990, 1999, 2003, and 2008 which are national population based surveys conducted through a multistage sampling technique. The surveys included women of reproductive ages 15–49 years and men age 15–59 years. For detailed description of survey methodology, see National Population Commission (Nigeria) and ORC Macro [14–16]. Child recode data of the surveys were used for all analyses.

The principal objective of the Nigeria Demographic and Health Surveys is to provide current and reliable data on fertility and family planning behaviour, child mortality, children's nutritional status, the utilization of maternal, and child health services, as well as knowledge and attitudes towards HIV/AIDS.

Apart from fertility and mortality variables, information about the timing of initiation of breastfeeding by women of reproductive age is also available in the data. Traditional statistical techniques assume that individual observations (responses) are independent from one another. However, due to the hierarchical nature through which these data were collected, it is sometimes appropriate to assume that responses from individuals that are within the same clusters might be correlated and those in different clusters are uncorrelated. Therefore, breastfeeding attitudes of respondents (nursing mothers) that belong to the same cluster are assumed to be correlated but uncorrelated between different clusters. Hence, a generalized logistic regression (GLR) approach that would account for “*within cluster*” correlation is used to monitor the trend of early breastfeeding behaviour of nursing mothers and explore the possible relationships between timing of breastfeeding initiation and its determinants within the hierarchical nature of the data. Findings from this work will provide information that will assist policy makers in assessing impact of previous interventions on improving timing of breastfeeding initiation and attitude about child breastfeeding among child-bearing women of reproductive age in Nigeria. These will further assist health administrators, policy makers, and government in designing appropriate interventions that can assist in improving the breastfeeding attitude of nursing mothers in Nigeria.

2. Materials and Methods

The NDHS data for 1990, 1999, 2003, and 2008 contained sociodemographic and maternal related responses from 7,902, 3,552, 5,138, and 28,647 mothers of reproductive ages, respectively. Thus, a total of 45,239 mothers were involved in the four NDHS data sets combined. Out of this figure, information on timing of breastfeeding initiation was available for only 30,475 of the respondents. Also, complete information over all the factors considered in this study is only available for 25,233 respondents, and as a result, the remaining 20,006 respondents with incomplete information were excluded from the final analysis. The mean age of mothers in the study is 29.27 years with a standard deviation of 6.86. The minimum and maximum ages of mothers involved in this study are 13 years and 49 years, respectively.

Similar to Adebayo [4], a question on when child was put to breast after birth was used to determine the child's age at breastfeeding initiation. The age at which a child was given the first breast milk plays a vital role in determining his/her health status as well as that of his/her mother. Early initiation of breastfeeding could help mother's uterus to retract, which can reduce postpartum blood loss which is a major complication after birth that might result into maternal mortality [4]. Thus, the child's age at which he/she was given the first breast milk determines the timing of his/her breastfeeding initiation. In this paper, timing of breastfeeding initiation was measured based on the following binary categorical scale: 0 if “*Immediate*” (i.e., if the first breastfeeding was initiated to baby within the first one hour of birth) and 1 if “*delayed*” (i.e., if the time of the first breastfeeding initiation is one hour or more after birth).

Apart from timing of breastfeeding initiation which is the response variable here, information on the following independent variables was also available in the data, and they were therefore included in data analysis. These are mother's age at birth (mab), mother's and her partner's levels of educational attainment which are categorized into “no education,” “primary,” “secondary,” and “higher” educational status with “no education” being the reference category. As employed in many studies [11–13], mother's age at birth of the child was categorized into six using class interval of five. This yielded the following classes of mother's age (in years) as used in this study: 15–19, 20–24, 25–29, 30–34, 35–39, and ≥ 40 with group 15–19 years being the reference category.

Others factors considered are child's sex, locality (urban or rural) where mother domiciled at the birth of the child, method of delivery (caesarean or normal), place of delivery (homes or hospitals), and birth type (singleton or multiple birth) with male, rural, normal, home, and multiple birth being the respective reference categories. Information on whether a mother received delivery assistance or not was equally available and incorporated in the analysis. Also, a variable that captures the number of antenatal visits by nursing mothers was included in this study. This was later categorized into whether a nursing mother ever had antenatal visits or never had it (the reference category). We also included variable on birth order which indicates whether the current child from a nursing mother is the first or not (the reference category).

Based on the 36 states and the federal capital territory (FCT) Abuja that make up the Federal Republic of Nigeria, the entire country has been divided into six mutually exclusive geopolitical zones comprising the North-East, North-West, North-Central, South-East, South-West, and South-South zones. While all these geopolitical zones may be similar in term of belonging to the same federation unit of Nigeria, each of them is unique in term of their sociocultural characteristics. Given this background, it is therefore necessary to compare the breastfeeding initiation behaviour of child-bearing mothers from these six different geopolitical zones. This was fully captured and discussed in this study.

The distributions of mothers in this study based on their timing of breastfeeding experience, and the identified

sociodemographic and biological factors are presented in Table 1.

To be able to monitor the trend of early breastfeeding behaviour of nursing mothers, three dummy variables were created for years of study beginning from 1990 to 2008 with 1990 being the reference category. This enables easy examination and comparisons of trends of breastfeeding initiation behaviour of nursing mothers in Nigeria from 1990 to 1999, 1990 to 2003, and 1990 to 2008. The timing of breastfeeding behaviours of all the 30,457 mothers between 1990 and 2008 are summarized in Table 2.

One of the metric covariates considered in this study is parity which indicates the total number of live births that already had by a mother including the current birth.

All the categorical predictor variables and metric covariate described previously were modelled nonlinearly on timing of breastfeeding initiation using binary logistic regression model [17–22]. The response variable $Y_i = (0, 1)$, $i = 1, \dots, n$, is indexed to be 0 if the i th nursing mother breastfed her baby within the first one hour of birth (i.e., timing of breastfeeding is early or immediate) and 1 if she breastfed her baby after one hour or more of birth (i.e., timing of breastfeeding is delayed or late). That is,

$$Y_i = \begin{cases} 0 & \text{: if timing of breastfeeding initiation is early} \\ & \text{(immediate),} \\ 1 & \text{: if timing of breastfeeding initiation is delayed} \\ & \text{(late).} \end{cases} \quad (1)$$

Finally, in order to reduce recall bias that are often associated with analysis of cross-sectional data, we adjusted for the variable that indexes the number of children that are living with the respondents including the last birth as well as the one that represents the current births (number of births in the past year) in the analysis. Most of the analyses carried out in this paper were performed using STATA/SE 10.0 and SPSS 17.0 softwares. Data management was performed with SPSS and Microsoft Excel packages.

3. Data Analysis and Results

Analysis of all the four waves of the NDHS data and the results obtained are presented in this section.

From the distribution of the breastfeeding initiation behaviours of all the 30,475 mothers of reproductive ages that are involved in this study as presented in Table 1, it is observed that initiation of breastfeeding was delayed in about two-thirds (63%) of the infants. The implication of this is that only about a third of the respondents' babies received the needed colostrum at birth. As a consequence, there is a higher likelihood of early introduction of other supplements by mothers which can increase the risks of a child contracting infections that could lead to infant and childhood death.

In epidemiological literature, place of delivery, maternal educational attainment, place/locality of residence, and mother's age at birth of the child among other factors have been found to be associated with timing of breastfeeding

initiation [23, 24]. From the descriptive statistics in Table 1, it is revealed that almost 7 out of every 10 births took place at homes, outside the hospitals. (Homes include mothers' homes and other traditional delivery homes, while hospitals include government and private hospitals, health centres, health posts, and clinics, as well as other public or private health services centres.) About 70% of the infants were born in the rural communities of Nigeria, and breastfeeding initiation was delayed in about two-thirds of this number. Also, breastfeeding initiation was delayed in about 70% of babies from illiterate parents, while about 70% of teenage mothers (age from 15 to 19 years) equally had delayed breastfeeding initiation experience.

Two-third of mothers with twin/multiple births have delayed timing of breastfeeding initiation, while about 70% of the inexperienced mothers that just had their first babies also initiated the first breast milk so lately. Almost 80% of mothers in the study received assistance during delivery. Two-third of the remaining 20% who did not receive delivery assistance delayed initiation of breastfeeding to their babies.

With respect to the six geopolitical zones in Nigeria, mothers from the North Eastern zone had the worst breastfeeding initiation behaviour with more than 70% of mothers from that region delayed initiation of breastfeeding after childbirth. The North Central had the best breastfeeding initiation experience with only 48% of mothers from that zone delayed breastfeeding initiation followed by the South-South zone having about 53% delayed cases.

About two-third of mothers in this study did not have antenatal visits prior to childbirth almost 70% of which delayed initiation of breastfeeding.

In terms trend of breastfeeding initiation behaviour of mothers over time, the summary statistics in Table 2 revealed an improvement in breastfeeding behaviour of mothers from the year 1990 to 1999 in which the percentage of mothers that delayed breastfeeding initiation dropped from around 69% in 1990 to 59% in 1999. However, this apparent improvement in breastfeeding initiation performance was not sustained for long before the percentage of mothers who delayed breastfeeding initiation went up to around 68% in 2003 and dropped again to around 61% in 2008. This shows an apparent improvement in breastfeeding initiation behaviours of mothers between 1990 and 1999 and between 2003 and 2008. Apparently similar breastfeeding initiation behaviours were exhibited by mothers in the years 1990 and 2003 among the early and late initiators of breastfeeding as shown by the bar chart of number of breastfeeding initiators in Figure 1. The general sinusoidal trend in breastfeeding initiation behaviours of mothers between 1990 and 2008 is graphically presented in Figure 2.

Except for child's sex and birth type (singleton or twin/multiple), the result from Pearson chi-square test of bivariate association between each of the previous identified factors and timing of breastfeeding initiation periods (early or immediate and late or delayed) is significant at 5% level ($P < 0.0001$). The P values of these tests are provided in Tables 1 and 2.

The results of the logit model that shows the relationship between all the previous categorical factors (and metrical

TABLE 1: Frequency (percentage in parenthesis) distribution of determinants of breastfeeding initiation across the three levels of breastfeeding initiation periods for 30,475 surveyed samples.

Determinants (factors)	Factors' levels	Timing of breastfeeding initiation		Total 30,475 (100%)	P value
		Early (0) 11,278 (37%)	Delayed (1) 19,197 (63%)		
Child's sex	Male (ref)	5,660 (36.7%)	9,769 (63.3%)	15,429 (50.6%)	0.237*
	Female	5,618 (37.3%)	9,428 (62.7%)	15,046 (49.4%)	
	No education (ref)	5138 (33.0%)	10,424 (67.0%)	15,562 (51.1%)	
Mother's educational status	Primary	2,890 (40.3%)	4,273 (59.7%)	7,163 (23.5%)	<0.001
	Secondary	2,615 (40.3%)	3,873 (59.7%)	6,488 (21.3%)	
	Higher	635 (50.3%)	627 (49.7%)	1,262 (4.1%)	
	No education (ref)	4,111 (32.5%)	8,539 (67.5%)	12,650 (42.7%)	
Partner's educational status	Primary	2,528 (37.6%)	4,189 (62.4%)	6,717 (22.7%)	<0.001
	Secondary	2,888 (40.0%)	4,334 (60.0%)	7,222 (24.4%)	
	Higher	1,433 (47.7%)	1,571 (52.3%)	3,004 (10.2%)	
Locality	Urban (ref)	3,554 (39.4%)	5,472 (60.6%)	9,026 (29.6%)	<0.001
	Rural	7,724 (36.0%)	13,725 (64.0%)	21,449 (70.4%)	
Place of delivery	Hospitals (ref)	4,300 (42.0%)	5,948 (58.0%)	10,248 (34.3%)	<0.001
	Homes	6,745 (34.3%)	12,911 (65.7%)	19,656 (65.7%)	
Method of delivery	Normal (ref)	11,006 (37.1%)	18,654 (62.9%)	29,660 (97.9%)	<0.001
	Caesarean	201 (31.9%)	429 (68.1%)	630 (2.1%)	
Birth type	Twin/multiple (ref)	241 (35.5%)	437 (64.5%)	678 (2.2%)	0.425*
	Singleton	11,037 (37.0%)	18,760 (63.0%)	29,797 (97.8%)	
Mother's age at birth (mab)	15–19 years (ref)	621 (28.8%)	1,534 (71.2%)	2,155 (7.1%)	<0.001
	20–24 years	2,117 (34.4%)	4,035 (65.6%)	6,152 (20.2%)	
	25–29 years	3,239 (38.7%)	5,130 (61.3%)	8,369 (27.5%)	
	30–34 years	2,424 (39.0%)	3,787 (61.0%)	6,211 (20.4%)	
	35–39 years	1,678 (38.9%)	2,634 (61.1%)	4,312 (14.1%)	
Birth order	40–44 years	829 (36.5%)	1,440 (63.5%)	2,269 (7.4%)	<0.001
	≥40 years	370 (36.7%)	637 (63.3%)	1007 (3.3%)	
	2nd or higher order	9,484 (37.9%)	15,556 (62.1%)	25,040 (82.2%)	
	1st born	1,794 (33.0%)	3,641 (67.0%)	5,435 (17.8%)	
	Assisted	9,341 (37.7%)	1,542 (62.3%)	24,762 (81.5%)	
Assisted delivery	Not assisted	1,908 (34.0%)	3,710 (66.0%)	5,618 (18.5%)	<0.001
	North-Central	3,090 (51.8%)	2,880 (48.2%)	5,970 (19.5%)	
	North-East	1,866 (26.5%)	5,179 (73.5%)	7,045 (23.1%)	
	North-West	2,562 (32.2%)	5,404 (67.8%)	7,966 (26.1%)	
	South-East	1,371 (37.2%)	2,315 (62.8%)	3,686 (10.5%)	
Geopolitical zones	South-South	1,482 (47.4%)	1,644 (52.6%)	3,126 (10.3%)	<0.001
	South-West	907 (33.8%)	1,775 (66.2%)	2,682 (8.8%)	
	No (ref)	3,424 (32.8%)	7,024 (67.2%)	10,448 (39.2%)	
	Yes	6,355 (39.2%)	9,854 (60.8%)	16,209 (60.8%)	

The P value is from Pearson chi-square test of independence. The symbol (*) indicates that the chi-square test of independence is not significant at 5% level. (ref) indicates the reference category of a factor as used in fitting the logit model.

covariates) and timing of breastfeeding initiation period as represented by (1) based on the four waves of the NDHS data for 1990, 1999, 2003, and 2008 are presented in Table 3. Except for birth type (Singleton or Twin/Multiple birth), only the results of factors that are statistically significant in the model at 5% level are presented due to space. Results in Table 3 contained the estimated *odds ratios (OR)*, *standard errors* of the estimated regression parameters, the *P* values

to justify the significance or otherwise of each categorical factor, or metrical covariates in the model, as well as the 95% confidence intervals of the estimated odds ratios. Finally, the table also reported the percentage change in odds ratios (PCOR) for a unit change in the level of each of the risk factors. The PCOR measures the percentage increase (+) or decrease (–) in the risk of delaying breastfeeding initiation due to the influence of the level of the respective risk factor.

TABLE 2: Frequency distribution (percentage in parenthesis) of all the 30,475 nursing mothers by their timing of breastfeeding initiation behaviours from 1990 to 2008. The chi-square test of association between timing of breastfeeding initiation and years of study is statistically significant ($P < 0.001$).

Factor	Timing of breastfeeding initiation		Total	P value
	Early (0)	Delayed (1)		
Year				
1990 (ref)	1,505 (31.4%)	3,283 (68.6%)	4,788 (15.71%)	<0.001
1999	1,319 (40.6%)	1,927 (59.4%)	3,246 (10.61%)	
2003	1,593 (32.4%)	3,329 (67.6%)	4,922 (16.15%)	
2008	6,861 (39.2%)	10,658 (60.8%)	17,519 (57.49%)	
Total	11,278 (37.0%)	19,197 (63.0%)	30,475 (100.0%)	

TABLE 3: Results of logistic regression model of timing of breastfeeding initiation on some sociodemographic and maternal factors. The odds ratio (OR), standard error, P value, 95% confidence intervals, and the percentage change in odds ratio for unit change in the level of each of the risk factors are presented.

Risk factor	Risk factor levels	Odds ratio (OR) exp(B)	s.e.(B)	P value	95% C.I. for exp(B)		% change in OR
					Lower	Upper	
Year	Year 1990 (ref)						
	Year 1999	0.726	0.049	<0.001	0.659	0.799	-27.4
	Year 2008	0.718	0.032	<0.001	0.674	0.765	-28.2
Mother's education status	No Education (ref)						
	Higher	0.769	0.076	0.001	0.663	0.892	-23.1
Partner's education status	No Education (ref)						
	Higher	0.740	0.050	<0.001	0.672	0.816	-26.0
Locality	Urban (ref)						
	Rural	1.119	0.033	0.001	1.049	1.194	+11.9
Mother's age at birth	15-19 years (ref)						
	25-29 years	0.923	0.031	0.010	0.868	0.981	-7.7
	>40 years	1.144	0.045	0.003	1.047	1.249	+14.4
Birth order	2nd and higher (ref)						
	First born	1.153	0.043	0.001	1.060	1.255	+15.3
Place of delivery	Hospitals (ref)						
	Homes	1.117	0.036	0.002	1.040	1.199	+11.7
Method of delivery	Normal (ref)						
	Caesarean	1.581	0.100	<0.001	1.299	1.925	+58.1
Got delivery assistance	No (ref)						
	Yes	0.914	0.038	0.018	0.848	0.985	-8.6
Antenatal visits	No (ref)						
	Yes	0.916	0.035	0.013	0.855	0.981	-8.4
Geopolitical zones	North-Central (ref)						
	North-West	2.202	0.041	<0.001	2.031	2.386	+120.2
	North-East	3.094	0.041	<0.001	2.854	3.355	+209.4
	South-East	1.902	0.049	<0.001	1.727	2.094	+90.2
	South-South	1.387	0.051	<0.001	1.254	1.534	+38.7
Birth type	South-West	2.657	0.058	<0.001	2.370	2.979	+165.7
	Twin/Multiple (ref)						
	Singleton	0.834	0.100	0.069*	0.691	1.032	-16.6
	Number of children living with mothers	0.951	0.009	<0.001	0.934	0.968	-4.9
	Number of births in past year	1.073	0.027	0.010	1.017	1.131	+7.3
	Constant	1.428	0.124	0.004			

The positive (+) or negative (-) signs represent positive or negative % changes in the OR which, respectively, reflected an increased or decreased risk of delaying breastfeeding initiation by nursing mothers due to the impact of the associated factor level. * indicates that the result is significant at 10% level.

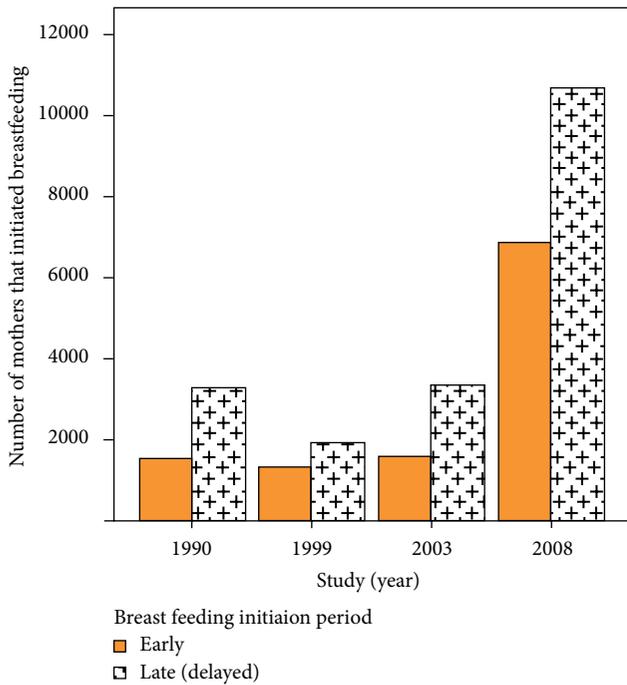


FIGURE 1: Bar chart of number of nursing mothers with early and delayed initiation of breastfeeding from 1990 and 2008. Breastfeeding behaviours of mothers among the early and late initiators of breastfeeding were apparently similar in 1990 and 2003.

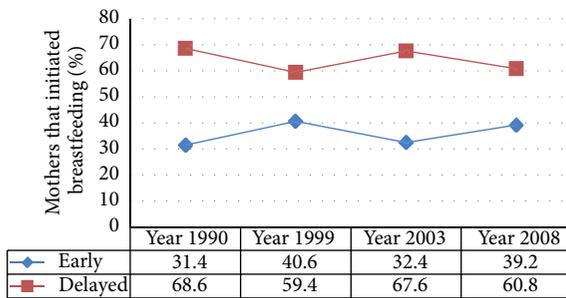


FIGURE 2: The line graph of percentage of mothers with early and late (delayed) initiation of breastfeeding from 1990 to 2008. The graph shows a sinusoidal trend in breastfeeding initiation behaviours of mothers over the period with apparently similar experience recorded in 1990 and 2003 among the early and late breastfeeding initiators.

The results in Table 3 show the influence of each factor or metrical covariate on timing of breastfeeding initiation by nursing mothers in Nigeria. All the estimated odds ratios were statistically significant at 5% level. Full interpretations and conclusions based on these results are presented in the next two sections.

4. Interpretation of Results and Discussions

Except for sex, parity, and birth type, logistic regression results in Table 3 generally revealed significant relationship between the two levels of timing of breastfeeding initiation

(immediate or delayed) and all the identified sociodemographic factors ($P < 0.05$). The influence of each factor on the two levels of timing of breastfeeding initiation is determined by the percentage change in its odds ratios (OR) as presented in the last column of Table 3.

According to the results in Table 3, mothers' educational status and that of their partners are positively associated with timing of breastfeeding initiation in Nigeria. More specifically, mothers with higher level of education have about 23% reduced risk of delaying breastfeeding initiation than their illiterate counterparts (OR = 0.769, $P < 0.001$). In the same manner, mothers whose husband (partner) have higher level of education also have lower propensity for delaying breastfeeding initiation with a reduced odds of about 26%.

In terms of locality where mother domiciled up to the time the baby was delivered, and the results showed that nursing mothers that delivered in the rural communities have higher risk of about 12% of delaying breastfeeding initiation than their counterpart that domiciled in urban communities where basic sociomedical amenities are available (OR = 1.119, $P = 0.001$).

Considering the ages of mothers at the birth of their babies, results in Table 3 showed that middle-aged mothers of ages between 25 and 29 years have a significant lower risk of delaying breastfeeding initiation relative to their teenage counterparts (OR = 0.923, $P = 0.010$). On the other hand, old mothers of more than 40 years of age have an increased odds of about 14% for delaying breastfeeding initiation (OR = 1.144, $P = 0.003$). Furthermore, inexperienced mothers that just had their first baby delivery (first born) have higher relative risk of about 15% for delaying breastfeeding initiation than experienced mothers that were having their second or more number of children (OR = 1.153, $P = 0.001$).

Mothers that delivered their babies at homes have an increased relative risk of about 12% of delaying early initiation of breastfeeding than mothers that delivered in the hospitals (or clinics) (OR = 1.117, $P = 0.002$). Also, mothers that were delivered of their babies through caesarean section have about 58% increased risk of delaying early introduction of the first breast milk to their babies as compared to mothers who had vaginal (normal) delivery (OR = 1.581, $P < 0.001$). Mothers that received antenatal care have relative reduced risks (odds) of about 8% of delaying breastfeeding initiation than mothers without antenatal care (OR = 0.916, $P = 0.013$). Furthermore, delivery assistance received by mothers at birth is positively associated with their attitudes toward early initiation of breastfeeding (OR = 0.914, $P = 0.018$).

In term of geopolitical zones, the timing of breastfeeding initiation behaviour of mothers across the six geopolitical zones differs. This is clearly presented by the bar graphs of proportions of early and late initiators of breastfeeding across the six geopolitical zones as shown in Figure 3.

Out of all the 30,475 mothers that are involved in this study, statistics from the bar graph in Figure 3 indicated that the North-Central zone has the highest percentage of early initiators of breastfeeding followed by the South-South with North-East having the least. In other words, the North-Eastern Nigeria has the highest percentage of late initiators of

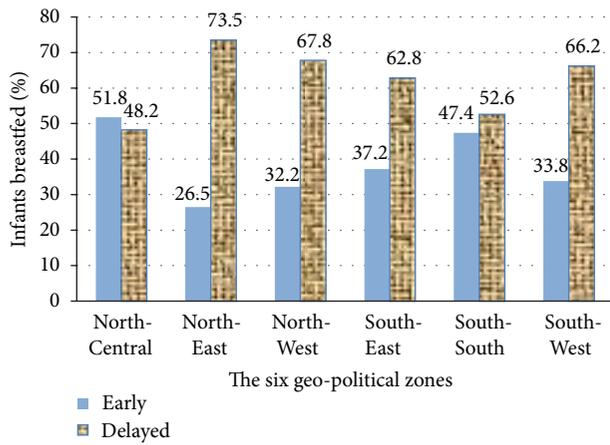


FIGURE 3: Bar chart of percentage of sampled mothers of reproductive ages with early and delayed initiation of breastfeeding across the six geopolitical zones based on the NDHS data for 1990, 1999, 2003, and 2008. The North-Central zone has the highest percentage of early breastfeeding initiators followed by the South-South with North-East being the least.

breastfeeding among the nursing mothers in Nigeria followed by North-West, South-West, South-East, South-South, and North-Central in that order. More generally, the results from logit model in Table 3 showed that geopolitical zone of mothers is negatively associated with their breastfeeding initiation behaviours. In particular, mothers from the North-West geopolitical zone in Nigeria have increased odds (relative risks) of about 120% of delaying breastfeeding initiations relative to their counterpart in the North-Central zone ($OR = 2.202, P < 0.001$). Similarly, mothers from the North-East, South-East, South-South, and South-West zones have about 209%, 90%, 39%, and 165% increased relative risks of delaying breastfeeding initiation, respectively, as compared to mothers from the North-Central zone. Therefore, it could be inferred from the result of the logit model that the risk of delaying breastfeeding initiations by mothers of reproductive age in Nigeria is highest in the North-East (209%) followed by South-West (165%), North-West (120%), South-East (90%), and South-South (39%) in that order. These results agreed to a reasonable extent with the summary statistics of the NDHS data for 1990, 1999, 2003, and 2008 on the breastfeeding initiation behaviours of mothers of reproductive ages from the six geopolitical zones in Nigeria as represented by the bar graph in Figure 3.

As remarked earlier, the sinusoidal trend that characterized the breastfeeding initiation behaviours of mothers of reproductive age in Nigeria from 1990 to 2008 is shown clearly by the summary statistics in Table 2 which is again presented by the line graphs of early and late initiator of breastfeeding among mothers in Figure 2. However, the results from logit model indicated a positive association between the timing of breastfeeding initiation and years of study. In particular, the results showed that the relative risks (odds) of delaying initiation of the first breast milk to babies by their mothers significantly reduced by about 27% from 1990 to 1999 ($OR = 0.726, P < 0.001$) and by about

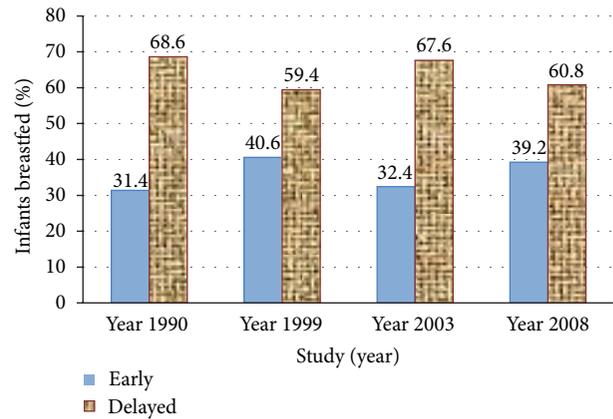


FIGURE 4: Bar chart of percentage of mothers of reproductive ages with early and delayed initiation of breastfeeding from 1990 and 2008. Breastfeeding behaviours of mothers among the early and late initiators of breastfeeding were apparently similar in 1990 and 2003.

28% from 1990 to 2008 ($OR = 0.718, P < 0.001$). This result is supported by the multiple bar graphs of proportion of mothers that initiated breastfeeding within the first one hour of birth (early) and those that delayed initiation of breastfeeding (expressed in %) from 1990 to 2008 as shown in Figure 4. From these bar graphs, it can be observed that the percentage of mothers that delayed breastfeeding initiation dropped from 68.6% in 1990 to 59.4% in 1999 justifying why the estimated relative risk (odds ratio) for 1999 is 0.726 (about 27% reduced risk of delaying breastfeeding initiation). Similarly, the percentage of mothers that delayed breastfeeding initiation dropped from 68.6% in 1990 to 60.8% in 2008 equally justifying why the estimated relative risk (odds ratio) for 2008 is 0.718 (about 28% reduced risk of delaying breastfeeding initiation).

The odds ratio estimated from the logit model for the year 2003 was 1.013 which is not significant at 5% level ($P = 0.552$), and as such, it was removed from the analysis. The simple interpretation of this result is that there is no significant improvement in the breastfeeding initiation behaviours of mothers from 1990 (the base year) to 2003. This result is supported by the bar graphs display in Figure 3, and the statistics provided therein, in which the percentage of mothers that delayed breastfeeding initiation in 2003, computed as 67.6% is not significantly lower than the percentage of mothers that delayed breastfeeding initiation in 1990 (computed as 68.6%) as would have been expected ($P = 0.335$). This is an indication of no significant improvement in early initiation breastfeeding between 1990 and 2003. Hence, the nonsignificant result reported for year 2003 in the logit model.

The result from the estimated logit model in Table 3 also indicated that an increase in the number of births in the most recent time (birth in past year) would increase the relative risk of delaying breastfeeding initiation by about 7%. In the contrary, an increase in the number of children that are living with mothers of reproductive age would reduce the relative risk of delaying initiation of breastfeeding.

More generally, the estimated confident intervals for all the factors and metric covariates give more credence to the stability of the regression results provided by the logit model.

5. Conclusions

The amount of health benefits derived from breastfeeding is influenced by age of the child at initiation of breastfeeding, the duration and intensity of breastfeeding, and age at which the child starts to receive supplementary foods and other liquids as well as the types of supplementary liquids and foods received. Delay in breastfeeding initiation will obviously increase the chance of giving the babies other (prelacteal) liquid supplementations that can enhance infection which in turn could lower the chance of child's survival. Lack of early initiation of breastfeeding in Nigeria can be attributable to the country's worst record in reduction of under-five mortality rates as compared to some other African countries. Findings from this paper have provided information which permits opportunity of discerning the determinants of breastfeeding initiation in Nigeria.

Mother's educational status plays important role at determining the time a child is introduced to the first breast milk. Of the 30,475 mothers covered by this study, more than half (precisely 15,562) of them are illiterates who can neither read nor write. Unfortunately, about 67% (10,424) of these 15,562 illiterate mothers delayed initiation of the first breast milk to their babies beyond the first hour of birth. Although, it is established here that early initiation of the first breast milk by Nigerian nursing mothers improved significantly over time (between 1990 and 1999 and between 1990 and 2008). Obviously, this is not unconnected with apparent increase in literacy levels among women of reproductive age in Nigeria over time.

Not only that the localities where mothers domiciled up to the time of delivery play significant role at determining their breastfeeding initiation period after birth. About 70% of mothers in this study (precisely 21,449 women) live in the rural areas. Only about one-third of this number (precisely 7,724 women) initiated the first breast milk to their babies immediately after birth. By the results in Table 3, the relative risk of delaying breastfeeding initiation period beyond the first hour of birth increased by about 12% for women living in the rural areas compared to their counterparts living in the urban areas (OR = 1.119). All these results generally showed that localities where mothers domicile have significant impacts on timing of breastfeeding initiation.

Nursing mothers that live in urban areas at the time of delivery are more likely to initiate the first breast milk to their babies earlier than their rural counterparts, probably due to their accessibility to adequate information on the need for early initiation of breast milk and exclusive breastfeeding in general coupled with their relatively higher literacy levels. In view of this, intensive enlightenment programs are needed to sensitize prospective mothers living in the rural areas of the country on the importance and advantage of early initiation of the first breast milk to their babies immediately after birth. This would tremendously help at reducing the spate of neonatal deaths in Nigeria.

Pregnant women should be strongly encouraged to receive necessary antenatal treatments right from the time of conception. This will surely avail them the opportunity of receiving appropriate information on child and maternal care. All these shall immensely help at reducing several cases of complications at birth that often resulted to caesarean delivery which might in turn incapacitate mother at initiating the first breast milk to her baby immediately after the child birth.

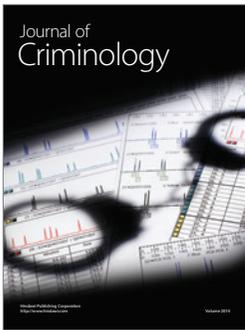
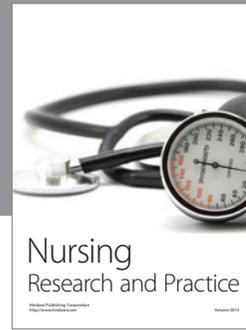
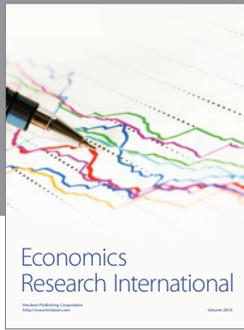
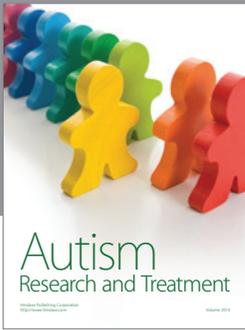
Although appreciable improvement in the percentage of early initiators of breastfeeding among mothers of reproductive ages in Nigeria was recorded in the North-Central zone relative to others, the results generally showed that the current situation in which 3 out of every 5 nursing mothers in Nigeria delayed initiation of breastfeeding is still not impressive. This clearly fall short of the national objective of Healthy People 2010 for breastfeeding initiation [25] which expects 4 out of every 5 nursing mothers to initiate breastfeeding immediately after childbirth.

Finally, the pattern of breastfeeding behaviour of mothers of reproductive ages in Nigeria does not seem to follow a predictable trend. While some improvements in early breastfeeding initiation experience from mothers were recorded from 1990 to 1999, this apparent improvement was not sustained to 2003. However, possible improved trend in early breastfeeding initiation is expected in future given that promising improvement in timely breastfeeding initiation was again recorded in 2008. However, this optimistic result needs to be validated with future NDHS data sets.

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