What Are the Individual, Household, and Community Factors Associated With Optimal Breastfeeding Practices in Three Selected West African Countries?

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Abstract

Optimal breastfeeding is rarely practiced among mothers across the three studied countries: Guinea, Nigeria, and Sierra Leone. The methodological approach used in this study is the first of its kind in the study area. It provides answers to the statistical association between individual, household, and community factors and optimal breastfeeding practices. The study adopted a cross-sectional research design. It employed secondary data. The study data were extracted from the Demographic Health Surveys in Guinea (2012 GDHS), Nigeria (2013 NDHS), and Sierra Leone (2013 SLDHS). Information was extracted from mothers (20–49 years) who had at least one child before the surveys. Optimal breastfeeding was coded into "1" if adhered to and "0" if otherwise. Multilevel mixed-effect logistic regression was used. It was found that optimal breastfeeding was infrequently practiced in Guinea (5.3%), Nigeria (8.6%), and Sierra Leone (14.0%). The fixed-effects results showed that optimal breastfeeding was significantly associated with individual, household, and community-level factors ($p < .05$). The random effect results showed that community factors accounted for 40.4%, 20.3%, and 20.7% variation in adherence to optimal breastfeeding for mothers in Guinea, Nigeria, and Sierra Leone, respectively. The study concluded that mothers in the study area rarely practice optimal breastfeeding.

Keywords

Community-level; household; individual; optimal breastfeeding; West Africa

Introduction

Breast milk has been shown to contain better nutrients than formulas. Moreover, breast milk enhances a baby's immunity, growth, and development (Arora et al., 2017). Optimal breastfeeding protected women against ovarian cancer, improved their health, and promoted the survival of the infant child (World Health Organization, 2014). Optimal breastfeeding safeguards infants against allergies and enhances closeness between a mother and her baby (UNICEF, 2021; World Health Organization, 2014). According to the World Health Organization (WHO), optimal breastfeeding is defined as breastfeeding practice that includes initiation of breastfeeding within 1 hour after birth; regular, on-demand feeding (including night feeds), and exclusive breastfeeding until the infant is about 6 months of age, follow with a transitional introduction to complementary breastfeeding for at least 6 to 23 months (World Health Organization, 2018).

The World Health Organization revealed that many women in the West African sub-region were at greater risk of developing ovarian cancer, mainly due to their non-adherence to optimal breastfeeding practices. Similarly, under-five vulnerabilities to respiratory and non-communicable diseases were highest for children born in West Africa than for children born in other developing regions (World Health Organization, 2014).

In fact, multiple studies maintained that an infant born in the sub-Saharan African region stood the highest risk of dying before age five compared to a newborn in other areas of the world (Bankole, 2017; Horwood et al., 2018; Mogre et al., 2016; Rees et al., 2016). This high risk of early childhood death in the sub-Saharan African region has been attributed to the non-adherent mothers to optimal breastfeeding as recommended by the World Health Organization. Consequently, infants born in the sub-Saharan African region were susceptible to developing physiological and cognitive impairments, weak immunity, early childhood morbidities, or dying before age five.

Several contemporary studies have examined breastfeeding practices in West Africa and sub-Saharan Africa as a whole (Asfaw et al., 2015; Bankole & Adetutu, 2015; Cresswell et al., 2017; Genetue et al., 2016; Hashim et al., 2016; Horii et al., 2017; Mogre et al., 2016; Rees et al., 2016). Nevertheless, these studies were more concerned about the possible predictors of exclusive breastfeeding, duration of breastfeeding, and timing of breastfeeding initiation as a unit, and this was measured at a point rather than exploring the extent to which optimal breastfeeding practice was being practiced or adhered to by mothers in the sub-region of West Africa. The methodological approach adopted in this study provided a clearer picture of underlying correlates that predetermine the choice of the generally practiced breastfeeding patterns among mothers in the study area.

Inconsequential attention has been directed towards exploring the implications for the non-adherence of mothers to optimal breastfeeding practice in the sub-Saharan African region. As a result, the low adherence rate to optimal breastfeeding by mothers in West Africa was identified as one of the factors responsible for the annual death of more than 8 million under-five children across all world regions (UNICEF, 2021). Therefore, this study is significant for many reasons. First, this study is vital to promoting infant, young child, and maternal health. Moreover, the outcome of this study would serve as a clear call for the formulation and implementation of

policies that promote and support cultural practices which would enhance mothers' adherence to optimal breastfeeding practices in the West African region.

In relation to the identified gap in the literature, the study addressed this limitation by describing breastfeeding patterns. Therefore, the study validated and contradicted findings from previous contemporary studies where mothers' sociodemographic and economic characteristics were identified as the predisposing predictors of breastfeeding practices among women in sub-Saharan African countries. The methodological approach adopted in this study was the first across countries in West Africa. Specifically, the multilevel analytic method that was used was the first among previous contemporary studies focusing on the predictors of patterns or choices of breastfeeding practices among mothers in West Africa. Therefore, the study examined the contextual predictors of optimal breastfeeding practices among mothers in West Africa by asking whether individual-, household-, and community-level factors are predictors of optimal breastfeeding among mothers of reproductive age in some selected West African countries. Nigeria, Sierra Leone, and Guinea were selected for this study. Nigeria, Sierra Leone, and Guinea were selected for this analysis as these three countries have the least adherence rates to exclusive breastfeeding and timing of breastfeeding initiations in the most recently conducted Demographic Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) across countries in West Africa (Population Reference Bureau, 2018; UNICEF, 2021; World Health Organization, 2014).

Theoretical focus: Theory of allocation of time

In the context of this study, the theory provided a conceptual background that suggested that a working-class woman would trade off either housework or paid jobs to overcome her household budget constraint. According to Heckman (2015), in discussing Becker's theory of allocating resources within a household, trading time for money to meet the household demands was indispensable. Becker argued that childcare was likely to be cost-intensive, taking up a lot of time that could have produced income, so this partly explained the low-income elasticity of the demand for children. Evidently, most establishments rarely provided places where a nursing mother could have her infant breastfed while at work. In line with this assertion, Ekanem et al. (2012), Haroon et al. (2013), and Rollins and Doherty (2019) maintained that hardly would you find organizations that believed it was economically meaningful to grant their female employees a six-month maternity leave that the World Health Organization recommended promoting exclusive breastfeeding of an infant during the first six months of birth.

Therefore, due to the non-existence of six-month maternity leave for women after childbirth, many young children were denied exclusive breastfeeding by their working-class mothers. In line with these workplace hindrances, several studies concluded that many women were left with no choice but to settle for complementary breastfeeding since they were not prepared to lose their means of livelihood (Fjeld et al., 2008; McInnes et al., 2001; Mututho, 2013). As a result, a breastfeeding-friendly working environment and the legalization of compulsory six-month maternity leave for women who had just given birth would enhance optimal breastfeeding among working-class women in the formal setting and contribute to the growth of the economy. Hence, the theory of time allocation is considered appropriate for this study.

Methods

Research design

This study adopted a cross-sectional design. Secondary data were extracted from the 2012 Guinea Demographic and Health Survey [GDHS] (National Institute of Statistics [Guinea] & ICF International, 2013), the 2013 Nigeria Demographic and Health Survey [NDHS] (National Population Commission (NPC) [Nigeria] & ICF International, 2014), and the 2013 Sierra Leone Demographic and Health Survey [SLDHS], (Statistics Sierra Leone & ICF International, 2014) respectively. The reasons for adopting a cross-sectional design were to collect large amounts of quantitative data at a single point in time and provide information about the state of things in the current population. Therefore, the study was designed to investigate the interactional effects of individual-level, community-level, and household-level factors on the practice of optimal breastfeeding among mothers in the study area.

Setting

The Nigeria Demographic Health Survey was conducted by the National Population Commission in 2013 across the country's 36 States, including Federal Capital Territory, Abuja. For Guinea, the Guinea Demographic Health Survey was conducted in 2012 across the country's administrative regions of Conakry, Boké, Faranah, Kankan, Kindia, Labé, Mamou, and N'Zérékoré by the Guinea National Institute of Statistics. And for Sierra Leone, the Demographic Health Survey was conducted in 2013 across the country's 14 administrative districts, including the national and regional estimates by the Statistics Sierra Leone.

Sample

The multistage sampling design was employed for this study. Three countries with the lowest exclusive breastfeeding adherence rate, least adherence rate to the initiation of breastfeeding within 1 hour after childbirth, and the lowest adherence rate a breastfeeding duration of 20–23 months before weaning the child. The study analyzed responses from 3,082 (Guinea), 12,180 (Nigeria), and 5,008 (Sierra Leone) women of reproductive age (20–49 years) who gave birth to at least a live birth in the last five years preceding the surveys. Women below 20 years of age were not included in the study. These women were excluded from the study to address birth implications that hinder them from putting their babies to breast milk immediately after birth due to their tender age at birth. Women who were pregnant and those that gave birth two months preceding the surveys were dropped from the study. The eligible sample sizes from the three women recode DHS datasets were appropriately weighted.

Measurement of research variables

The outcome variable of the study was breastfeeding practice. It was captured by optimal and sub-optimal breastfeeding. The breastfeeding patterns were classified into exclusive

breastfeeding, time of breastfeeding initiation, partial breastfeeding, and complementary breastfeeding. The breastfeeding duration indicator was categorized into "1" if < 6 months, "2" if ≥ 6 months ≤ 23 months (minimum duration of breastfeeding as recommended by UNICEF/WHO), and "3" if ≥ 24 months (acceptable duration of breastfeeding as recommended by UNICEF/WHO). Exclusive breastfeeding was generated from the introduction of pre-lacteal foods and breastfeeding duration ≥ 6 months ≤ 23. Breastfeeding practices were categorized into two: if a child was exclusively breastfed for 6 months, breastfed for > 6 months ≤ 23 months, and given breast milk immediately after birth (< 1 hour), it was captured as optimal breastfeeding, and it was categorized as "1" or "0 "otherwise. The term "exclusive breastfeeding" means that the infant was fed with breast milk expressed in addition to the breastfeeding from the mother or wet nurse and might be supplemented with drops, syrups (e.g., vitamins, minerals, medicine), except for any other liquid or semi foods (UNICEF, 2021). Hence, the term "optimal breastfeeding" as conceptualized includes initiation of breastfeeding within 1 hour after birth, regular on-demand feeding (including night feeds), and exclusive breastfeeding until the infant was about 6 months of age, followed by a transitional introduction to complementary breastfeeding for at least 6 to 23 months.

The explanatory variables for this study were individual-level, household, and community-level factors. The individual-level and household factors of interest included: maternal age, maternal education, marital status, maternal nutrition, body mass index, maternal employment status, parity, religious affiliation, and birthplace. The selected community-level factors included: place of residence, community level of education, community level of poverty, community level of media saturation, community antenatal care, and community hospital delivery. All variables at the community level were generated from individual-level and health-related variables except for place of residence and media saturation.

Using Stata software, individual-level variables were aggregated at the level of the primary sampling unit to create the community-level variables of interest. Based on facts emanating from empirical studies, it was found imperative to generate variables at the community level since it is challenging to discard the possible influence of culture and sociological factors on the attitude or perception of women towards breastfeeding practices across communities. Hence, the primary aim of this study was to validate or contradict this empirically established assertion.

Data management

Quantitative data were extracted from the 2013 NDHS, 2013 SLDHS, and 2012 EDSG individual recoded. Quality checks for data were carried out to minimize errors. The identified data of the three datasets were checked and compared to establish compatibility. Also, the elicited sample size from each recoded data set was weighted appropriately, cleaned, and analyzed using Stata version 14.

Data analysis

Statistical analyses were carried out at the descriptive and multivariable levels using Stata version 14. The outcome variable (breastfeeding practices) was dichotomized into "1" if optimal

breastfeeding was practiced by the mother and "0" if otherwise (suboptimal breastfeeding was practiced). The multilevel mixed-logistic regression was used to determine the association between the explanatory variables (individual-, household-, and community-level factors) and the response variable

Hence, the fixed, as well as the random statistical effects were carried out in this study. While the odd ratios were measured by introducing the fixed statistical effects, the intra-class correlation coefficient (ICC) and the log-likelihood outcomes were measured by introducing the random statistical effects. The multilevel approach was considered appropriate in this study since the aim was to check for clustering in the sample design. The two-level model is specified below:

$$y_{ij} = \beta_0 X_{0ij} + \beta_1 X_{1ij} + U_j X_{0ij} + \xi_{ij}$$

Where

y_{ij} was breastfeeding practice of ith woman in the jth community
β_0, β_1 were the fixed effects; Uj, ξ_{ij} were the random effects

Three (3) models (Empty Model, Models 1 & 2) were developed through the use of the Stata xtmelogit command (StataCorp, 2011). In order to determine the mixed effects logistic regression, an empty model was developed. The empty model revealed the extent of discrepancy in the response variable (breastfeeding practice) while the covariates were constant. Additional models with the introduction of the independent variables were fixed after that—Model 1 comprised individual and household variables, while Model 2 included the generated community variables. Also, the variance inflation factor (VIF) was computed to determine the degree of multi-collinearity for each of the identified independent and intervening variables against another in the regression model. Variables with VIF > 10 were dropped from multivariate models. This aspect was built on the postulation that variables with VIF > 10 were typical of a severe degree of multi-collinearity (Akinwande et al., 2015; O'Brien, 2007). Also, the ICC was calculated as follows:

$$\frac{\sigma_{ui}^2}{\sigma_{ui}^2 + [n^2/3]}$$

Where σ_{ui}^2 was the variance at the community level (Merlo et al., 2016).

The study's confidence level was fixed at 95%. Hence, if discovered to be < .05, the results were significantly linked.

Results

The descriptive results of the study, as presented in Table 1, showed that about two-thirds (66.5%) of mothers in Sierra Leone did not breastfeed their babies for up to 6 months. Also, 61.3% of mothers in Nigeria and about 60% in Guinea failed to breastfeed their babies for 6 months before weaning. Results by the time of initiation of breastfeeding showed that a significant proportion

of mothers in Guinea (81.6%) and Nigeria (64.9%) delayed in putting their babies to breast milk within an hour after birth, while about 54% of mothers in Sierra Leone practiced early initiation of breastfeeding. In terms of exclusive breastfeeding, less than one-third of the mothers in Nigeria (24.6%), Sierra Leone (23.5%), and Guinea (30.6%) adhered to it. The results further showed that less than 10% of mothers in Guinea (5.3%) and Nigeria (8.6%) practiced optimal breastfeeding, while less than 15% of mothers in Sierra Leone adhered to it. It was, therefore, evident that optimal breastfeeding was rarely practiced among mothers in West Africa. Evidently, only 1 in every 5 mothers adhered to optimal breastfeeding across the three countries.

Table 1: Percentage Distribution of Respondents by Patterns of Breastfeeding Practices in Three Selected West African Countries

Variables	Guinea n = 3,082	Nigeria n = 12,180	Sierra Leone n = 5,008
Pattern of Breastfeeding	**Frequency (%)**	**Frequency (%)**	**Frequency (%)**
Duration of breastfeeding			
< 6 months	1,823 (59.2)	7,466 (61.3)	3,329 (66.5)
6–23 months (minimum duration)	1,062 (34.5)	4,413 (36.2)	1,485 (29.7)
≥ 24 months (acceptable duration)	197 (6.4)	301 (2.5)	193 (3.9)
Time of Initiation of breastfeeding			
< 1 hour (early initiation)	568 (18.4)	4,279 (35.1)	2,688 (53.7)
≥ 1 hour (late initiation)	2,514 (81.6)	7,901 (64.9)	2,319 (46.3)
Exclusive breastfeeding			
Practiced (exclusive)	944 (30.6)	2,999 (24.6)	1,178 (23.5)
Not practiced (non-exclusive)	2,138 (69.4)	9,181 (75.4)	3,829 (76.5)
Optimal breastfeeding			
Practiced (optimal)	164 (5.3)	1,050 (8.6)	703 (14.0)
Not practiced (sub-optimal)	2,918 (94.7)	11,130 (91.4)	4,305 (86.0)

Note: Author's work (Data generated from 2012 GDHS, 2013 NDHS, and 2013 SLDHS)

As presented in Table 2, the results show that the proportion of mothers who practiced optimal breastfeeding in the three countries decreased as these mothers grew older. For instance, while the proportion of mothers in the 20–29 age bracket who practiced optimal breastfeeding in Nigeria, Guinea, and Sierra Leone was observed to be 54.5%, 50.7%, and 54.7%, respectively, a relatively lower proportion of mothers within the age bracket of 40–49 years in Nigeria (8.7%), Sierra Leone (8.9%), and Guinea (12.6%) practiced optimal breastfeeding. The chi-square (χ^2) results established the existence of a significant statistical relationship between age and the practice of optimal breastfeeding among mothers in Guinea ($\chi^2 = 8.53$, $p = .014$) and Nigeria ($\chi^2 = 37.62$, $p = .000$). The results were an indication that age influenced the decision of mothers in Guinea and Nigeria to practice optimal breastfeeding as recommended.

Results by the level of education and optimal breastfeeding practice in the three countries followed the same pattern. The results showed an inverse relationship between educational level and optimal breastfeeding practice among mothers in Nigeria, Sierra Leone, and Guinea. For

instance, while 78.8%, 73.3%, and 44.5% of mothers with no informal education adhered to optimal breastfeeding in Guinea, Sierra Leone, and Nigeria, a relatively lower proportion of mothers with of with post-secondary qualifications in Guinea (1.3%), Sierra Leone (0.9%), and Nigeria (6.9%) practiced optimal breastfeeding, respectively. Results of the chi-square analysis show a significant statistical relationship between the level of education and the practice of optimal breastfeeding among mothers in Sierra Leone ($\chi^2 = 12.82$, $p = .005$). This result implied that the level of educational attainment of a mother in Sierra Leone had a significant influence on her decision to practice optimal breastfeeding or not.

In addition, the results as presented in Table 2 showed that optimal breastfeeding was practiced mainly by mothers who were currently married. For instance, 96.7%, 92.3%, and 85.8% of mothers in Guinea, Nigeria, and Sierra Leone that were currently married claimed that they adhered to the practice of optimal breastfeeding. Likewise, the chi-square results showed a significant relationship between marital status and optimal breastfeeding practice among mothers in Nigeria ($\chi^2 = 10.38$, $p = .006$) and Sierra Leone ($\chi^2 = 9.49$, $p = .009$). Thus, it was evident from the results that the decision of mothers to adhere to optimal breastfeeding practice in the three countries was influenced by their marital status.

Table 2: Relationship Between Mothers' Sociodemographic Characteristics and Optimal Breastfeeding

Variable	Guinea		Nigeria		Sierra Leone	
	n = 164	n = 2,918	n = 1,050	n =11,130	n = 703	n = 4,305
Individual-Level Factor	**Optimum %**	**Suboptimum %**	**Optimum %**	**Suboptimum %**	**Optimum %**	**Suboptimum %**
Age						
20–29 years	50.7	50.3	54.5	46.0	54.5	49.3
30–39 years	36.7	44.4	36.8	39.6	36.6	38.8
40–49 years	12.6	5.3	8.7	14.5	8.9	11.9
Mean age	29.9 years		30.6 years		30.2 years	
Chi-square	χ^2 (2) = 8.53, p = .014*		χ^2 (2) = 37.62, p = .000***		χ^2 (2) = 8.63, p = .013*	
Educational level						
No formal education	78.8	78.4	44.5	43.2	73.3	67.2
Primary	11.9	11.1	20.6	21.1	12.6	13.5
Secondary	8.0	9.0	28.0	28.1	13.2	17.5
Post-secondary	1.3	1.6	6.9	7.5	0.9	1.8
Chi-square	χ^2 (3) = 0.33, p = .995		χ^2 (3) = 1.03, p = .793		χ^2 (3) = 12.82, p = .005**	
Marital status						
Never married	1.3	4.0	1.5	2.4	5.9	9.2
Currently married	96.7	92.2	96.2	93.7	90.0	85.8
Previously married	2.0	3.8	2.3	3.9	4.1	5.0
Chi-square	χ^2 (2) = 4.27, p = .118		χ^2 (2) = 10.38, p = .006**		χ^2 (2) = 9.49, p = .009**	
Parity						
< 3 children	95.4	96.0	91.5	92.1	95.6	95.2
≥ 3 children	4.6	4.0	8.5	7.9	4.4	4.8

Variable	Guinea		Nigeria		Sierra Leone	
	n = 164	n = 2,918	n = 1,050	n =11,130	n = 703	n = 4,305
Individual-Level Factor	**Optimum %**	**Suboptimum %**	**Optimum %**	**Suboptimum %**	**Optimum %**	**Suboptimum %**
Mean parity in the last 5 years	1.5		1.6		1.4	
Chi-square	χ^2 (1) = 0.164, p = .686		χ^2 (1) = 0.487, p = .485		χ^2 (1) = 0.258, p = .611	
Micronutrient supplement intake						
None	47.0	50.5	55.0	54.8	5.8	5.8
Inadequate	45.7	43.0	40.3	39.8	67.3	62.1
Adequate	7.3	6.5	4.8	5.4	26.9	32.2
Chi-square	χ^2 (2) = 0.733, p = .693		χ^2 (2) = 0.701, p = .704		χ^2 (2) = 0.798, p = .018*	
Body mass index						
Underweight	6.9	11.7	10.2	10.3	10.4	10.6
Normal	81.9	69.2	65.6	63.9	75.3	71.5
Overweight	11.1	19.1	24.2	25.8	14.3	18.0
Chi-square	χ^2 (2) = 5.29, p = .071		χ^2 (2) = 1.34, p = .512		χ^2 (2) = 3.12, p = .210	
Employment status						
Employed	78.8	82.2	70.6	74.1	83.0	82.1
Unemployed	21.2	17.8	29.4	25.9	17.0	17.9
Chi-square	χ^2 (1) = 1.098, p = .295		χ^2 (1) = 5.60, p = .018*		χ^2 (1) = 0.35, p = .551	

*Notes: *p < .05, **p < .01, ***p < .001, p > .05 (not significant)*

As presented in Table 3, mothers in the 30–39 age group in Guinea were 172% more likely to practice optimal breastfeeding than mothers in the 20–29 age group (OR = 2.17, 95% CI [1.14, 4.15]). Results for Nigeria showed that mothers in the 30–39 and 40–49 age groups were 25.9% (OR = 0.74, 95% CI [0.614, 0.894]) and 56.2% (OR = 0.44, 95% CI [0.32, 0.60]) less likely to practice optimal breastfeeding than mothers in the 20–29 age group. Consistently, results for Sierra Leone showed that mothers in the 30–39 and 40–49 age groups were 49.8% (OR = 0.50, 95% CI [0.38, 0.66]) and 59.9% (OR = 0.40, 95% CI [0.26, 0.63]) less likely to practice optimal breastfeeding than mothers in the 20–29 years age group. Based on the evidence presented in Table 2, it was logical to conclude that age was a determinant of mothers' adherence to optimal breastfeeding in Nigeria, Sierra Leone, and Guinea, respectively (p < .05). Thus, the age of mothers influenced the decision to practice optimal breastfeeding in all three countries.

As presented in Table 3, the results show that mothers with high school education in Sierra Leone were 95.8% (OR = 0.04, 95% CI [0.48, 0.99]) less likely to practice optimal breastfeeding than mothers with no informal education, while mothers in Nigeria from the richer household wealth quintile were 15.9% (OR = 0.84, 95% CI [1.02, 2.36]) less likely to practice optimal breastfeeding practice than their contemporaries who were from the poorest wealth quintile household. It was evident from the results showed that mothers' adherence to optimal breastfeeding practice in Sierra Leone was significantly associated with the level of educational attainment (p < .05). Based on the evidence from the study, mothers' adherence to optimal breastfeeding in Nigeria was established to be significantly associated with household wealth (p < .05).

Table 3: Binary Logistic Odds Ratio for Fixed Effects Related to Optimal Breastfeeding Practices Among Mothers in Three Selected West African Countries

	GUINEA			NIGERIA			SIERRA LEONE		
Characteristic	**Odds ratio**	*p* value	**95% CI**	**Odds ratio**	*p* value	**95% CI**	**Odds ratio**	*p* value	**95% CI**
Age of Respondent									
20–29 years [ref]	**1.000**			**1.000**			**1.000**		
30–39 years	2.172	0.019*	1.136–4.152	0.741	0.002**	0.614–0.894	0.502	0.000***	0.383–0.658
40–49 years	0.791	0.662	0.277–2.261	0.438	0.000***	0.320–0.600	0.401	0.000***	0.255–0.633
Educational level									
No formal education ref	**1.000**			**1.000**			**1.000**		
Primary	1.327	0.65	0.566–3.113	1.063	0.640	0.823–1.372	0.901	0.578	0.624–1.301
Secondary	1.396	0.67	0.528–3.692	0.993	0.958	0.762–1.293	0.682	0.042*	0.472–0.987
Post–secondary	1.290	0.22	0.130–12.769	0.995	0.981	0.669–1.480	0.835	0.736	0.292–2.387
Household wealth [ref]									
Poorest [ref]	**1.000**			**1.000**			**1.000**		
Poorer	1.018	0.965	0.455–2.280	1.185	0.312	0.853–1.646	0.877	0.548	0.571–1.346
Middle	0.543	0.213	0.208–1.420	1.388	0.090	0.785–1.536	0.982	0.936	0.537–1.515
Richer	0.860	0.745	0.346–2.137	1.550	0.841*	1.018–2.359	0.699	0.146	0.432–1.133
Richest	0.613	0.465	0.165–2.280	1.388	0.501	0.727–1.918	0.765	0.394	0.413–1.417
Micronutrient intake									
None [ref]	**1.000**			**1.000**			**1.000**		
Inadequate	0.986	0.960	0.559–1.738	1.059	0.558	0.873–1.285	1.561	0.155	0.845–2.883
Adequate	0.592	0.441	0.156–2.245	0.934	0.735	0.628–1.389	1.239	0.514	0.651–2.356
Body mass index									
Underweight [ref]	**1.000**			**1.000**			**1.000**		
Normal	2.006	0.184	0.718–5.598	1.092	0.543	0.822–1.452	0.892	0.578	0.596–1.335
Overweight	0.834	0.778	0.238–2.929	1.043	0.800	0.752–1.447	0.878	0.604	0.535–1.438
Parity									
< 3 children [ref]	**1.000**			**1.000**			**1.000**		
≥ 3 children	1.566	0.490	0.448–5.339	1.127	0.439	0.832–1.527	0.681	0.236	0.360–1.286
Marital status [ref]									
Never married	**1.000**			**1.000**			**1.000**		
Currently married	4.633	0.062	0.925–23.196	1.637	0.124	0.873–3.071	1.485	0.029*	1.042–2.117
Previously married	1.807	0.579	0.223–14.643	0.839	0.666	0.379–1,849	1.216	0.476	0.711–2.081
Employment status									

	GUINEA			NIGERIA			SIERRA LEONE		
Characteristic	**Odds ratio**	*p* value	**95% CI**	**Odds ratio**	*p* value	**95% CI**	**Odds ratio**	*p* value	**95% CI**
Employed [ref]	**1.000**			**1.000**			**1.000**		
Unemployed	1.228	0.440	0.729–2.066	0.120	0.025*	1.028–1.502	1.019	0.875	0.804–1.292
Place of Birth delivery									
Home [ref]	**1.000**			**1.000**			**1.000**		
Health Facilities	0.991	0.979	0.496–1.978	1.342	0.032*	1.026–1.755	1.109	0.531	0.803–1.530

*Notes: ref (reference category), * p < .05, **p < .01, ***p < .001, p > .05 (not significant)*

Results by marital status showed that currently married mothers in Sierra Leone were 97.1% (OR = 0.03, 95% CI [1.04, 2.12]) less likely to practice optimal breastfeeding than mothers who were never married. The results further showed a significant statistical association between marital status and optimal breastfeeding practice in Sierra Leone (p < .05). Therefore, the decision of mothers to practice optimal breastfeeding in Sierra Leone was found to be significantly influenced by their marital status. The results by employment status showed that unemployed mothers in Nigeria were 97.5% (OR = 0.03, 95% CI [1.03, 1.50]) less likely to practice optimal breastfeeding than gainfully employed mothers. The results further showed a significant statistical association between employment status and optimal breastfeeding practice among mothers in Nigeria (p < .05). Equally, results by place of child delivery showed that mothers who gave birth to their babies in healthcare facilities were 96.8% (OR = 1.03, 1.76) less likely to practice optimal breastfeeding than those who gave birth to their babies at home. The results further showed a significant statistical association between the place of childbirth and the practice of optimal breastfeeding among mothers in Nigeria (p < .05). Therefore, the results indicated that mothers' adherence to optimal breastfeeding practices in Nigeria was a function of their utilization of healthcare facilities.

As presented in Table 4 below, mothers who were residents of rural settlements in Nigeria were 70% (OR = -0.30, 95% CI [-0.48, -0.13]) less likely to practice optimal breastfeeding than mothers living in the urban communities. Correspondingly, mothers in Sierra Leone who were living in rural communities of Sierra Leone were found to be 41.1% (OR = 59, 95% CI [0.32, 0.86]) less likely to adhere to optimal breastfeeding than their counterparts who were residents of urban settlements. Hence, the results showed that community type statistically influenced optimal breastfeeding. This finding was an indication that the type of settlement where a mother lives in Nigeria or Sierra Leone influenced their decision to practice optimal breastfeeding or not (p < .05). The results by community poverty level showed that mothers who fell within the high poverty quintile in the community in Nigeria (OR = 0.45, 95% CI [0.21, 0.69]) and Sierra Leone (OR = -0.49, 95% CI [-0.83, -0.14]) were 55.1% and 51.3% less likely to practice optimal breastfeeding than mothers who were within the low poverty quintile in their respective communities. The results indicated a significant statistical association between community level of poverty and the practice of optimal breastfeeding among mothers in Nigeria and Sierra Leone (p < .05).

Results by women's level of education at the community level showed that mothers with a high level of education in Nigeria and Sierra Leone were found to be 66.9% (OR = 0.33, 95% CI [0.09, 0.57]) and 56.4% (OR = -0.44, 95% CI [-0.75, -0.12]) less likely to practice optimal breastfeeding than mothers with a low level of education at the community level, respectively. Thus, Nigeria and Sierra Leone showed a significant statistical association between optimal breastfeeding practice and community level of women's education (p < .05). Results by women's level of utilization of healthcare facilities during childbirth at the community level for Sierra Leone showed that mothers with a high level of utilization of healthcare facilities during child delivery were 48% (OR = -0.52, 95% CI [-0.84, -0.19]) less likely to practice optimal breastfeeding than mothers with a low level of utilization of healthcare facilities during child delivery. Thus, the results for Sierra Leone showed that there was a significant statistical association between the practice of optimum breastfeeding and the community level of women's utilization of healthcare facilities during childbirth (p < .05).

The "empty model" results for Guinea showed that community-level factors accounted for 40.4% of the variation in adherence to optimal breastfeeding practice for mothers. For Nigeria and Sierra Leone, the "empty model" results showed that the community-level factors accounted for 20.3% and 21.4% of the variation in adherence to optimal breastfeeding practices for mothers in the two countries, respectively. The log-likelihood test with unpredictable values of the chi-square statistic confirmed the goodness of fit for all the fitted models ($p < .05$). Specifically, for Guinea, the results showed that community-level factors accounted for 24.1% variation in adherence to optimal breastfeeding practice for mothers in Model 1, while it accounted for 38.2% variation in adherence to optimal breastfeeding practice in Model 2. For Nigeria, the community-level factors accounted for 20.3% and 18.37% variation in adherence to optimal breastfeeding practice for mothers in Model 1 and Model 2. In the same way, for Sierra Leone, the community-level factors accounted for 20.7%, 17.3%, and 20.7% variation in adherence to optimal breastfeeding practice as contained in Models 1 and 2 separately. Hence, the study's outcomes showed that community-level factors were predictors ($p < .05$) of optimal breastfeeding practice in the three countries. Furthermore, the log-likelihood test with varying figures of the chi-square statistic established the goodness of fit of Model 1 and Model 2 ($p < .05$).

Table 4: Multilevel Logistic Regression Showing Fixed and Random Effects Related to Optimal Breastfeeding Practices for Mothers in Selected West African Countries

Characteristic	Guinea		Nigeria		Sierra Leone	
	Coefficient	**95% CI**	**Coefficient**	**95% CI**	**Coefficient**	**95% CI**
Fixed Effect Result (Controlling for Individual-Level Factors)						
Community type						
Urban [ref]	**1.000**		**1.000**		**1.000**	
Rural	0.170	-0.35–0.69	-0.300**	-0.48–-0.13	0.589***	0.32–0.86
Community level of poverty concentration						
Low [ref]	**1.000**		**1.000**		**1.000**	
Medium	-0.340	-0.93–0.25	0.217	-0.03–0.47	-0.009	-0.33–0.32
High	0.204	0.35–0.76	0.449***	0.21–0.69	-0.487**	-0.83–-0.14
Community level of women's education						
Low [ref]	**1.000**		**1.000**		**1.000**	
Medium	0.194	-0.40–0.79	0.136	-0.11–0.38	0.115	-0.21–0.44
High	0.315	-0.28–0.91	0.331**	0.09–0.57	-0.436**	-0.75–-0.12
Community level of women who delivered their babies in health facilities						
Low [ref]	**1.000**		**1.000**		**1.000**	
Medium	0.262	-0.35–0.87	0.032	-0.24–0.30	-0.633***	-0.97–-0.30
High	0.427	-0.17–1.02	0.074	-0.18–0.33	-0.520**	-0.84–-0.19
Community level of antenatal care visit						
Low [ref]	**1.000**		**1.000**		**1.000**	
Medium	0.653*	0.07–1.23	0.067	-0.22–0.36	0.203	-0.19–0.59
High	0.511	-0.09–1.11	0.242	-0.04–0.53	0.170	-0.21–0.55
Community level of media saturation						
Low [ref]	**1.000**		**1.000**		**1.000**	
Medium	-0.065	-0.69–0.56	-0.095	-0.34–0.15	-0.321	-0.65–0.12
High	0.142	-0.43–0.71	0.116	-0.12–0.36	-0.212	-0.54–0.11

Random Effect Result

	Guinea			Nigeria			Sierra Leone		
Parameter	**Empty Model**	**Model 1**	**Model 2**	**Empty Model**	**Model 1**	**Model 2**	**Empty Model**	**Model 1**	**Model 2**
Random Effect									
Community-level variance (SE)	2.234 (.77)	1.047 (.77)	2.034 (.72)	0.836 (.14)	0.838 (.17)	0.737 (.14)	0.897 (.14)	0.858 (.20)	0.690 (.12)
ICC (%)	40.4	24.1	38.2	20.3	20.3	18.3	21.4	20.7	17.3
Log-likelihood	-575.4	-279.2	-571.8	-3398.4	-3372.0	-3381.6	-1958.3	-1002.3	-1935.6
Model Fitness									
Log-likelihood test	58.9***	5.05	48.9**	150.87***	138.9**	123.1**	157.7***	49.8**	106.1**
AIC	1,156.7	588.5	1,169.6	6,802.8	6,674.1	6,791.1	3,922.6	2,034.6	3,899.2

*Notes: * $p < .05$, ** $p < .01$, *** $p < .001$, $p > .05$ (not significant); ref (reference category).*

Discussion

This study describes the variation in breastfeeding patterns among mothers of reproductive age in Guinea, Nigeria, and Sierra Leone. Findings emanating from the duration of breastfeeding practice across the three selected countries show that a larger proportion of mothers in all the study's locations breastfeed their infants for less than 6 months. In Guinea, about one-third of the mothers breastfeed their babies within the minimum of 5 to 23 months recommended by the WHO and UNICEF.

Evidence from the study reveals that the proportion of mothers in Nigeria and Sierra Leone who breastfeed their babies for 6 to 23 months are 61.3% and 66.3%, respectively. These findings indicate that a relative proportion of infants born in these countries are sufficiently breastfed, at least for the minimum duration as recommended. Similarly, findings from this study are consistent with Horii et al. (2017). They argued that many infants and young children in sub-Saharan Africa are denied either exclusively breastfeeding or given breast milk within one hour after birth due to mothers' adherence to some predominant sociocultural influences or financial constraints. For instance, Horii et al. noted that women with low socioeconomic status across rural settlements in the Niger republic are less likely to put their babies to breast milk within an hour after childbirth.

Findings from this study buttress Sika-Bright (2010), who maintained that many mothers in Ghana fail to breastfeed their babies for the recommended minimum duration due to the country's low access to health care facilities. Equally, findings from the study reveal that many mothers in West Africa are yet to adhere to the required minimum duration of breastfeeding, nearly 30 years after the 1990 WHO/UNICEF Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding (World Health Organization, 1990).

This study reveals that late initiation breastfeeding is observed more than early initiation by at least 3 out of every 5 mothers in the studied countries. It is evident that only 1 in 5 newborns (18.4%) in Guinea is given breast milk within an hour after birth, while for babies born in Nigeria, about two-thirds (64.9%) of these newborns are not given breast milk within an hour after birth. These results align with Bankole (2017) and Senbanjo et al. (2013), who maintained that many newborns in Nigeria are not given breast milk within the first hour of birth.

Similarly, Sika-Bright (2010) argued that many babies in Ghana are not immediately fed with breast milk. According to Sika-Bright, many babies were not given breast milk within an hour after delivery due to the uncarted attitude of some of the healthcare workers in most of the healthcare facilities. According to World Health Organization (2014), this nonchalant attitude may be attributed to the shortage of well-trained healthcare workers in many sub-Saharan African countries. Furthermore, findings on breastfeeding patterns in this study validate that the absence of baby-friendly hospitals indirectly hinders the practice of optimal breastfeeding in West Africa.

On the other hand, exclusive breastfeeding is infrequently practiced among many mothers in West Africa. The reasons for the low adherence to optimal breastfeeding practice in the study area vary from mothers' poor knowledge of the benefits (for both babies and their mothers) of optimal breastfeeding to mothers' conformity to some prevailing sociocultural norms and values which ignorantly negate the practice of the act. This is evident in this study, as only 14%, 8.6%, and 5.4% of mothers in Sierra Leone, Nigeria, and Guinea adhere to optimal breastfeeding recommended by UNICEF and WHO.

Relatively, findings from this study establish a significant association between type of occupation and the practice of optimal breastfeeding by mothers in Nigeria and Sierra Leone. Also, it is evident from the study that the mother's age is one of the critical predictors of optimal breastfeeding in West Africa. Therefore, findings emanating from this study are in affirmation with Onah et al. (2014). They recognized the mothers' demographic and socioeconomic characteristics as some of the key predictors of exclusive breastfeeding practices among women of reproductive age in the Southeast region of Nigeria. Correspondingly, evidence from this study is consistent with Tampah-Naah & Kumu-Kyereme (2013), who argued that mothers' intention or choice of breastfeeding in Ghana is, to a considerable extent, predetermined by some individual-level physiognomies. Specifically, Taampah-Naah et al. (2013) identified the marital status of women, their place of residence, and the place of childbirth as some of the major predisposing factors that hinder mothers in Ghana from practicing exclusive breastfeeding.

In the same way, findings from this study establish a direct and significant association between individual maternal characteristics—age, employment status, literacy level, and mothers' adherence to optimal breastfeeding in West Africa. Studies validated the existence of a statistically significant association between maternal factors and breastfeeding practices among women of reproductive age in the sub-Saharan African region (Bankole & Adetutu, 2015; Horii et al., 2017; Mogre et al., 2016). For instance, while Bankole & Adetutu (2015) identified maternal age, level of education, and employment status as the proximate determinants of exclusive breastfeeding among mothers in Nigeria, Mogre et al. (2016) maintained that the child's age and mother's level of education are significant determinants of the practice of exclusive breastfeeding among mothers in rural Ghana.

More so, the findings from this study confirm Cresswell et al. (2017) and Mogre et al. (2016). They argued that the chance or likelihood that a group of women in a specific community would practice optimal breastfeeding as the WHO/UNICEF recommended mainly depends on wide-ranging and interacted community factors. These factors vary from socioeconomic to accessibility to primary healthcare facilities by mothers or pregnant women. Findings from this study likewise validate (Bankole, 2017; Ogunlesi, 2010; Ugboaja et al., 2013) who consistently maintain that rural community resident women in Nigeria breastfeed their infants for a longer duration than their contemporaries who live in urban communities. These authors identify the communal way of living among rural women as the primary factor influencing the practice of a longer duration of breastfeeding among rural women.

There is no doubt that factors such as women's exposure to mass media, the antenatal care system, women's literacy level, and poverty at household and community levels significantly influence how mothers in West Africa will be willing and ready to practice optimal breastfeeding. To validate this assertion, evidence from this study clearly shows that community-level factors accounted for 38.2%, 18.3%, and 17.3% variation in adherence to optimal breastfeeding practice for mothers in Guinea, Nigeria, and Sierra Leone, respectively. Empirical evidence from this study has vividly revealed that the chance of mothers' adherence to optimal breastfeeding is influenced by the individual-level and community-level characteristics of mothers of reproductive age in West Africa.

Conclusion

The study shows that maternal characteristics and individual-level and community-level factors are predictors of mothers' adherence to optimal breastfeeding practices in Guinea, Nigeria, and Sierra Leone. Results for Nigeria and Sierra Leone reveal that poverty concentration at the community level, and community level of maternal education are critical predictors of breastfeeding practices. Results for Guinea indicate that the community level of utilization of healthcare facilities by pregnant women are predictors of breastfeeding practices among mothers in the country. Moreover, the mother's age is identified as a key factor influencing the extent to which mothers adhere to optimal breastfeeding in Nigeria, Guinea, and Sierra Leone, respectively. The results for Nigeria and Sierra Leone reveal that breastfeeding among mothers is significantly influenced by their marital status and religion. On the other hand, the reverse is the case among mothers in Guinea. Optimum breastfeeding is explicitly established to be rarely practiced by mothers in West Africa. Imperatively, further studies should employ the mixed-method approach, and a comparative analysis should be carried out across rural and urban resident mothers.

Limitation

An in-depth study on the factors associated with breastfeeding practices requires the availability of complex and multidimensional variables that are not fully available in the three nations' DHS datasets used in this study. The datasets used do not provide the authors of this study with

sufficient sociocultural factors that may influence breastfeeding practices. Also, a deeper exploration of all identified regions across the selected area would have possibly provided room to capture diverse, varying patterns across the numerous ethnic groups that make up nations of the sub-continent.

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