Exploring the Factors Influencing Birth Registration in Nigeria

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Abstract

Birth registration is a fundamental right crucial for establishing citizenship and informing policy decisions, yet many children in developing nations like Nigeria remain unregistered. This study investigates the determinants of birth registration in Nigeria at both the individual and state levels. Analyzing data from 30,154 children under five years from Nigeria's 2021 Multiple Indicator Cluster Surveys (MICS), we find significant disparities in registration rates across demographic and socioeconomic factors, as well as among Nigerian states. Multilevel logistic regression reveals associations between registration likelihood and variables such as child age, maternal education, household wealth, urban residency, and health care utilization. The findings underscore the need for targeted interventions to ensure universal birth registration and safeguard children's rights. Recommendations in education and financial barriers, enhancing inter-agency collaborations, utilizing native language media for education, and implementing mobile registration offices and SMS-based reporting systems to improve registration coverage and accessibility.

Keywords: Birth registration, determinants, multi-level regression, children, CRVS.

การสำรวจปัจจัยที่มีอิทธิพลต่อการจดทะเบียนเกิดในประเทศไนจีเรีย

Exploring the Factors Influencing Birth Registration in Nigeria

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Introduction

Birth registration is an indispensable right that facilitates the official recording of children's births and establishes their citizenship. SDG objective 16.9 endeavors to ensure legal identification for all individuals, including newborns, by 2030, highlighting the imperative to assess Civil Registration and Vital Statistics (CRVS) performance and address areas in need of enhancement for universal birth registration (United Nations, 2015). Additionally, birth registration serves as a pivotal data source for policymaking across various domains such as education, housing, and security.

Despite its significance, a significant number of children, especially in developing nations, are denied this fundamental right (Pais, 2009; United Nations, 1989). Approximately 230 million children globally lack official birth records, rendering them susceptible to myriad rights violations (Bambas, 2005; Bequele, 2005; Cappa, Gregson, Wardlaw, & Bissell, 2014; Corbacho, Brito, & Osorio, 2012; Dow, 1988; UNICEF, 2013). Notably, birth registration rates in Africa lag behind those of other regions, with 56% of the population in African countries whose birth are not registered (UNICEF, 2022).

The decision to register births is influenced by various factors operating at different levels, as highlighted by Li, Zhang, and Feldman (2010) and (UNICEF, 2013). Birth registration decisions primarily occur at the household level, primarily by parents or guardians, influenced by the socioeconomic and demographic attributes of the household. Household wealth and access to mobile phones play critical roles, with technological advancements such as registration via cell phones reducing costs. Additionally, education levels impact registration rates, while demographic factors such as the child's age and family composition influence registration. At the state level, regional and national environments shape birth registration decisions, affecting service availability, regulations, and infrastructures. Urbanization levels, regional infrastructure, and information infrastructure play crucial roles, with historical factors like colonialism and conflicts also impacting registration systems' progress.

The Convention on the Rights of the Child (CRC), initiated in 1989, underscores international efforts to safeguard children's rights, with Article 7 specifically guaranteeing children's entitlement to have their births officially recorded (UNICEF, 2014). Despite Nigeria's ratification of the CRC and legal obligations under the Child Rights Act of 2003, challenges persist in ensuring compliance with birth registration. A recent household survey in Nigeria revealed alarming statistics: 70% of children under the age of five are unregistered, and of these, 83% lack birth certificates (National Population Commission - NPC & ICF, 2019). Furthermore, a reports by the United Nations Children's Fund (UNICEF) in 2019, highlighted Nigeria's disproportionately high rates of non-documentation of births, surpassing both Sub-Saharan Africa (59%) and West and Central Africa (55%).

To address the issue of neglected birth registration, it is imperative to identify factors contributing to its protection or risk. These factors may include limited availability of Birth Registration (BR) centers, socioeconomic status, or parental education levels. Research suggests that determinants influencing child survival are closely linked to the fundamental issues impacting child mortality and morbidity (Mosley & Chen, 1984). Given the limitations of historical census data, surveys like the Multiple Indicator Cluster Surveys (MICS) and Demographic and Health Surveys (DHS) emerge as potential alternatives to generate reliable birth registration data (AbouZahr, Rampatige, Lopez, & deSavigny, 2012).

However, it is crucial to acknowledge that existing research on birth registration determinants predominantly extends beyond the Nigerian context. Therefore, this research study aims to delve into the determinants of birth registration specifically within Nigeria. By focusing on the year 2021, this study endeavors to offer valuable insights for policymakers and stakeholders, aiming to provide a nuanced understanding of the challenges and opportunities associated with birth registration, ultimately informing strategies to enhance completeness in Nigeria.

Description of Study Area and Population

Nigeria, situated in West Africa, shares borders with Benin, Cameroon, Chad, and Niger, while its southern border touches the Atlantic Ocean. Spanning 923,768 square kilometers, Nigeria boasts diverse topography, including lowlands in the south, hills and plateaus in the central region, and mountainous terrain in the southeast, with plains predominating in the north (Zewoldi, 2019). As the most populous country in Africa and the sixth largest globally, Nigeria's population has steadily increased, reaching approximately 229.2 million in 2024. Key administrative aspects include Abuja as the capital city, English as the official language, and the National Population Commission (NPopC) overseeing civil registration under the Office of the Presidency (Zewoldi, 2019).

Current Practices in Birth Registration in Nigeria

Traditionally, birth registration in Nigeria relied on paper-based methods conducted at grassroots-level registration centers, primarily situated in government health institutions and Local Government Authority (LGA) centers. The National Population Commission (NPC) centralized and processed quarterly and annual registered births, facing challenges such as duplicate registration, verification complexities, and delays. In 2023, the NPC transitioned to the Electronic Civil Registration and Vital Statistics (VITAL REG) system, aiming to improve precision, availability, and efficiency in recording key events and administration (National Population Commission - NPC, 2023). Nigeria's digital birth registration process now includes streamlined procedures such as hospital onboarding, birth verification, and birth notification.

Procedures of Birth Registration in Nigeria

Registration services for births, stillbirths, and deaths are provided free of charge by the NPopC, with penalties for late registrations. Birth certificates are issued under four scenarios, including births in hospitals, births outside hospitals, individuals under 18 without birth certificates, and individuals above 18 requiring an attestation letter and Age Declaration Affidavit. Procedures involve presenting proof of birth, such as hospital-issued documents or affidavits, at NPopC registration centers, where birth certificates or certificates of registration are issued (Citizenship Rights in Africa Initiative, 2017)

Objective

Our study encompasses two objectives, which are to Investigate the size of the birth registration by state using the map and also the determinants of birth registration in Nigeria in 2021.

Methods

Data

The data utilized in this study were derived from Nigeria's 2021 Multiple Indicator Cluster Surveys (MICS), accessible at https://mics.unicef.org/surveys. These cross-sectional surveys are representative at both the national and state levels and were conducted using the sampling frame from the 2006 Population and Housing Census of the Federal Republic of Nigeria (NPHC). The survey employed a stratified multi-stage sampling design, where Primary Sampling Units (PSUs) were selected in each state with probability proportional to size, followed by households. The main Nigeria MICS aimed for a total target sample size of 1,850 clusters and 37,000 households. Additionally, a supplemental sample of 337 clusters and 6,740 households was selected for the National Immunization Coverage Survey (NICS) to enhance the precision of immunization indicators. However, due to accessibility issues, 128 enumeration areas, 95 from the MICS sample and 33 from the NICS sample, could not be surveyed. In total, the survey covered 41,532 households. However, this study specifically focused on children under the age of 5 with complete information, totaling 30,154 individuals.

Variables

The dependent variable is defined as children at a given age whose births were reported as registered, regardless of whether the child possesses a birth certificate, designated as '1,' while unregistered births are denoted as '0.'. This information was obtained through caregiver reports and encompassed both children with birth certificates and those whose births were registered with civil authorities but lacked a birth certificate. The denominator used for calculating this percentage was the total number of children under five included in the nationally representative survey.

The independent variables considered in this study were drawn from previous research conducted at both the characteristic and state levels (Li et al., 2010; UNICEF, 2013). At the characteristic level, variables included children's age (grouped into five categories: 0-11 months (reference group), 12-23 months, 24-35 months, 36-47 months, and 48-59 months), sex (categorized as boy (reference) and girl), and health insurance status (classified as without (reference) and with health insurance). Maternal and household head education were categorized into three groups: primary and lower (no formal school attendance or attendance up to the highest level of primary school (reference)), secondary (attendance up to junior and senior secondary levels, vocational enterprise programs, or secondary technical education), and higher secondary/tertiary education. The ethnicity of the household head included Hausa (reference), Igbo, Yoruba, Fulani, Kanuri, and others (comprising Ijaw, Tiv, Ibibio, and Edo). Household characteristics examined were area of residence (urban (reference) and rural), wealth quintiles (classified as poor (reference), middle, and rich), presence of internet connectivity, and possession of a mobile phone by any member of the household. Wealth quintiles were determined by the MICS using a household asset index based on principal components analysis, with wealth categorized into poor (quintiles 1 and 2), middle (quintile 3), and rich (quintiles 4-5).

At the state level, which consists of 37 states, ratio variables included the percentage of mothers who had at least eight prenatal visits by a professional and the percentage of childbirths that occurred in health facilities. The former was calculated by dividing the number of mothers who received antenatal care by a professional at least eight times by the total number of mothers, while the latter was determined by dividing the number of childbirths in hospitals by the total number of childbirths.

Statistical analyses

Initially, a descriptive analysis was conducted to delineate the characteristics of the sample. Subsequently, a bivariate cross-tabulation chi-squared test was employed to examine the association between birth registration and various characteristics and state factors, with significance set at $p < 0.05$. To address issues of disproportionate sampling and non-response, sampling weights (chweight) were applied to ensure the representativeness of the entire population (Makinde, Olapeju, Ogbuoji, & Babalola, 2016).

Also, an intercept-only model (Model 1) was formulated to estimate the intra-class correlation (ICC) and evaluate community disparities. Model 2 introduced socio-demographic variables from Model 1 to assess the impact of characteristic-level features, while Model 3 incorporated both characteristic-level and state-level predictors to evaluate their combined effects on birth registration. Odds ratios (OR), p-values, and 95% confidence intervals (C.I) were calculated and compared. The impact of random effects was expressed using the Intra-Class Correlation (ICC), and model adequacy was assessed using the Akaike Information Criterion (AIC). The 2-level logistic regression models were executed using the "melogit" program in Stata.

Results

Description of sample and bivariate analysis

A total of 30,154 children under the age of five were included in the analysis. Among these, 57.73% (n=16,794) had their births registered, leaving 42.27% (n=13,360) vulnerable to being unrecognized by the legal system of Nigeria. The characteristics of child-, maternal-, household head-, household-, and state-level factors are delineated in Table 1 (Column 2). Among the sampled children, 50.84% were male, 55.92% were aged below 36 months, and 2.49% lacked health insurance coverage. A significant portion (58.11%) were born to mothers with the highest level of education being primary school or lower primary

school. Similarly, half of the children (52.43%) resided with household heads whose highest level of education was primary school or lower primary school, with approximately one-third (28.91%) residing with household heads of Hausa ethnicity. Regarding household characteristics, approximately half of the children (51.79%) were born into households classified as having a low wealth status, while 29.07% resided in urban areas, 17.02% lived in households where no member possessed a mobile phone, and 73.31% lived in households without internet access. At the state level, Nigeria is comprised of 37 administrative states, with approximately 16.22% (n=6) exhibiting low percentages of mothers receiving prenatal care by professionals (<51.09%) and low percentages of mothers delivering their children at health facilities (<22.43%).

Bivariate analysis (Table 1, Column 3-5) revealed a positive correlation between age and birth registration rates, indicating an increase in registration as children age. Additionally, children with health insurance were more likely to have their births registered. Higher levels of maternal and household head education were associated with increased birth registration rates. Significant disparities in birth registration prevalence were observed across different ethnicities of household heads, with children residing with Igbo (79.61%) and Yoruba (78.26%) household heads exhibiting the highest rates of birth registration. Furthermore, children in households with better wealth status were more likely to have their births registered compared to those in households with lower wealth status. Urban residency was also associated with higher birth registration rates compared to rural residency. The presence of mobile phones and internet access in households was positively correlated with increased birth registration prevalence. Significant variations in birth registration rates were evident across different levels of prenatal care by professionals and levels of child delivery in health facilities.

Table 1 Descriptive analysis of the sample, Nigeria, MICS 2021 (n=30,154)

Variables	Sample	% of unregistered birth	% of registered birth	Chi-square	p-value
Child's sex					
- Boys	15,331 (50.84%)	41.79	58.21	1.60	0.206
- Girls	14,823 (49.16%)	42.76	57.24		
Child's age (unit: months)					
- 0 – 11	5,670 (18.80%)	49.47	50.53	85.09	0.000
- 12 - 23	5,468 (18.13%)	42.40	57.60		
- 24 – 35	5,978 (19.82%)	40.46	59.54		
- 36 – 47	6,294 (20.87%)	39.82	60.18		
- 48 – 59	6,744 (22.36%)	39.76	60.24		

Variables	Sample	% of unregistered birth	% of registered birth	Chi-square	p-value
Child's health insurance				177.74	0.000
- No	29,401 (97.50%)	43.26	56.74		
- Yes	753 (2.49%)	7.74	92.26		
Maternal education				1642.27	0.000
- Primary and lower	17,524 (58.11%)	56.39	43.61		
- Secondary	10,084 (33.44%)	29.23	70.77		
- Higher secondary	2,546 (8.44%)	11.68	88.32		
Head of household's education				1474.22	0.000
- Primary and lower	15,809 (52.43%)	56.36	43.64		
- Secondary	9,439 (31.30%)	32.99	67.01		
- Higher secondary	4,804 (15.93%)	18.90	81.10		
Household head's ethnicity				979.07	0.000
- Hausa	8,719 (28.91%)	50.49	49.51		
- Igbo	3,150 (10.44%)	20.37	79.63		
- Yoruba	3,098 (10.27%)	21.75	78.25		
- Fulani	3,111 (10.31%)	62.02	37.98		
- Kanuri	1,086 (3.60%)	53.64	46.36		
- Others	10,990 (36.44%)	43.83	56.17		
Household wealth status				2183.73	0.000
- Poor	15,617 (51.79%)	61.27	38.73		
- Fair	6,383 (21.16%)	40.86	59.14		
- Rich	8,154 (27.04%)	17.06	82.94		

Variables	Sample	% of unregistered birth	% of registered birth	Chi-square	p-value
Area of residence				1432.29	0.000
- Urban	8,768 (29.07%)	20.85	79.15		
- Rural	21,386 (70.92%)	54.69	45.31		
Mobile telephone				360.64	0.000
- No	5,134 (17.02%)	58.15	41.85		
- Yes	25,020 (82.97%)	39.24	60.76		
Household access to internet				786.84	0.000
- No	22,107 (73.31%)	49.57	50.43		
- Yes	8,047 (26.68%)	25.30	74.70		
State's level					
Level of prenatal visits by professional				711.13	0.000
- Low	6 (16.22%)	55.26	44.74		
- Fair	23 (62.16%)	45.13	54.87		
- High	8 (21.62%)	16.52	83.48		
Level of child delivery in health facilities				997.48	0.000
- Low	6 (16.22%)	57.74	42.36		
- Fair	19 (51.35%)	45.13	54.87		
- High	12 (32.43%)	20.25	79.75		

State-level prevalence rate of birth registration in Nigeria.

Figure 1 illustrates the distribution of sample size and the prevalence rate of birth registration among children under the age of five across the 37 administrative states in Nigeria, highlighting notable variations among states. Sokoto exhibited the lowest birth registration rate at 22.65%, whereas Lagos recorded the highest rate at 93.93%. Apart from Lagos, only four states boasted birth registration rates of 81% or higher: Anambra (86.57%), FCT (87.44%), Ebonyi (86.15%), and Edo (81.54%). Conversely, six states, in

addition to Sokoto, reported birth registration rates of 40% or lower: Bauchi (38.33%), Bayelsa (28.41%), Jigawa (23.91%), Niger (30.01%), Taraba (32.25%), and Zamfara (31.80%).

Figure 1 Map of Nigeria showing the birth registration of children under-5 years across the 37 administrative states (n=30,154).
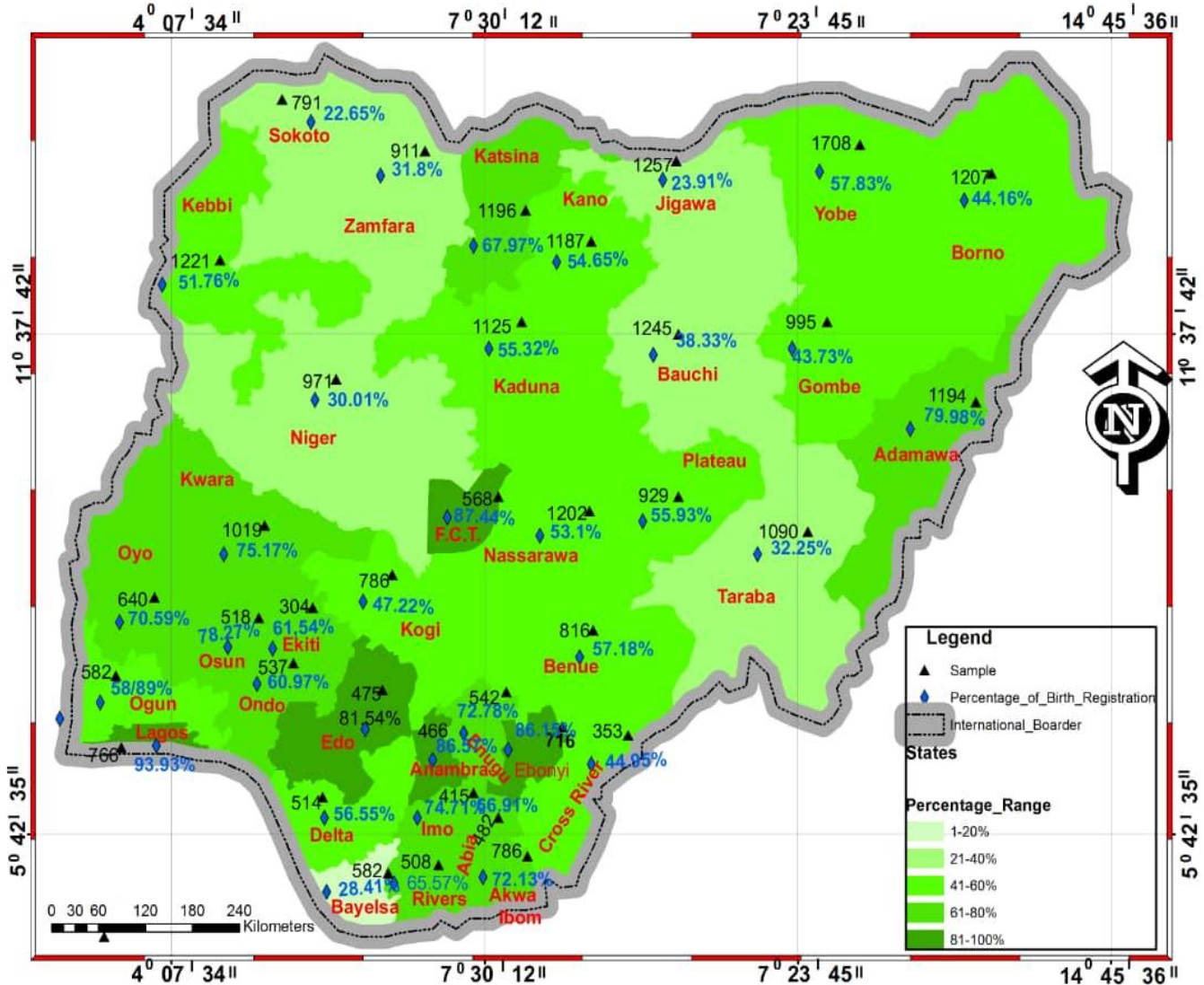
Characteristic- and state-level determinants of birth registration of children under-five years

Table 2 depicts the fixed effects outcomes of the 2-level logistic regression. In Model 2, with the exception of the child's sex, all characteristic factors exhibited significant associations with birth registration. Notably, increasing child age demonstrated a statistically significant association with a higher likelihood of birth registration.

Children aged 48-54 months had the highest odds of birth registration (AOR = 1.92; 95% CI = 1.77 - 2.08) compared to those below 12 months. Additionally, children with health insurance displayed a significantly higher probability of birth registration (AOR = 3.06; 95% CI = 2.32 - 4.02) compared to those without insurance.

Moreover, children born to mothers with secondary (AOR = 1.40; 95% CI = 1.30 – 1.50) or higher secondary education (AOR = 1.94; 95% CI = 1.68 – 2.25) were more likely to be registered at birth than

those born to mothers with primary or lower primary education. Similarly, children living with household heads with secondary (AOR = 1.32; 95% CI = 1.23 – 1.41) or higher secondary education (AOR = 1.72; 95% CI = 1.56 – 1.90) exhibited higher odds of birth registration compared to those living with household heads with primary or lower primary education.

Ethnicity of the household head also influenced birth registration, with children living with household heads of Fulani (AOR = 0.65; 95% CI = 0.58 – 0.72) or Kanuri ethnicity (AOR = 0.69; 95% CI = 0.59 – 0.81) exhibiting lower odds of birth registration compared to those with Hausa ethnicity. Increasing wealth status was associated with higher odds of birth registration, with the highest odds observed among children in the richest wealth status (AOR = 2.84; 95% CI = 2.58 – 3.12). Moreover, rural residency was associated with lower odds of birth registration (AOR = 0.74; 95% CI = 0.68 – 0.79) compared to urban residency. Households with mobile phone access (AOR = 1.12; 95% CI = 1.04 – 1.20) and internet access (AOR = 1.21; 95% CI = 1.12 – 1.29) exhibited higher odds of birth registration.

While the results of characteristic variables in Model 2 were similar to those in Model 3, which included state factors, only the percentage of childbirths delivered at health facilities was significant. An increase in the percentage of childbirths delivered at health facilities was associated with increased odds of birth registration.

The random effects analysis revealed variations in birth registration attributed to model compositions. Model 1 indicated that state clusters accounted for approximately 72% of birth registrations in Nigeria, with the between-state variance contributing to 18% of the total variation in birth registration (ICC = 0.18). These variances decreased to 13% (ICC = 0.13) in Model 2 and 11% (ICC = 0.11) in Model 3, indicating that differences in state-level factors contributed significantly to the variations in birth registration relative to characteristic-level factors. Although Model 3 had the lowest AIC (33,673), suggesting the best-fitting model, this value did not differ significantly from the AIC of Model 2 (33,675).

Table 2. Two-level logistic regression results on factors associated with the birth registration of children under-5 in Nigeria MICS 2021, (n = 30,154)

Characteristics	Model 1		Model 2		Model 3	
Fixed effects	**OR**	**95%CI**	**AOR**	**95%CI**	**AOR**	**95%CI**
Intercept	1.45**	(1.10 - 1.91)	0.46***	(0.35 - 0.60)	0.25***	(0.15 - 0.42)
Individual Characteristics						
Child's age (Months)						
- 0 - 11						
- 12 - 23			1.57***	(1.44 - 1.71)	1.57***	(1.44 - 1.71)
- 24 - 35			1.81***	(1.66 - 1.97)	1.81***	(1.66 - 1.97)
- 36 - 47			1.83***	(1.68 - 1.98)	1.83***	(1.68 - 1.98)
- 48 - 59			1.92***	(1.77 - 2.08)	1.92***	(1.77 - 2.08)

Characteristics	Model 1		Model 2		Model 3	
Fixed effects	**OR**	**95%CI**	**AOR**	**95%CI**	**AOR**	**95%CI**
Sex of the child						
- Male (Ref.)						
- Female			0.96	(0.91 - 1.01)	0.96	(0.91 - 1.01)
Health insurance						
- No (Ref.)						
- Yes			3.06***	(2.32 - 4.02)	3.05***	(2.32 - 4.01)
Maternal education						
- Primary and lower (Ref.)						
- Secondary			1.40***	(1.30 - 1.50)	1.40***	(1.30 - 1.50)
- Higher secondary			1.94***	(1.68 - 2.25)	1.94***	(1.67 - 2.24)
Household head's education						
- Primary and lower (Ref.)						
- Secondary			1.32***	(1.23 - 1.41)	1.32***	(1.23 - 1.41)
- Higher secondary			1.72***	(1.56 - 1.90)	1.72***	(1.56 - 1.90)
Household head's ethnicity						
- Hausa (Ref.)						
- Igbo			1.17	(0.93 - 1.47)	1.10	(0.87 - 1.39)
- Yoruba			1.10	(0.93 - 1.31)	1.08	(0.91 - 1.28)
- Fulani			0.65***	(0.58 - 0.72)	0.64***	(0.58 - 0.71)
- Kanuri			0.69***	(0.59 - 0.81)	0.69***	(0.59 - 0.81)
- Others			0.92+	(0.84 - 1.01)	0.91+	(0.83 - 1.00)
Household's wealth status						
- Poor (Ref.)						
- Middle			1.75***	(1.63 - 1.88)	1.74***	(1.62 - 1.88)

Characteristics	Model 1		Model 2		Model 3	
Fixed effects	**OR**	**95%CI**	**AOR**	**95%CI**	**AOR**	**95%CI**
- Rich			2.84***	(2.58 - 3.12)	2.83***	(2.57 - 3.11)
Household' residence						
- Urban (Ref.)						
- Rural			0.74***	(0.68 - 0.79)	0.74***	(0.68 - 0.79)
Mobile telephone						
- No (Ref.)						
- Yes			1.12**	(1.04 - 1.20)	1.12**	(1.04 - 1.20)
Household access to internet						
- No (Ref.)						
- Yes			1.21***	(1.12 - 1.29)	1.21***	(1.13 - 1.30)
State Characteristics						
Percentage of receiving at least 8 prenatal visits by professional					1.00	(0.98 - 1.01)
Percentage of child delivery in health facilities					1.01*	(1.00 - 1.03)
Random effect parameter						
State	0.72	(0.45 - 1.14)	0.47	(0.30 - 0.75)	0.40	(0.25 - 0.64)
ICC	0.18	(0.12 - 0.26)	0.13	(0.08 - 0.19)	0.11	(0.07 - 0.16)
LR-test	$\chi^2=$ 3,857 p < 0.001		$\chi^2=2,440$ p < 0.001		$\chi^2=$ 1,993 p < 0.001	
Log Likelihood	-18,777		-16,816		-16,813	
AIC	37,557		33,675		33,673	
BIC	37,573		33,858		33,872	

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

Discussion and conclusions

The decision-making process regarding birth registration is influenced by a myriad of factors spanning

different levels, encompassing household socioeconomic status, technological access, and broader regional and national contexts (Li et al., 2010; UNICEF, 2013). This study contributes to the existing research by delving into the determinants of birth registration in Nigeria, focusing on both individual characteristics and state-level factors. The findings underscore the pivotal role of birth registration as a fundamental right crucial for citizenship establishment and informing policymaking across diverse domains, aligning with the objectives of SDG 16.9. Despite its significance, a substantial proportion of children in countries like Nigeria are still deprived of this essential right, with nearly 45.34% of children under five years vulnerable to being unrecognized by legal systems. Notably, disparities in birth registration rates are evident across various demographic and socioeconomic strata, including maternal education, household wealth, and urban residency. Moreover, significant disparities exist among Nigerian states, with wide-ranging registration rates ranging from 22.65% in Sokoto to 93.93% in Lagos. Multilevel logistic regression analysis further elucidates the influence of diverse factors on birth registration likelihood, with characteristics such as child age, health insurance coverage, maternal education, household wealth, and urban residency demonstrating significant associations (Aboagye et al., 2023; Amo-Adjei & Annim, 2015; Corbacho et al., 2012; Isara & Atimati, 2015). Additionally, state-level variables, particularly the proportion of childbirths occurring in health facilities, significantly impact registration rates (Isara & Atimati, 2015). Children from affluent families exhibit a positive correlation between wealth and birth registration, as higher economic status affords resources to address associated costs (Aboagye et al., 2023; Corbacho et al., 2012; Kumar & Saikia, 2021).

Maternal education also plays a crucial role, with higher educational attainment correlating with increased registration likelihood due to enhanced decision-making capabilities (Aboagye et al., 2023; Amo-Adjei & Annim, 2015; Corbacho et al., 2012; Kumar & Saikia, 2021). Notably, certain Nigerian states, including Lagos, Anambra, and the FCT, exhibit higher registration rates attributed to factors such as economic vibrancy and technological integration. Conversely, rural areas face challenges in registration due to logistical barriers and higher associated costs (Amo-Adjei & Annim, 2015; Kumar & Saikia, 2021). The presence of mobile phones and internet access positively influences registration rates, facilitating access to information and enabling innovative registration methods (Candia, 2019; Dunning, Gelb, & Raghavan, 2014; Ebbers & Smits, 2022; Manby, 2021). Moreover, institutional childbirths correlate with higher registration rates due to established registration protocols in health facilities (Ebbers, 2020; Kumar & Saikia, 2021). However, our study did not find a significant correlation between prenatal care and registration rates.

My study highlights the importance of understanding birth registration patterns within the context of the COVID-19 pandemic. The disparities observed in registration rates, particularly the lower rates among infants aged 0-11 months, likely result from the pandemic's indirect effects on registration services. Lockdown measures might have restricted access to registration facilities, causing delays in registering newborns. Additionally, concerns about virus transmission may have discouraged timely birth registration during the peak of the pandemic. Despite governmental efforts to maintain registration services through mobile teams and online platforms, their effectiveness, especially for newborns, may have been hindered by the severity of the pandemic. It is noteworthy that the fieldwork for the 2021 Multiple Indicator Cluster Survey (MICS) in Nigeria took place between September and December 2021, after the strict lockdown measures enforced from March to May 2020. This timing suggests that data collection largely occurred outside the peak impact of the pandemic. Furthermore, we acknowledge the proactive measures undertaken by the National Population Commission (NPC) of Nigeria to mitigate disruptions in birth

registration services during the lockdown period, including deploying mobile registration teams and utilizing online platforms. These efforts aimed to ensure the continuity of birth registration services despite the challenges posed by the pandemic.

Additionally, our findings demonstrate consistent patterns in birth registration rates across different age groups in both the 2021 MICS and the previous 2016-17 MICS. Notably, the persistent and significant disparity in registration rates between infants aged 0-11 months and those aged 12-23 months underscores the enduring influence of age-specific dynamics on birth registration trends. Conversely, minimal variations are observed in registration rates among children aged 12-23 months compared to older age groups.

These findings underscore the importance of further exploring the underlying factors driving these disparities and emphasize the ongoing relevance of age-specific dynamics in birth registration trends.

In conclusion, variables such as child age, maternal education, household wealth, residency, ethnicity, technological access, and health care utilization significantly influence birth registration rates. Targeted interventions are imperative to address registration disparities, prioritizing marginalized populations such as uneducated mothers, home birthing practices, rural residents, and socioeconomically disadvantaged individuals.

Recommendations

To enhance birth registration in Nigeria, it is recommended to alleviate financial barriers and improve accessibility to registration services, with a focus on rural communities. Strengthening inter-agency collaborations between NPopC, NIMC, and the Ministry of Health can streamline registration processes and enhance service delivery. Utilizing native language media platforms for public education and establishing mobile registration offices in rural areas can improve registration coverage and reduce logistical barriers. Additionally, implementing SMS-based birth reporting systems can expedite registration processes and mitigate technological barriers, thereby ensuring timely registration and certificate issuance.

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