

ORIGINAL RESEARCH ARTICLE

Prevalence and predictive factors for early initiation of breastfeeding in Nigeria: Evidence from the Nigerian demographic and health survey (2003-2018)

DOI: 10.29063/ajrh2022/v26i11s.3

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Abstract

Early initiation of breastfeeding (EIBF) is an essential first step in exclusive breastfeeding that is expected to commence within an hour after childbirth. This study examined the prevalence and the factors associated with EIBF among nursing mothers in Nigeria based on an analysis of the 2003, 2008, 2013, and 2018 Nigerian Demographic Health Survey (NDHS) data. The prevalence of early breastfeeding initiation by women's demographic, socio-economic and reproductive characteristics were computed for each of the survey rounds. The differences in the prevalence estimates for early breastfeeding initiation between the last two survey periods were calculated. A crude and adjusted model to examine association between explanatory variables and early breastfeeding initiation were fitted using Poisson regression model. The mean age of respondents was 29 years (SD=7.3). The prevalence of EIBF increased from 31.5% in 2003 (95% CI 28.4-34.5) to 43.8% in 2018 (95% CI 42.6-45.0), with a decline to 35.3% in 2013 (95% CI 34.0-36.7). The identified risk factors associated with EIBF were being 35-39 years, having at least a primary education, lower wealth quintiles, multiparity, and delivery in a public hospital. EIBF was lower among women that had skilled occupation, access to media, decided to delay pregnancy, history of previous caesarean section, small size baby at birth, and women who received antenatal care. The results indicate that the proportion of women with EIBF in Nigeria is low. Addressing the barriers identified in this paper will help promote EIBF practices in the country. (*Afr J Reprod Health 2022; 26[11s]: 28-43*).

Keywords: Early initiation of breastfeeding, breastfeeding; women, Nigeria

Résumé

L'initiation précoce de l'allaitement maternel (EIBF) est une première étape essentielle de l'allaitement maternel exclusif qui devrait commencer dans l'heure qui suit l'accouchement. Cette étude a examiné la prévalence et les facteurs associés à l'EIBF chez les mères allaitantes au Nigeria sur la base d'une analyse des données de l'enquête démographique et de santé nigérienne (NDHS) de 2003, 2008, 2013 et 2018. La prévalence de l'initiation précoce à l'allaitement selon les caractéristiques démographiques, socio-économiques et reproductives des femmes a été calculée pour chacune des séries d'enquêtes. Les différences dans les estimations de la prévalence de l'initiation précoce à l'allaitement maternel entre les deux dernières périodes d'enquête ont été calculées. Un modèle brut et ajusté pour examiner l'association entre les variables explicatives et l'initiation précoce à l'allaitement maternel a été ajusté à l'aide du modèle de régression de Poisson. L'âge moyen des répondants était de 29 ans (ET = 7,3). La prévalence de l'EIBF est passée de 31,5 % en 2003 (IC à 95 % 28,4-34,5) à 43,8 % en 2018 (IC à 95 % 42,6-45,0), avec une baisse à 35,3 % en 2013 (IC à 95 % 34,0-36,7). Les facteurs de risque identifiés associés à l'EIBF étaient d'avoir entre 35 et 39 ans, avoir au moins une éducation primaire, des quintiles de richesse inférieurs, la multiparité et l'accouchement dans un hôpital public. L'EIBF était plus faible chez les femmes qui avaient une profession qualifiée, un accès aux médias, qui avaient décidé de retarder la grossesse, des antécédents de césarienne, un bébé de petite taille à la naissance et les femmes qui avaient reçu des soins prénatals. Les résultats indiquent que la proportion de femmes avec EIBF au Nigeria est faible. Aborder les obstacles identifiés dans ce document aidera à promouvoir les pratiques EIBF dans le pays. (*Afr J Reprod Health 2022; 26[11s]: 28-43*).

Mots-clés: Initiation précoce à l'allaitement maternel, allaitement maternel, femmes, Nigeria

Introduction

Breastfeeding is an important first intervention offered after childbirth to the newborn by mothers¹. Breast milk contains essential minerals, antibodies

and other useful nutrients, which provide useful nourishment to the baby, prevent infections, and ultimately improve child survival^{1,2}. Generally, breastfeeding has been associated with several maternal and neonatal benefits. Women who

engaged in breastfeeding are less likely to experience postpartum haemorrhage due to atony, postpartum mental ill health, and unwanted pregnancy¹. Evidence indicate that mothers that breastfed have reduced risks of some non-communicable diseases such as type 2 diabetes mellitus, ovarian cancer, and breast cancers¹³. Breastfed babies tend to have higher intelligent quotients, and they are protected from respiratory infections, diarrhoeal, obesity and diabetes mellitus, thus leading to improved lifelong benefits^{1,2}.

Optimal breastfeeding involves initiation of breastfeeding within an hour of childbirth (early initiation of breastfeeding – EIBF), sustaining the breastfeeding on demand without supplement in the first six months of life (exclusive breastfeeding) and maintaining the breastfeeding for another 12 to 18 months with other food supplements^{4,5}. Over the years, optimal breastfeeding has been shown to be central to the global reduction of under-five morbidity and mortality^{1,3}. This is why the United Nations and other stakeholders on child nutrition and survival initiated several policies and programmes that promote breastfeeding globally^{6,7}. The latest of such commitments was the United Nations Decade of Action on Nutrition (2016–2025) and the Sustainable Development Goal (SDG-2.2) aimed at ending all forms of malnutrition⁶.

EIBF has been shown to be directly associated with optimal breastfeeding and ultimately reduces the risk of neonatal mortality. Babies whose mothers' initiated breastfeeding within an hour of childbirth are more likely to be fed exclusively for six months and to be breastfed for up to two years^{8,9}. One of the main benefits of EIBF is the exposure of colostrum to the baby. The colostrum has high content of antibodies that promotes passive and active immunity against common infections in children⁹. EIBF has also been shown to improve mother to baby bonding, reduces maternal postpartum complications, and provides high sense of psychological achievement for mothers^{8,9}. Despite these benefits, EIBF by mothers varied in different settings and it is dependent on sociodemographic, maternal and cultural factors. For example, a high prevalence of EIBF was reported in Ethiopia, Kenya and Zambia with rates of 75.7%, 80.2% and 92.4% respectively. By contrast, a low prevalence of was reported in many West African countries relative to other regions in Africa^{10,11}. Nigeria has adopted all the breastfeeding

policies and programmes including a recent increase in the maternity leave from three to four months for all mothers. The country also adopted baby friendly initiative programmes that promote EIBF including the use of support persons¹². However, the prevalence of EIBF in Nigeria is less than 50%¹³⁻¹⁵. The relatively low prevalence of EIBF in Nigeria has been associated with age, education, wealth index, location of residence (rural and urban), obstetric factors and weight which are positively associated with EIBF. Other factors such as location of residence and obstetric factors had mixed findings^{13,15,16}. In 2013, Yahaya and Adebayo examined the socioeconomic determinants of the trends towards EIBF in Nigeria using the 1990, 1999, 2003, and 2008 National Demographic Health Surveys (NDHS)¹⁷. The results showed a sinusoidal pattern of prevalence with a dip in EIBF in the 2003 NDHS¹⁷. The study also found that mother's age at birth, higher education, residency in urban settings, delivery of a singleton baby and frequent antenatal clinic attendance positively influenced EIBF¹⁷. In that study, mothers whose last childbirth was delivered by caesarean section, delivery at home and being a first childbirth were all found to be negatively associated with EIBF¹⁷.

Although, many other studies in Nigeria have also reported similar findings on factors associated with EIBF^{13,15,18}, yet, there is no published paper that has used nationally representative data that investigate the trend of EIBF and associated explanatory factors. It is important to investigate the dynamics of the different explanatory factors over time in relation to EIBF in Nigeria. The outcome of this study will help policy makers and programme planners to appreciate and prioritise and invest in factors that positively influence EIBF over time. The aim of this study is to assess factors that contribute to EIBF over the four waves of NDHS – 2003, 2008, 2013 and 2018 - in Nigeria among women of childbearing age.

Methods

Data source and sampling design

We used four rounds of the Nigerian Demographic Health Survey (NDHS) datasets collected in 2003, 2008, 2013 and 2018. The NDHS adopted a two-stage stratified cluster sampling design to collect information on several health indicators which

include fertility, contraceptive use, breastfeeding practices, maternal and child health, female genital mutilation, women's empowerment, domestic violence and other health-related issues. The first stage involved the selection of enumeration areas (EAs) within urban and rural strata, while the second stage was the selection of women aged 15-49 from the identified households. The NDHS survey used a standardized questionnaire over several rounds, and the questionnaires were usually translated into the three local languages in Nigeria - Hausa, Yoruba, and Igbo. Further details of survey implementation and methodology can be found in the NDHS reports¹⁹.

Extraction of variables

The outcome variable was time to start breastfeeding after birth; respondents who reported that they initiated breastfeeding immediately after birth or less than an hour after birth were categorized as early initiation (<1 hour which was coded as 1) while respondents who did not breastfeed their child within one hour after birth were classified not to be timely (≥ 1 hour and coded as 0). Explanatory demographic and socio-economic variables considered were: marital status (never married, currently married, formerly married); mother's age group (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49); occupation (not working, unskilled/clerical/household and domestic, agricultural, skilled/sales/services, professional/technical/managerial); highest level of education (none, primary, secondary, tertiary); religion (Christians, Muslims, others); residence (urban, rural); region (North Central, North East, North West, South East, South, South West); wealth quintiles (poorest, poorer, middle, richer, richest). Exposure to mass media (none, at least a source) and access to family planning information ((none, at least a source) were measured with respect to access to any of radio, television, newspaper or magazine. Also, the reproductive variables included were: parity (1, 2-3, 3-4, 4-5, 6 or more); wanted pregnancy (Yes, later, no more); sex of child (male, female); type of delivery (normal vaginal, caesarian); baby size (large, average, small, not reported); number of births (single, multiple), number of antenatal visits (no visit, 1-3, 4-7, 8 or more), place antenatal care was received (home/other homes/others, Government hospital,

Government health centres/post, private hospital/clinic), place of delivery (home/other homes/others, Government hospital, Government health centres/post, Private hospital/clinic), delivery assistance (unskilled vs. skilled personnel [doctors, nurses, midwife and auxiliary midwife]). The survey years controlled for in the study were NDHS 2003, 2008, 2013 and 2018).

Statistical analysis

For our analysis, the sampling weight for each of the survey rounds were de-normalized using population of women aged 14-49 (from the UN's World Population Prospect) at the time of survey before pooling the datasets. We extracted information on women who have had a childbirth in the past 5 years preceding the surveys. The pooled sample size contained 58244 mothers, which ranges from 11450 (19.7%) in 2003, 12349 (21.2%) in 2008, 16990 (29.2%) in 2013 and 17455 (30.0%) in 2018.

The descriptive statistics of background characteristics for the pooled and each survey rounds were presented. The prevalence and its 95% confidence intervals [CI] of early breastfeeding initiation by women demographic, socio-economic and reproductive information were also computed for each of the survey rounds. We then compared the differences in prevalence estimates for early breastfeeding initiation between the last two survey periods (i.e. 2013 and 2018) using a chi-squared test of association to report significance of the differences. A crude and adjusted model to examine association between explanatory variables and early breastfeeding initiation was fitted using Poisson regression model. Multicollinearity test was inspected using correlation matrix and variance inflation factor < 5 as cut-off²⁰, birth order was dropped due to perfect collinearity with parity. Furthermore, the Blinder-Oaxaca non-linear decomposition model was used to examine the differences in the EIBF between two time points. This method decomposes EIBF between a reference time (least year) and a more recent year into two parts that is explained by differences in observed characteristics and other parts attributable to differences in the estimate of the coefficient. All analyses were performed using Stata version 15.0 (Stata Corp LP, College Station, Texas, USA) at p -value < 0.05 and adjusted for complex survey design.

Results

The descriptive statistics of mothers' demographic, socio-economic and reproductive information are presented in Table 1. Over 94% of the mothers were currently married with a mean (SD) age of 29 (7.3) years. About three in 10 of the mothers were unemployed and almost half of them had no formal education. A higher proportion of mothers were from the North western region (35%), resided in rural areas (66%), and were Muslims (61%) relative to other regions. Similarly, a higher proportion of mothers were either in the poorest or in the poorer wealth quintiles (46%), had never heard about family planning either from television, radio or from print media (64%). The sex of the children was evenly distributed to mothers; most of the births were from normal vaginal delivery and were mostly assisted by non-medical personnel. The data showed that assisted delivery by skilled professionals increased over time from 37% in 2003 to 48% in 2018, while non-utilization of antenatal care services declined from 39% in 2003 to 25% in 2018. Similarly, not receiving antenatal care at health facilities reduced from 42% in 2003 to 27% in 2018, while the proportion of home delivery decreased slightly from 67% in 2003 to 60% in 2018.

The prevalence of early initiation of breastfeeding fluctuated between 2008 and 2013 (Figure 1); the prevalence of early initiation in 2008 was 37.6% (95% CI 36.0-39.2) which was higher compared to 2003 (31.5%; 95% CI 28.4-34.5) and then reduces in 2013 (35.3%; 95% CI 34.0-36.7) and then increased in 2018 (43.8%; 95% CI 42.6-45.0). The trends in prevalence of early initiation of breastfeeding and changes in prevalence in the two most recent survey by mothers' background characteristics were presented in Table 2. Although, the analysis revealed a significant increase in early initiation of breastfeeding by mothers' background characteristics in 2018 compared to 2013; except for mothers who attended between 1-3 ANC visits ($P_a=0.2$; $p=0.861$) and among women who delivered through caesarian section ($P_a=-1.1$; $p=0.704$). The prevalence of early initiation of breastfeeding among mothers' who reside in the North Eastern region reduced significantly by 12.1% and by 14.2% among mothers who practice other religion aside

Christianity and Islam. In the most recent survey, more than half of mothers in the richest quintile (54.3%; 95% CI 51.6-57.1) and women who delivered in government centres or post (53.8%; 95% CI 51.1-56.3) initiated breastfeeding within the first hour of birth. A large variation in trends and prevalence in timely initiation of breastfeeding was observed among regions with a substantial heterogeneity across states. Less than half of mothers in the North East (29.7%; 95% CI 26.8-32.7), North West (34.1%; 95% CI 31.8-36.4) and South East (42.2%; 95% CI: 40.1-44.4) initiated breastfeeding within an hour after birth in the most recent survey. The prevalence of timely initiation of breastfeeding ranges from about 11% in Jigawa, Taraba and 97% in Bayelsa (Figure 2).

The factors associated with EIBF in each of the survey years and the pooled dataset for 2003 to 2018 were analysed using the Poisson regression model (Table 3). The adjusted pooled analysis showed that mothers were 1.18 (95% CI: 1.07-1.31), 1.12 (95% CI: 1.01-1.23) and 1.35 (95% CI: 1.22-1.29) times more likely in 2008, 2013 and 2018, respectively compared to year 2003 to initiate breastfeeding early. Women between the age 35-39 years were 1.13 (95% CI: 1.02-1.25) times more likely to initiate breastfeeding early compared to adolescent mothers (15-19 years). There was a positive linear trend between EIBF with women's level of education, wealth quintiles and parity. In the 2008 survey, women who are skilled workers were 1.08 (95% CI: 1.01-1.16) times more likely to initiate breastfeeding early compared to those who are not employed.

While in the subsequent surveys in 2013 and 2018, women who were skilled workers were 0.89 (95% CI: 0.83-0.94) and 0.91 (95% CI: 0.85-0.97) less likely to initiate breastfeeding early compared to those who were not working. Mothers in the rural areas were 0.91 (95% CI: 0.85-0.96) times less likely to initiate breastfeeding early compared to those in the urban setting. Similarly, women in the North-east, North-west, South-east, South-south and South-west geo-political regions were less likely to initiate breastfeeding within the first hour of birth compared to those in the North-central region. Mothers who were expose to mass media were 0.95 (95% CI: 0.91-0.99) times less

Table 1: Background characteristics of mothers with a childbirth in Nigeria, NDHS 2003-2018

Variables	N (%)	NDHS 2003	NDHS 2008	NDHS 2013	NDHS 2018
<i>Demographic/Socio-economic variables</i>					
Current marital status					
Never married	1350 (2.3)	311 (2.7)	282 (2.3)	367 (2.2)	387 (2.2)
Currently married	55005 (94.4)	10714 (93.6)	11704 (94.8)	16119 (94.9)	16468 (94.4)
Formerly married	1889 (3.2)	426 (3.7)	362 (2.9)	501 (2.9)	600 (3.4)
Age (mean±SD)					
15-19	29.29±7.29	28.50±7.36	29.38±7.56	29.37±7.30	29.66±7.14
20-24	3918 (6.7)	1041 (9.1)	835 (6.8)	1083 (6.4)	960 (5.5)
25-29	11661 (20.0)	2528 (22.1)	2401 (19.4)	3376 (19.9)	3356 (19.2)
30-34	15346 (26.4)	3066 (26.8)	3283 (26.6)	4452 (26.2)	4545 (26.0)
35-39	11959 (20.5)	2081 (18.2)	2532 (20.5)	3537 (20.8)	3809 (21.8)
40-44	8885 (15.3)	1556 (13.6)	1852 (15.0)	2605 (15.3)	2871 (16.4)
45-49	4648 (8.0)	920 (8.0)	983 (8.0)	1385 (8.1)	1359 (7.8)
	1826 (3.1)	258 (2.2)	464 (3.8)	552 (3.2)	553 (3.2)
Occupation					
Not working	17795 (30.6)	4008 (35.0)	3816 (30.9)	5049 (29.7)	4993 (28.2)
Unskilled	652 (1.1)	333 (2.9)	105 (0.9)	81 (0.5)	132 (0.8)
Agricultural	8190 (14.1)	1556 (13.6)	2156 (17.4)	1843 (10.8)	2633 (15.1)
Skilled	29279 (50.3)	5128 (44.8)	5888 (47.7)	9400 (55.3)	8863 (50.8)
Professional	2327 (4.0)	423 (3.7)	384 (3.1)	617 (3.6)	903 (5.2)
Highest level of education					
None	27990 (48.1)	5984 (52.3)	5863 (47.4)	8258 (48.6)	7885 (45.2)
Primary	11238 (19.3)	2631 (23.0)	2775 (22.4)	3201 (18.8)	2630 (15.1)
Secondary	15370 (26.4)	2424 (21.2)	3018 (24.4)	4477 (26.4)	5452 (31.2)
Tertiary	3646 (6.3)	412 (3.6)	692 (5.6)	1054 (6.2)	1488 (8.5)
Religion					
Christians	22090 (37.9)	4059 (35.4)	5174 (41.9)	6304 (37.1)	6553 (37.5)
Islam	35528 (61.0)	7233 (63.2)	6934 (56.1)	10520 (61.9)	10841 (62.1)
Others	626 (1.1)	159 (1.4)	241 (2.0)	165 (1.0)	61 (0.4)
Residence					
Urban	19689 (33.8)	3290 (28.7)	3658 (29.6)	5922 (34.9)	6819 (39.1)
Rural	38555 (66.2)	8161 (71.3)	8691 (70.4)	11068 (65.1)	10636 (60.9)
Region					
North central	8405 (14.4)	1750 (15.3)	1806 (14.6)	2401 (14.1)	2449 (14.0)
North East	10681 (18.3)	2594 (22.7)	2115 (17.1)	2829 (16.7)	3142 (18.0)
North West	20456 (35.1)	4002 (34.9)	3865 (31.3)	6372 (37.5)	6215 (35.6)
South East	4530 (7.8)	555 (4.9)	943 (7.6)	1359 (8.0)	1674 (9.6)
South South	6091 (10.4)	1531 (13.4)	1465 (11.9)	1567 (9.2)	1528 (8.8)
South West	8081 (13.9)	1018 (8.9)	2155 (17.4)	2461 (14.4)	2447 (14.0)
Wealth quintiles					
Poorest	13431 (23.1)	2551 (22.3)	3055 (24.7)	3988 (23.4)	3837 (22.0)
Poorer	13088 (22.5)	2472 (21.6)	2810 (22.8)	3874 (22.8)	3932 (22.5)
Middle	11433 (19.6)	2363 (20.6)	2282 (18.4)	3239 (19.1)	3548 (20.3)
Richer	10505 (18.0)	2157 (18.8)	2119 (17.2)	2992 (17.6)	3237 (18.5)
Richest	9787 (16.8)	1907 (16.7)	2083 (16.9)	2896 (17.6)	2901 (16.6)
Exposure to mass media					
None	19114 (32.8)	2925 (25.5)	3873 (31.4)	5640 (33.2)	6677 (38.3)
At least a type of media	39129 (67.2)	8526 (74.5)	8476 (68.6)	11350 (66.8)	10778 (61.7)
Access to FP information					
Not heard about FP	37335 (64.1)	6763 (59.1)	7653 (62.0)	11438 (67.3)	11482 (65.8)
At least from a source	20906 (35.9)	4688 (40.9)	4696 (38.0)	5552 (32.7)	5973 (34.2)

<i>Reproductive information</i>					
Parity					
1	10406 (17.9)	2298 (20.1)	2122 (17.2)	3028 (17.8)	2957 (16.9)
2-3	18311 (31.4)	3284 (28.7)	3919 (31.7)	5322 (31.3)	5787 (33.1)
4-5	13754 (23.6)	2546 (22.2)	3001 (24.3)	4092 (24.1)	4115 (23.6)
≥6	15773 (27.1)	3323 (29.0)	3307 (26.8)	4547 (26.8)	4596 (26.3)
Wanted pregnancy					
Yes	51241 (88.0)	9600 (83.8)	10896 (88.2)	15365 (90.4)	15380 (88.1)
Later	4699 (8.1)	1119 (9.8)	813 (6.6)	1266 (7.5)	1501 (8.6)
No more	2304 (4.0)	732 (6.4)	640 (5.2)	358 (2.1)	574 (3.3)
Sex of child					
Male	29580 (50.8)	5866 (51.2)	6269 (50.8)	8528 (50.2)	8917 (51.1)
female	28664 (49.2)	5584 (48.8)	6080 (49.2)	8461 (49.8)	8538 (48.9)
Type of delivery					
Normal	56900 (97.7)	11232 (98.1)	12130 (98.2)	16616 (97.8)	16922 (97.0)
Caesarian	1344 (2.3)	218 (1.9)	219 (1.8)	374 (2.2)	533 (3.1)
Baby size					
Large	24213 (41.6)	4827 (42.2)	5924 (48.0)	7476 (44.0)	5985 (34.3)
Average	25233 (43.3)	4850 (42.4)	4545 (36.8)	6943 (40.9)	8895 (51.0)
Small	8322 (14.3)	1701 (14.9)	1787 (14.5)	2492 (14.7)	2342 (13.4)
Not reported	475 (0.8)	72 (0.6)	93 (0.7)	78 (0.5)	233 (1.3)
Birth					
Single	57162 (98.1)	11192 (97.7)	12154 (98.4)	16680 (98.2)	17136 (98.2)
Multiple	1082 (1.9)	259 (2.3)	195 (1.6)	309 (1.8)	319 (1.8)
Number of antenatal visits					
0	19633 (33.7)	4416 (38.6)	4957 (40.1)	5954 (35.0)	4306 (24.7)
1-3	8032 (13.8)	1535 (13.4)	1312 (10.6)	2119 (12.5)	3066 (17.6)
4-7	16753 (28.8)	2654 (23.2)	2843 (23.0)	4684 (27.6)	6573 (37.7)
8+	13826 (23.7)	2846 (24.9)	3237 (26.2)	4233 (24.9)	3510 (20.1)
Place ANC sought					
Home/other homes	21552 (37.0)	4759 (41.6)	5597 (45.3)	6419 (37.8)	4777 (27.4)
Govt hospital	14143 (24.3)	3033 (26.5)	2656 (21.5)	4496 (26.5)	3958 (22.7)
Govt health centres/post	14017 (24.1)	1827 (15.9)	2099 (17.0)	3669 (21.6)	6423 (36.8)
Private hospital/clinic	8531 (14.7)	1832 (16.0)	1997 (16.2)	2406 (14.1)	2297 (13.2)
Place of birth/delivery					
Home/other homes	37064 (63.6)	7707 (67.3)	8136 (65.9)	10799 (63.6)	10421 (59.7)
Govt hospital	7860 (13.5)	1514 (13.2)	1513 (12.2)	2468 (14.5)	2365 (13.5)
Govt health centres/post	5684 (9.8)	698 (6.1)	980 (7.9)	1530 (9.0)	2477 (14.2)
Private hospital/clinic	7635 (13.1)	1532 (13.4)	1720 (13.9)	2193 (12.9)	2191 (12.6)
Delivery assistance					
Unskilled	33913 (58.2)	7197 (62.8)	7632 (61.8)	9921 (58.4)	9163 (52.5)
Skilled	24331 (41.8)	4254 (37.2)	4717 (38.2)	7069 (41.6)	8292 (47.5)
Total	58244 (100)	11450 (19.7)	12349 (21.2)	16990 (29.2)	17455 (30.0)

likely to initiate breastfeeding earlier compared to those who were not exposed to mass media.

Likewise, mothers who wanted pregnancy at a later time were 0.91 (95% CI: 0.86-0.96) times less likely to initiate breastfeeding early compared to those whose pregnancy was intended early. For all survey rounds except for 2003, women who gave birth through caesarean section were less likely to breastfeed their child within the first hour birth

compared to those with vaginal delivery and women who reported that the size of their baby was small were 0.93 (95% CI: 0.89-0.98) times more likely than mothers who reported an average size. Although, women who sought antenatal care in government health centres or post were 0.90 (95% CI: 0.81-0.98) times less likely to initiate breastfeeding early compared to those who sought at home. However, women who delivered in

Table 2: Prevalence of early initiation of breastfeeding among mothers' in Nigeria, NDHS 2003-2018

<i>Variable</i>	<i>NDHS 2003 Prevalence, (95% CI)</i>	<i>%</i>	<i>NDHS 2008 Prevalence, (95% CI)</i>	<i>%</i>	<i>NDHS 2013 Prevalence, (95% CI)</i>	<i>%</i>	<i>NDHS 2018 Prevalence, (95% CI)</i>	<i>%</i>	<i>Prev. diff (Pa) [2018-2013] p-value</i>
National average									
Current marital status	31.5(28.4-34.5)		37.6(36.0-39.2)		35.3(34.0-36.7)		43.8(42.6-45.0)		8.5 <i>p<0.001</i>
Never married	47.2(31.7-63.2)		39.5(33.2-46.0)		38.9(24.0-34.4)		45.7(40.6-50.8)		16.8 <i>p<0.001</i>
Currently married	30.6(27.4-34.0)		37.3(35.7-39.0)		35.4(34.0-36.8)		43.6(42.4-44.9)		8.2 <i>p<0.001</i>
Formerly married	42.9(33.2-53.2)		45.2(40.2-50.4)		37.2(32.8-41.8)		46.8(42.0-51.6)		9.6 <i>p<0.001</i>
Age									
15-19	25.1(17.7-34.4)		30.0(26.7-33.5)		28.0(24.6-31.7)		33.1(29.6-36.8)		5.1 <i>p<0.001</i>
20-24	29.0(24.2-34.3)		35.0(32.7-37.4)		33.7(31.5-36.0)		40.7(38.4-42.9)		7.0 <i>p<0.001</i>
25-29	33.8(29.5-38.3)		39.2(37.1-41.4)		36.2(34.2-38.3)		44.3(42.3-46.1)		8.1 <i>p<0.001</i>
30-34	29.4(25.3-33.8)		40.1(37.7-42.5)		36.1(33.9-38.3)		46.0(44.0-48.1)		9.9 <i>p<0.001</i>
35-39	37.5(32.0-43.4)		38.6(36.0-41.2)		37.6(35.3-40.0)		47.7(45.6-49.7)		10.1 <i>p<0.001</i>
40-44	32.6(25.3-40.9)		37.7(34.6-40.9)		36.1(33.1-39.3)		44.1(41.2-47.2)		8.0 <i>p<0.001</i>
45-49	33.2(21.8-47.0)		36.1(31.9-40.6)		34.8(30.4-39.5)		41.1(36.8-45.7)		6.3 <i>p<0.001</i>
Occupation									
Not working	29.1(25.2-33.4)		32.4(30.1-34.8)		36.5(34.2-38.8)		40.4(38.3-42.6)		3.9 <i>p<0.001</i>
Unskilled	35.5(23.7-49.4)		45.1(34.5-56.2)		44.1(31.6-57.4)		51.1(41.5-60.6)		7.0 <i>p<0.001</i>
Agricultural	34.3(28.0-41.3)		47.5(43.8-51.2)		36.9(34.0-40.0)		49.7(46.7-52.7)		12.8 <i>p<0.001</i>
Skilled	30.5(26.4-35.0)		36.6(34.7-38.5)		33.7(32.1-35.3)		43.0(41.3-44.7)		9.3 <i>p<0.001</i>
Professional	52.8(41.1-64.2)		47.3(41.9-52.8)		44.5(40.0-49.2)		51.8(48.0-55.6)		7.3 <i>p<0.001</i>
Education									
None	27.2(23.2-31.7)		32.0(30.0-34.3)		30.8(28.8-32.9)		36.5(34.7-38.4)		5.7 <i>p<0.001</i>
Primary	36.0(31.4-40.8)		43.0(40.5-45.7)		37.6(35.4-39.9)		46.4(43.7-49.2)		8.8 <i>p<0.001</i>
Secondary	34.1(29.3-39.4)		41.4(40.0-43.9)		39.9(37.7-42.0)		50.5(48.9-52.2)		10.6 <i>p<0.001</i>
Tertiary	50.6(37.8-63.4)		46.6(41.7-51.5)		44.7(40.7-48.8)		52.8(49.1-56.4)		8.1 <i>p<0.001</i>
Religion									
Christians	38.9(34.4-43.6)		44.7(42.3-47.0)		38.1(36.3-40.0)		50.9(49.2-52.6)		12.8 <i>p<0.001</i>
Islam	27.1(23.4-31.3)		32.1(30.0-34.3)		33.6(31.7-35.5)		39.6(37.9-41.4)		6.0 <i>p<0.001</i>
Others	42.1(29.6-55.7)		43.5(35.8-51.5)		40.6(30.5-51.5)		26.4(14.0-44.0)		-14.2 <i>p=0.034</i>
Residence									
Urban	33.3(29.1-37.7)		38.8(36.1-41.6)		42.8(40.5-45.1)		50.2(48.2-52.2)		7.4 <i>p<0.001</i>
Rural	30.8(26.9-35.1)		37.1(35.1-39.1)		31.3(29.7-33.0)		39.7(38.1-41.2)		8.4 <i>p<0.001</i>
Region									
North central	45.0(40.3-49.9)		62.4(58.8-65.9)		47.5(44.7-50.4)		61.7(58.5-64.8)		14.2 <i>p<0.001</i>
North East	27.5(22.0-33.7)		24.9(21.6-28.4)		41.7(38.2-45.3)		29.7(26.8-32.7)		-12.0 <i>p<0.001</i>
North West	26.4(20.7-32.9)		31.5(28.5-34.6)		27.7(25.4-30.2)		34.1(31.8-36.4)		6.4 <i>p<0.001</i>
South East	56.1(40.4-70.8)		35.7(31.8-39.8)		35.1(30.9-39.5)		42.2(40.1-44.4)		7.1 <i>p<0.001</i>
South South	40.5(34.0-47.4)		49.6(44.5-54.8)		45.1(41.4-48.7)		55.3(52.4-58.2)		10.2 <i>p<0.001</i>
South West	11.9 (9.4-15.1)		32.9(29.6-36.4)		29.7(27.0-32.6)		62.5(59.5-65.5)		32.8 <i>p<0.001</i>
Wealth quintile									
Poorest	24.5(20.0-29.6)		30.1(27.3-33.1)		25.7(22.9-28.7)		32.2(29.9-34.5)		6.5 <i>p<0.001</i>
Poorer	29.3(24.0-35.2)		37.6(34.8-40.5)		31.2(28.9-33.7)		38.7(36.3-41.2)		7.5 <i>p<0.001</i>
Middle	35.2(29.8-41.1)		42.4(39.7-45.3)		38.0(35.6-40.5)		47.0(44.8-49.2)		9.0 <i>p<0.001</i>
Richer	36.1(29.7-43.0)		42.1(39.5-44.8)		43.9(41.4-46.5)		50.8(48.3-53.3)		6.9 <i>p<0.001</i>
Richest	34.1(28.9-39.8)		38.7(35.6-41.9)		42.2(39.2-45.4)		54.3(51.6-57.1)		12.1 <i>p<0.001</i>
Exposure to mass media									
None	30.5(26.5-34.9)		35.6(33.3-38.0)		32.0(29.7-34.3)		39.9(37.9-41.8)		7.9 <i>p<0.001</i>
At least one type of media	31.9(28.4-35.6)		38.5(36.8-40.3)		37.0(35.5-36.7)		46.2(44.8-47.7)		9.2 <i>p<0.001</i>

Access to FP information	30.9(27.1-34.9)	37.4(35.5-39.4)	33.9(32.2-35.5)	42.3(40.8-43.9)	8.4	p<0.001
Not heard about FP	32.5(28.6-36.6)	37.9(35.8-40.1)	38.4(36.4-40.4)	46.6(44.6-48.6)	8.2	p<0.001
At least one source						
Parity						
1	25.1(20.4-30.5)	34.2(31.9-36.6)	32.2(30.1-34.5)	41.2(39.1-43.4)	9.0	p<0.001
2-3	32.6(28.7-36.8)	38.5(36.5-40.5)	37.0(35.1-39.0)	46.0(44.3-47.7)	9.0	p<0.001
4-5	33.6(29.1-38.5)	39.1(36.9-41.4)	37.2(35.3-39.2)	46.5(44.5-48.5)	9.3	p<0.001
≥6	33.3(29.3-37.5)	37.4(35.2-39.7)	33.7(31.8-35.8)	40.2(38.3-42.1)	6.5	p<0.001
Wanted pregnancy						
Yes	30.8(27.5-34.3)	37.3(35.7-39.0)	35.4(34.0-36.9)	43.4(42.1-44.7)	8.0	p<0.001
Later	30.9(25.4-37.1)	39.2(35.5-43.0)	34.3(31.2-37.6)	45.6(42.8-48.5)	11.3	p<0.001
No more	42.1(30.2-55.0)	40.5(36.4-44.7)	33.8(28.8-39.2)	49.5(44.8-54.2)	15.7	p<0.001
Sex of child						
Male	30.5(27.1-34.2)	37.2(35.4-39.0)	31.4(28.2-34.7)	43.9(42.5-45.4)	12.5	p<0.001
female	32.6(28.9-36.5)	38.1(36.3-39.9)	38.6(27.0-51.7)	43.7(42.2-45.2)	5.1	p<0.001
Type of delivery						
Normal	31.4(28.2-34.7)	37.9(36.2-39.5)	35.6(34.3-37.1)	44.5(43.3-45.8)	8.9	p<0.001
Caesarean	38.6(27.0-51.7)	24.0(19.0-30.0)	21.4(17.1-26.5)	20.3(16.9-24.1)	-1.1	p=0.704
Baby size						
Large	29.2(25.3-33.4)	37.6(35.7-39.4)	37.5(35.9-39.3)	44.7(42.7-46.7)	7.2	p<0.001
Average	34.5(30.7-38.5)	37.8(35.5-40.2)	34.5(32.6-36.4)	44.9(43.4-46.5)	10.4	p<0.001
Small	29.6(24.1-35.7)	36.1(33.1-39.2)	31.1(28.5-33.8)	35.7(33.3-38.3)	4.6	p<0.001
Not reported	30.7(13.5-55.7)	60.2(45.2-73.4)	34.1(24.2-45.6)	57.5(49.6-65.0)	23.4	p<0.001
Birth						
Single	31.4(28.2-34.6)	37.7(36.1-39.3)	35.4(34.0-36.8)	43.8(42.5-45.0)	8.4	p<0.001
Multiple	39.1(24.9-55.5)	34.3(28.3-40.8)	30.9(25.7-36.7)	44.8(38.8-50.9)	13.9	p<0.001
Number of ANC visits						
0	26.7(22.6-31.2)	33.0(30.6-35.6)	28.2(25.9-30.6)	39.4(36.9-42.0)	11.2	p<0.001
1-3	35.4(28.9-42.5)	40.8(37.4-44.4)	37.4(34.3-40.6)	37.6(35.2-40.1)	0.2	p=0.861
4-7	37.4(32.3-42.8)	44.0(41.7-46.3)	42.3(40.1-44.5)	45.1(43.3-46.9)	2.8	p=0.002
8+	31.4(26.9-36.4)	37.7(35.3-40.2)	36.6(34.3-39.0)	52.1(49.9-54.3)	15.5	p<0.001
Place ANC sought						
Home/other homes	27.1(23.2-31.4)	33.5(31.2-35.9)	28.8(26.6-31.1)	40.9(38.4-43.4)	12.1	p<0.001
Govt hospital	35.7(31.0-40.7)	42.9(40.4-45.4)	42.2(39.8-44.5)	49.0(46.4-51.6)	6.8	p<0.001
Govt health centres/post	28.0(22.6-34.0)	42.4(39.2-45.6)	38.2(36.0-40.1)	40.8(39.0-42.7)	2.8	p=0.006
Private hospital/clinic	39.7(32.1-47.7)	37.1(33.8-40.4)	35.6(32.5-38.9)	49.4(46.7-52.0)	13.8	p<0.001
Place of delivery						
Home/other homes	27.9(24.2-32.0)	34.7(32.7-36.7)	31.4(29.7-33.2)	38.7(37.2-40.3)	7.3	p<0.001
Govt hospital	35.4(30.8-40.3)	49.0(46.1-51.9)	48.0(45.5-50.6)	50.8(48.1-53.5)	2.8	p=0.039
Govt health centres/post	38.0(30.0-46.9)	44.9(41.1-48.9)	41.2(38.3-44.2)	53.8(51.1-56.3)	12.6	p<0.001
Private hospital/clinic	42.9(34.4-51.9)	37.2(34.0-40.7)	36.1(32.8-39.6)	49.2(46.8-51.6)	13.1	p<0.001
Delivery assistance						
Unskilled	27.5(23.7-31.6)	34.3(32.3-36.4)	31.2(29.4-33.1)	37.4(35.7-39.1)	6.2	p<0.001
Skilled	38.4(34.4-42.6)	43.0(40.9-45.0)	41.1(39.4-42.9)	50.9(49.3-52.4)	9.8	p<0.001

P_d - Difference in Prevalence

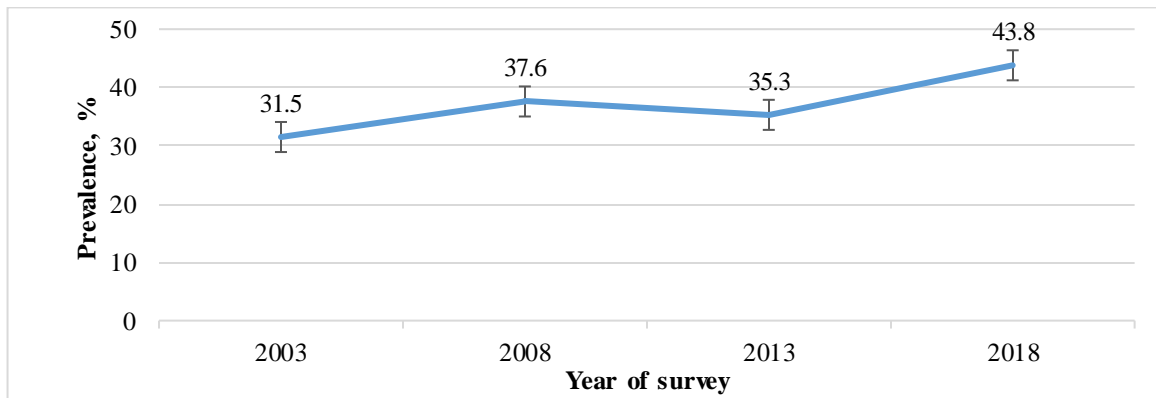


Figure 1: Trends in prevalence of early breastfeeding Initiation in Nigeria, (NDHS 2003–2018)

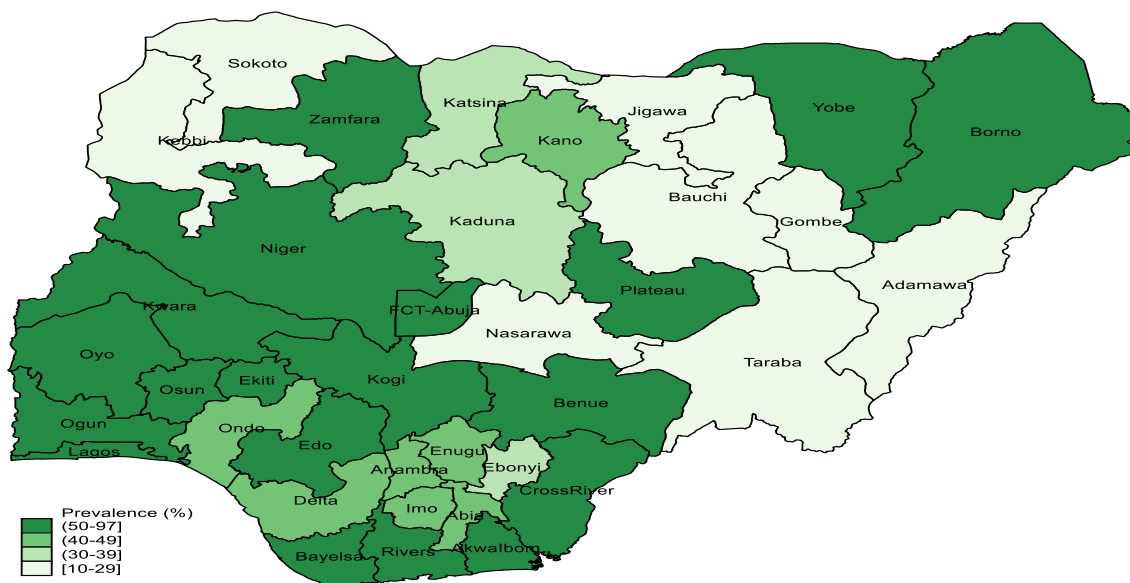


Figure 2: Prevalence of breastfeeding initiation within the first hour of birth, Nigeria DHS 2018

government hospitals or in a government centres/posts were 1.10 (1.02-1.19) and 1.19 (1.11-1.27) times more likely to initiate breastfeeding earlier compared to those who delivered at home.

The Blinder-Oaxaca non-linear decomposition model revealed that 7% increase in EIBF from year 2003 and 2008 and a 27% decline between the year 2003 to 2008 survey is attributable to differences in the explanatory variable. Although, there were no evidence to suggest that the 8.5 points increase in EIBF between year 2013 and 2018 survey may be due to differences in the covariates ($p > 0.05$). The part of the differential attributable to different characteristics which was negative for the year 2008 and 2018 survey, implies that one or more explanatory variables in the year 2008 possesses a

relative advantage compared to those of 2018 survey.

Discussion

This study provided a robust information on the national effort at promoting EIBF among nursing mothers in the past 15 years from the four waves of NDHS data (2003 – 2018). Although the result showed a steady moderate increase in the prevalence of EIBF from 31.5% in 2003 to 43.8% in 2018 with a slight dip in 2013, but it is still at suboptimal level, as more than half of mothers did not initiate breastfeeding within an hour. Generally, there was a significant increase in the prevalence of EIBF in the last two waves of NDHS (2013-2018)

Table 3: Poisson regression of factors associated with early initiation of breastfeeding among mothers in Nigeria, (NDHS 2003-2018)

Variable	2003-2018 Crude RR (95% CI)	2003 aRR (95% CI)	2008 aRR (95% CI)	2013 aRR (95% CI)	2018 aRR (95% CI)	2003-2018 aRR (95% CI)
<i>Control variable</i>						
NDHS 2003	Reference 1.0					Reference 1.0
NDHS 2008	1.19 (1.07-1.33)**					1.18 (1.07-1.31)**
NDHS 2013	1.12 (1.01-1.25)**					1.12 (1.01-1.23)**
NDHS 2018	1.39 (1.25-1.54)***					1.35 (1.22-1.29)***
<i>Current marital status</i>						
Never married	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Currently married	0.93 (0.83-1.05)	0.62 (0.45-0.84)**	1.00 (0.85-1.18)	1.16 (0.96-1.40)	0.99 (0.88-1.11)	0.92 (0.82-1.03)
Formerly married	1.07 (0.93-1.23)	0.81 (0.57-1.16)	1.08 (0.89-1.32)	1.18 (0.94-1.48)	1.04 (0.90-1.20)	0.99 (0.87-1.13)
<i>Mother's Age</i>						
15-19	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
20-24	1.21 (1.10-1.32)***	(0.73-1.38)	1.06 (0.95-1.19)	1.05 (0.93-1.19)	1.07 (0.96-1.20)	1.06 (0.97-1.16)
25-29	1.34 (1.22-1.47)***	1.02 (0.73-1.44)	1.13 (1.01-1.27)**	1.10 (0.96-1.25)	1.07 (0.95-1.19)	1.09 (0.99-1.19)*
30-34	1.35 (1.23-1.48)***	0.89 (0.62-1.28)	1.15 (1.01-1.30)**	1.11 (0.97-1.28)	1.08 (0.96-1.21)	1.07 (1.02-1.25)
35-39	1.42 (1.30-1.56)***	1.02 (0.68-1.52)	1.09 (0.95-1.25)	1.19 (1.03-1.38)**	1.12 (0.99-1.26)*	1.13 (1.02-1.25)**
40-44	1.32 (1.19-1.46)***	0.92 (0.57-1.48)	1.06 (0.89-1.28)	1.18 (1.00-1.38)**	1.08 (0.94-1.24)	1.08 (0.96-1.21)
45-49	1.28 (1.12-1.44)***	0.97 (0.55-1.73)	1.06 (0.89-1.28)	1.18 (0.97-1.44)*	1.05 (0.90-1.23)	1.06 (0.93-1.21)
<i>Occupation</i>						
Not working	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Unskilled	1.18 (0.99-1.40)*	1.10 (0.78-1.56)	1.17 (0.93-1.49)	1.00 (0.75-1.33)	0.94 (0.78-1.13)	1.02 (0.87-1.21)
Agricultural	1.24 (1.16-1.31)***	1.03 (0.80-1.32)	1.20 (1.10-1.32)***	0.94 (0.85-1.04)	1.05 (0.97-1.13)	1.04 (0.97-1.11)
Skilled	1.04 (1.00-1.09)*	1.04 (0.88-1.22)	1.08 (1.01-1.16)**	0.89 (0.83-0.94)***	0.91 (0.85-0.97)**	0.95 (0.91-0.99)**
Professional	1.41 (1.31-1.51)***	1.34 (0.99-1.81)*	1.14 (0.99-1.31)*	0.94 (0.83-1.06)	0.96 (0.87-1.05)	1.07 (0.99-1.15)
<i>Highest level of education</i>						
None	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Primary	1.27 (1.21-1.34)***	1.09 (0.91-1.300)	1.11 (1.03-1.19)**	1.04 (0.96-1.13)	1.00 (0.94-1.07)	1.05 (1.00-1.11)**
Secondary	1.35 (1.28-1.42)***	1.04 (0.84-1.28)	1.12 (1.03-1.22)**	1.05 (0.97-1.14)	1.02 (0.96-1.08)	1.06 (1.00-1.11)**
Tertiary	1.54 (1.44-1.64)***	1.36 (0.94-1.96)*	1.31 (1.13-1.51)***	1.08 (0.95-1.21)	1.05 (0.95-1.15)	1.15 (1.06-1.24)***
<i>Religion</i>						
Christians	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Islam	0.78 (0.74-0.81)***	0.94 (0.76-1.15)	0.93 (0.85-1.02)	1.07 (0.98-1.17)	1.07 (1.00-1.14)*	1.02 (0.97-1.08)

Variable	2003-2018 Crude RR (95% CI)	2003 aRR (95% CI)	2008 aRR (95% CI)	2013 aRR (95% CI)	2018 aRR (95% CI)	2003-2018 aRR (95% CI)
Others	0.93 (0.81-1.08)	1.34 (0.95-1.88)*	1.10 (0.94-1.29)	1.26 (1.01-1.58)**	0.59 (0.37-0.95)**	1.14 (1.06-1.24)*
Residence						
Urban	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Rural	0.81 (0.77-0.85)***	0.96 (0.77-1.21)	0.97 (0.88-1.07)	0.80 (0.72-0.88)***	0.95 (0.89-1.02)	0.91 (0.85-0.96)**
Region						
North Central	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
North East	0.58 (0.54-0.62)***	0.71 (0.54-0.91)**	0.45 (0.39-0.53)	0.95 (0.86-1.06)	0.51 (0.45-0.56)***	0.63 (0.59-0.68)***
North West	0.55 (0.52-0.59)***	0.73 (0.57-0.94)**	0.60 (0.53-0.69)	0.65 (0.59-0.73)***	0.58 (0.52-0.64)***	0.61 (0.57-0.66)***
South East	0.74 (0.69-0.81)***	1.01 (0.71-1.43)	0.54 (0.47-0.62)	0.68 (0.58-0.78)***	0.70 (0.64-0.77)***	0.68 (0.62-0.76)***
South South	0.88 (0.83-0.93)***	0.84 (0.68-1.02)*	0.75 (0.66-0.85)	0.93 (0.84-1.04)	0.97 (0.89-1.05)	0.88 (0.83-0.94)***
South West	0.70 (0.66-0.75)***	0.26 (0.20-0.34)***	0.53 (0.47-0.61)	0.55 (0.49-0.62)***	1.06 (0.98-1.15)	0.67 (0.63-0.72)***
Wealth quintiles						
Poorest	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Poorer	1.22 (1.14-1.30)***	1.18 (0.94-1.49)	1.15 (1.05-1.26)	1.17 (1.03-1.32)**	1.14 (1.04-1.23)**	1.16 (1.09-1.23)***
Middle	1.45 (1.36-1.55)***	1.35 (1.04-1.74)**	1.19 (1.07-1.32)	1.27 (1.10-1.45)**	1.29 (1.17-1.41)***	1.26 (1.17-1.35)***
Richer	1.56 (1.45-1.67)***	1.32 (0.95-1.82)*	1.20 (1.07-1.35)	1.38 (1.19-1.60)***	1.29 (1.17-1.42)***	1.30 (1.20-1.42)***
Richest	1.54 (1.43-1.65)***	1.23 (0.89-1.71)	1.09 (0.95-1.26)	1.36 (1.15-1.60)***	1.33 (1.20-1.48)***	1.28 (1.16-1.40)***
Exposure to mass media						
None	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Expose to at least a type	1.10 (1.06-1.14)***	0.95 (0.81-1.11)	1.00 (0.93-1.06)	0.99 (0.92-1.07)	0.87 (0.82-0.92)***	0.95 (0.91-0.99)**
Access to FP information						
Not heard about FP	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Access to at least a source	1.07 (1.03-1.11)**	1.02 (0.88-1.19)	0.98 (0.92-1.06)	(0.94-1.07)	1.03 (0.98-1.09)	1.00(0.91-1.04)
Parity						
1	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
2-3	1.17 (1.12-1.22)***	1.41 (1.15-1.73)**	1.09 (1.02-1.18)**	1.13 (1.05-1.21)**	1.09 (1.03-1.16)**	1.15 (1.10-1.20)***
4-5	1.18 (1.13-1.24)***	1.50 (1.23-1.84)***	1.12 (1.02-1.21)**	1.13 (1.04-1.23)**	1.16 (1.07-1.25)***	1.19 (1.13-1.26)***
≥6	1.08 (1.03-1.13)***	1.54 (1.18-2.02)**	1.12 (1.01-1.24)**	1.06 (0.95-1.19)	1.15 (1.05-1.26)**	1.17 (1.09-1.25)***
Wanted pregnancy						
Yes	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Later	1.02 (0.96-1.07)	0.93 (0.78-1.12)	0.96 (0.87-1.05)	0.91 (0.82-1.00)*	0.93 (0.87-0.99)**	0.91 (0.86-0.96)**
No more	1.13 (1.02-1.26)**	1.03 (0.80-1.31)	1.00 (0.90-1.11)	0.85 (0.73-0.98)**	0.92 (0.84-1.00)*	0.99 (0.90-1.09)

Variable	2003-2018 Crude RR (95% CI)	2003 aRR (95% CI)	2008 aRR (95% CI)	2013 aRR (95% CI)	2018 aRR (95% CI)	2003-2018 aRR (95% CI)
Type of delivery						
Normal	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Caesarian	0.64 (0.56-0.73)***	0.86 (0.61-1.23)	0.54 (0.43-0.67)***	0.48 (0.39-0.60)***	0.37 (0.31-0.44)***	0.52 (0.45-0.59)***
Baby size						
Large	0.97 (0.93-1.01)	0.84 (0.73-0.97)**	0.94 (0.88-1.00)*	0.97 (0.97-1.09)	1.03 (0.98-1.08)	0.98 (0.94-1.02)
Average	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Small	0.85 (0.81-0.90)***	0.90 (0.75-1.07)	1.01 (0.93-1.10)	0.94 (0.87-1.02)	0.88 (0.82-0.94)***	0.93 (0.89-0.98)**
Not reported	1.29 (1.12-1.49)***	0.99 (0.54-1.83)	1.53 (1.20-1.94)**	1.04 (0.76-1.42)	1.07 (0.93-1.22)	1.20 (1.06-1.36)**
Number of antenatal visits						
0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
1-3	1.19 (1.12-1.27)***	1.16 (0.80-1.67)	0.95 (0.82-1.09)	1.15 (0.94-1.40)	0.98 (0.84-1.16)	1.04 (0.94-1.16)
4-7	1.36 (1.29-1.44)***	1.14 (0.84-1.55)	0.98 (0.85-1.12)	1.19 (0.99-1.43)*	1.04 (0.89-1.22)	1.08 (0.98-1.19)
8+	1.26 (1.19-1.34)***	0.97 (0.71-1.32)	0.91 (0.79-1.05)	1.08 (0.90-1.30)	0.95 (0.81-1.11)	0.96 (0.87-1.06)
Place ANC sought						
Home/other homes	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Govt hospital	1.32 (1.26-1.40)***	0.99 (0.74-1.33)	1.04 (0.91-1.19)	0.94 (0.79-1.11)	1.10 (0.94-1.29)	1.02 (0.93-1.12)
Govt health centres/post	1.20 (1.13-1.26)***	0.74 (0.54-1.01)*	1.04 (0.91-1.20)	0.95 (0.80-1.13)	0.88 (0.76-1.02)	0.90 (0.81-0.98)**
Private hospital/clinic	1.25 (1.17-1.34)***	0.92 (0.68-1.26)	0.94 (0.81-1.09)	0.91 (0.76-1.09)	0.97 (0.84-1.13)	0.93 (0.84-1.03)
Place of delivery						
Home/other homes	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Govt hospital	1.39 (1.33-1.46)***	0.98 (0.71-1.35)	1.04 (0.91-1.19)	1.36 (1.19-1.54)***	1.00 (0.91-1.10)	1.10 (1.02-1.19)**
Govt health centres/post	1.40 (1.33-1.48)***	1.15 (0.81-1.61)	1.04 (0.91-1.20)	1.21 (1.05-1.40)**	1.21 (1.12-1.31)	1.19 (1.11-1.27)***
Private hospital/clinic	1.24 (1.16-1.32)***	1.16 (0.87-1.54)	0.94 (0.81-1.09)	1.17 (1.01-1.35)**	1.02 (0.93-1.12)	1.06 (0.98-1.15)
Delivery assistance						
Unskilled	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0	Reference 1.0
Skilled	1.35 (1.30-1.41)***	1.20 (0.91-1.59)	0.98 (0.85-1.12)	0.92 (0.81-1.04)	0.94 (0.94-1.10)	0.97 (0.97-1.12)

aRR – adjusted relative risk, ***p<0.001; **p<0.05; *p<0.10

Table 4: The Blinder-Oaxaca non-linear decomposition of factor associated with early initiation of breastfeeding by survey year (NDHS 2003, 2008, 2013 and 2018)

Results	2003-2008		2008-2013		2003-2018		2008-2018		2013-2018	
	Coefficient	%	Coefficient	P%	Coefficient	%	Coefficient	%	Coefficient	P%
Omega=1										
Characteristics	0.004*	6.79%	0.006***	-27.03%	0.012**	9.37%	-0.014***	-22.64%	-0.001	-1.54%
Coefficient	0.057***	93.21%	-0.029***	127.03%	0.111***	90.63%	0.076***	122.64%	0.0860***	101.54%

*p-value<0.01; p-value<0.05; p-value<0.1

across all the selected socio-demographic, obstetrics and access to media factors of mothers with exception of those that had caesarean delivery birth, from North-east region of the country and those that practiced other religions apart from Islam and Christianity. The factors that consistently influenced EIBF across the four waves of the study were parity, mode of delivery and region of residence in the country. There was a higher risk of EIBF among multiparous relative to primiparous and a lower risk of EIBF among women that had caesarean birth compared to those that had vaginal birth. There was also a significant regional variation in the risk of EIBF with the lowest risk in the Northern regions compared to the southern regions.

In the pooled analysis of data of the four NDHS waves, the significant factors that were positively associated with EIBF were age of 35-39 year, that had at least primary education, wealth quintiles category of poorer and above, multiparity and delivery in the public hospital. However, EIBF was negatively associated with mothers with the following characteristics: skilled occupation, exposure to media, decision to delay pregnancy, history of caesarean section during the last childbirth, having a small sized baby at birth and attended ANC at the public health centers or post.

Most of the factors that were found to be associated with the EIBF in this analysis had been previously reported in other African countries such Ethiopia, Zambia, Kenya, and many Economic of West African Countries^{10,11,15}. Notably, women with previous childbirths had high rate of EIBF consistently in the four waves of NDHS in this study had also been previously reported in other studies in Ethiopia, Saudi Arabia and other ECOWAS countries^{15,21}. The possible explanation is that women with previous childbirth experience would have acquired all the necessary skills that will facilitate initiation of breastfeeding apart from the repeated exposure to counselling on the benefit of EIBF in the ANC and postnatal clinic. However, caesarean birth has been reported in studies from different settings that it often delayed breastfeeding initiation after adjusting for other confounders such as age, parity and other obstetric factors^{15,22,23}. Caesarean section is sometimes associated with postoperative pain which usually make it uncomfortable for mothers to initiate breastfeeding timely. In some occasion, mothers do suffer

morbidities such postpartum haemorrhage and anaesthetic complications that make breastfeeding almost impossible immediately after childbirth²⁴.

Another interesting finding in this study is the significant regional variation of EIBF. It is surprising to note that women in the Northeast and part of Northwest had the lowest risk of EIBF compared to other regions. It is plausible that the observed relatively low EIBF in this region might be due to lack of adequate information on the health benefits, socio-cultural misconception of feeding babies with colostrum and preoccupation with other cultural norms to take care of the mother and newborn by the family members, particularly, when delivery is conducted at home. Several Nigerian studies had reported on the negative impact of culture or family or community rites against early breastfeeding before the baby is breastfed by the mother^{14,25-27}. Although the socio-cultural effects on maternal health had been widely reported in different Nigerian culture, a few studies had shown that these conservative beliefs were more rampant among mothers with no western education and living in the rural communities^{14,28,29}.

Over the years, Nigerian government with development partners and other stakeholders had invested in the promotion of baby friendly initiative^{30,31}. Many public health facilities – primary, secondary, and tertiary centers – were supposed to have integrated baby friendly initiative programmes into their services^{30,32}. Unfortunately, the implementation of this laudable initiative has not been optimally implemented due to lack of adequate manpower, disruption of healthcare services at the public facilities from health workers' strikes and poor incentives to sustain breastfeeding practices during maternity services^{32,33}.

It is important that findings in this analysis should be interpreted with caution. The study pooled data that were collected at different points in time with the assumption that participants had same understanding. The participants in each of the four waves of NDHS were different and there is a possibility that this might have accounted for the observed variations across the years. There is also the possibility of recall bias because mothers were asked questions about their last childbirth which could be up to five years. Despite these limitations, this study provided the largest nationally representative data the provided evidence on EIBF

by the nursing mothers in Nigeria. The study also provided information on drivers and barriers for different periods and as well as recurring factors that influence EIBF in the country.

In conclusion, this study showed that EIBF among nursing mothers in Nigeria is low in the past 15 years (2003-2018). Parity, mode of delivery and region of residence remained a recurring factor that impact on EIBF in the country. It is imperative that policy makers and healthcare providers design programme and interventions that will effectively profile potential mothers from the ANC and at postnatal clinic in order to fully prepare them for EIBF. In addition, it may also be beneficial to use support person or doula during and after childbirth or community volunteers and health workers to assist mothers to initiate breastfeeding timely^{34,35}. These efforts will assist government at both national and state levels to quickly progress towards the achievement of sustainable development goal target for efficient child nutrition and survival in Nigeria.

Ethical consideration

This was a secondary data analysis. The original DHS protocol was reviewed and approved by the National Health Research Ethics Committee of Nigeria (NHREC) and the ICF Institutional Review Board.

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