Examining Urban–Rural Inequities in Early Maternal Discharge in Nigeria: Evidence from National Survey Data

Filippo Andrea Martini 1*, Lorenzo Matteo Ruggieri[1]

[1]Department of Management, University of Trento, Trento, Italy.

*E-mail ✉ f.martini.trento@gmail.com

Abstract

This research aimed to assess the disparity between urban and rural areas in the rate of early postpartum discharge after institutional vaginal birth in Nigeria. A nationally representative sample comprising 8,614 women aged 15–49 years was selected and examined. Multivariate decomposition analysis combined with the concentration index was applied to investigate the occurrence and urban-rural inequities in early maternal discharge following facility-based vaginal delivery. Around 65.6% of women in rural areas and 50.5% in urban areas experienced early maternal discharge. The distribution of early maternal discharge showed a pro-poor pattern. The concentration index was -0.0817 (SE = 0.0063; p < 0.001) for rural areas and -0.0346 (SE = 0.0083; p < 0.001) for urban areas. Differences in the composition of characteristics (endowments) between urban and rural settings accounted for approximately 17.6% of the gap in early maternal discharge, whereas 82.4% arose from variations in the effects of unexplained factors. In the decomposition analysis, factors such as multiple births, attainment of secondary or higher education, moderate to high autonomy in decision-making, and residence in the South South geopolitical zone reduced the urban-rural disparity in early maternal discharge. Conversely, birth in a private facility, household size of 5 or more members, and residence in the North East, South East, or South West geopolitical zones, respectively, increased the urban-rural disparity. The gap was further exacerbated by the uneven distribution of women with advanced education, reliance on private facilities, larger households, and living in the North East, South East, and South West regions. These findings highlight the need for tailored interventions targeting both systemic and individual factors to promote equitable postnatal services irrespective of geographical or socioeconomic status.

Keywords: Urban areas, Rural areas, Public health, Vaginal delivery

Introduction

Maternal morbidity and mortality continue to pose major global public health challenges, with the greatest risks occurring in the first 24 hours after birth and remaining substantially high in the subsequent days [1, 2]. This postpartum phase is dangerous not only for mothers (48.9% of deaths take place within the first 24 hours) [2–5], but also for infants (around 2.3 million deaths), as neonatal deaths are likewise concentrated shortly after delivery [6]. Despite sustained initiatives to enhance maternal and child health outcomes [7–11], Nigeria—the continent's most populous nation—bears a heavy share of maternal and child morbidity and mortality [12]. Such adverse events represent persistent public health issues and reveal ongoing disparities in access to and delivery of healthcare services.

The elevated rates of maternal and child mortality in Nigeria are aggravated by intertwined social, economic, and structural elements that affect the quality and promptness of vital health interventions [13, 14]. Institutional delivery is a key strategy for preventing avoidable deaths; yet, giving birth in a facility alone does not ensure favourable results. A vital component of institutional care is the duration of stay before maternal

discharge after vaginal birth [15]. The World Health Organization advises that mothers and newborns receive professional monitoring for a minimum of 24 hours following delivery to identify and address possible complications like haemorrhage, sepsis, or newborn distress [16]. Discharge within 24 hours—termed early discharge—may endanger both mother and infant, particularly in settings with inadequate follow-up support [17].

Marked urban-rural differences persist in maternal health service utilisation and outcomes throughout Nigeria. Women in rural areas typically encounter more obstacles to obtaining professional care, are more prone to home births, and, when accessing facilities, tend to be discharged sooner [18]. These inequities stem from variations in health infrastructure, staffing levels, economic conditions, and access to information across urban and rural contexts. Nevertheless, the specific drivers of disparities in discharge timing remain incompletely understood, limiting the development of focused policies and programmes [19].

The present study seeks to deepen insight into urban-rural differences in early maternal discharge after institutional vaginal delivery in Nigeria. Through multivariate decomposition analysis, we separate the contributions of compositional differences in population attributes from differences in their effects. The results are intended to guide approaches for enhancing the fairness and quality of postpartum services, thereby helping to lower avoidable maternal and neonatal mortality in urban and rural communities alike.

Materials and Methods

Ethics statement
The analysis relied on a de-identified, publicly accessible secondary dataset. Ethical clearance for the NDHS was provided by the National Health Research Ethics Committee of Nigeria (NHREC), and informed consent was secured from participants following established protocols. The assigned NHREC number is NHREC/01/01/2007. Approval was also granted by the ICF Institutional Review Board under project number 132989.0.000.NG.DHS.01. The corresponding author obtained authorisation to utilise the ethically collected data; thus, additional consent was not necessary. Further details on DHS ethical standards are available at: http://goo.gl/ny8T6X.

Data source
The analysis utilised data from the women's individual questionnaire in the 2018 Nigeria Demographic and Health Survey (NDHS). The sample included 8,614 women aged 15–49 years. Conducted as the fifth iteration by the National Population Commission (NPC), the 2018 NDHS collected information from August 14 to December 29, 2018 [20]. A stratified, multistage cluster sampling approach was employed, using enumeration areas (EAs) as primary units. From 1,389 selected EAs, approximately 30 households were systematically chosen per cluster, achieving a 99% response rate.

Sampling technique
The 2018 NDHS utilised a three-stage stratified sampling strategy to achieve national representativeness. The process began by separating areas into urban and rural strata, followed by the random selection of enumeration areas (EAs) within each stratum, and concluded with systematic equal-probability selection of households from each chosen EA. The sampling framework was derived from the 2006 Population and Housing Census of the Federal Republic of Nigeria, carried out by the National Population Commission. For the 2018 survey, Nigeria's 36 states plus the Federal Capital Territory were divided into urban and rural categories, yielding 74 separate sampling strata. Since its inception in 1984, the Demographic and Health Surveys (DHS) programme has received primary funding from the United States Agency for International Development (USAID), supplemented by contributions from other donors and participating countries, and has completed over 230 standardised household surveys in more than 80 nations. Comprehensive descriptions of DHS sampling methods are available elsewhere [21].

Selection and measurements of variables
Outcome variable
The primary outcome examined was early postpartum discharge following institutional vaginal birth. Duration of stay at the delivery facility was assessed through the survey question on "time spent at the place of delivery" after childbirth. In line with World Health Organization criteria for early discharge after vaginal delivery [22], the variable was dichotomised as "1 = yes" for discharge within less than 24 hours post-vaginal birth and "0 = no" for stays of 24 hours or longer. Only women who had a facility-based vaginal delivery in the five years preceding the survey were retained for analysis.

Explanatory variables
Selection of covariates was informed by prior research [23–28]. These included: type of birth (singleton versus multiple); birth order (first, 2nd/3rd, 4th and above); perceived baby size at birth (large, average, small); infant sex (male versus female); timing of ANC booking (early versus late); number of ANC visits (none, 1–3, 4–7, 8+); delivery facility type (public versus private); maternal age in years (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49); highest education attained (none, primary, secondary, higher); total children ever born (1–2, 3–4, 5+); religion (Christianity, Islam, other/no religion); employment status (unemployed versus employed); difficulty obtaining money for treatment (big problem versus not a big problem); health insurance status (not covered versus covered); marital status (never in union, currently in union, formerly in union); media exposure (no versus yes); women's decision-making autonomy (low, moderate, high); attitude toward wife beating (justified versus not justified); household size (1–4 versus 5+); wealth quintile (poorest, poorer, middle, richer, richest); sex of household head (male versus female); age of household head in years (<30, 30–39, 40–49, 50–59, 60+); geopolitical zone (North Central, North East, North West, South East, South South, South West); residence type (urban versus rural); community ethnic diversity (mono-ethnic versus multi-ethnic).

Analytical approach
Data analysis was performed using Stata version 17.0 (Stata Corporation, College Station, Texas, USA). Given the complex multi-stage stratified cluster design, the 'svy' command was applied to adjust for survey weights, clustering, and stratification. Descriptive statistics and chi-square tests were conducted for univariate and bivariate examinations. Lorenz curves were constructed to visualise socioeconomic inequality by plotting the cumulative share of early maternal discharge after facility-based vaginal delivery against the cumulative population share ranked by wealth [29]. A positive Concentration Index occurs when the Lorenz curve lies below the equality line, signifying concentration among wealthier groups, with the opposite indicating concentration among poorer groups. Analyses were stratified by urban-rural residence. For the curves, individuals were ordered by increasing wealth to determine their socioeconomic ranking. Since concentration indices for binary outcomes are influenced

by the outcome mean—complicating comparisons across groups with differing prevalence—we employed the normalised Erreygers index as an alternative [30].
Multivariate decomposition analysis was applied to partition the urban-rural difference in early maternal discharge rates, while the Erreygers normalised concentration index quantified the contribution of individual factors to socioeconomic disparities in early discharge across wealth groups. Statistical significance was set at $p < 0.05$.
Non-linear multivariate decomposition was used to isolate the sources of group differences in predicted probabilities. Accordingly, the observed urban-rural gap in early maternal discharge after facility-based vaginal delivery can be attributed to two components: differences in the distribution of characteristics across populations (endowments) or differences in the effects of those characteristics (coefficients).
The logistic regression model for urban-rural differences in early maternal discharge is expressed as:

$$
\begin{aligned}
YA - YB &= F(XA\beta A) - F(XB\beta B) \\
&= \frac{F(XA\beta A) - F(XB\beta A)}{E} \\
&+ \frac{F(XB\beta A) - F(XB\beta B)}{C}
\end{aligned} \quad (1)
$$

The E component, referred to as the explained portion, accounts for the segment of the urban-rural difference that arises from variations in the distribution of observable characteristics across groups. In contrast, the C component, known as the unexplained portion, captures the segment attributable to differences in the impacts of those characteristics or to unmeasured factors influencing responses.
A factor is said to widen the urban-rural disparity in early postpartum discharge when it increases the difference in the probability of early discharge between urban and rural settings, thereby exacerbating inequality. For instance, if urban women benefit more from superior healthcare access that lowers early discharge rates compared to rural women, the disparity grows larger. On the other hand, a factor narrows the disparity when it decreases the difference, aligning early discharge rates more closely across the two areas. This might happen if a policy or service, like enhanced community-based postnatal support, disproportionately advantages rural mothers and reduces the existing gap. Thus, the direction in which a variable affects the gap indicates its role in

either advancing or undermining equity in postpartum care, revealing whether it helps bridge or perpetuate divides between urban and rural communities.

Results and Discussion

Table 1 presents the socioeconomic and demographic profile of the study participants. Predominantly, the sample comprised women with singleton births (97.5%), average-sized newborns (53.4%), delayed initiation of antenatal care (71.0%), births in public facilities (69.4%), Christian faith (62.4%), employment (76.7%), no health insurance coverage (96.4%), current marital union (92.3%), regular media exposure (80.2%), rejection of justification for wife beating (79.6%), and residence in male-headed households (85.3%). Additionally, characteristics exhibiting statistically significant urban-rural differences are highlighted. Refer to **Table 1** for complete details.

Table 1. Distribution of the respondents' characteristics.

Variable	Rural (n = 4168)	Urban (n = 4446)	Pooled sample (n = 8614)	P-value
Type of birth				0.783
Single birth	4061 (97.4)	4336 (97.5)	8397 (97.5)	
Multiple birth	107 (2.6)	110 (2.5)	217 (2.5)	
Order of birth				<0.001*
First child	888 (21.3)	911 (20.5)	1799 (20.9)	
Second or third	1433 (34.4)	1758 (39.5)	3191 (37.0)	
Fourth or higher	1847 (44.3)	1777 (40.0)	3624 (42.1)	
Size of baby at birth				0.026*
Large	1347 (32.3)	1559 (35.1)	2906 (33.7)	
Average	2275 (54.6)	2328 (52.4)	4603 (53.4)	
Small	546 (13.1)	559 (12.6)	1105 (12.8)	
Sex of child				0.861
Male	2168 (52.0)	2321 (52.2)	4489 (52.1)	
Female	2000 (48.0)	2125 (47.8)	4125 (47.9)	
Timing of ANC registration				0.176
Early booking	1157 (29.7)	1235 (28.4)	2392 (29.0)	
Late booking	2737 (70.3)	3120 (71.6)	5857 (71.0)	
Number of ANC visits				<0.001*
None	271 (6.5)	86 (1.9)	357 (4.1)	
One to three	628 (15.1)	460 (10.3)	1088 (12.6)	
Four to seven	2056 (49.3)	1954 (44.0)	4010 (46.6)	
Eight or more	1213 (29.1)	1946 (43.8)	3159 (36.7)	
Place of childbirth				<0.001*
Public facility	3114 (74.7)	2867 (64.5)	5981 (69.4)	
Private facility	1054 (25.3)	1579 (35.5)	2633 (30.6)	
Maternal age (years)				<0.001*
15–19	231 (5.5)	111 (2.5)	342 (4.0)	
20–24	858 (20.6)	639 (14.4)	1497 (17.4)	
25–29	1078 (25.9)	1209 (27.2)	2287 (26.6)	
30–34	868 (20.8)	1152 (25.9)	2020 (23.4)	
35–39	681 (16.3)	857 (19.3)	1538 (17.8)	
40–44	322 (7.7)	362 (8.1)	684 (7.9)	
45–49	130 (3.1)	116 (2.6)	246 (2.9)	
Highest level of education				<0.001*
No formal schooling	994 (23.8)	431 (9.7)	1425 (16.5)	
Primary education	862 (20.7)	605 (13.6)	1467 (17.0)	
Secondary education	1939 (46.5)	2452 (55.2)	4391 (51.0)	

Higher education	373 (9.0)	958 (21.5)	1331 (15.5)	
Total children ever born				<0.001*
One to two	1670 (40.1)	1819 (40.9)	3489 (40.5)	
Three to four	1197 (28.7)	1490 (33.5)	2687 (31.2)	
Five or more	1301 (31.2)	1137 (25.6)	2438 (28.3)	
Religious affiliation				<0.006*
Christianity	2633 (63.2)	2741 (61.7)	5374 (62.4)	
Islam	1503 (36.1)	1690 (38.0)	3193 (37.1)	
Other/none	32 (0.8)	15 (0.3)	47 (0.5)	
Employment status				0.223
Not employed	995 (23.9)	1012 (22.8)	2007 (23.3)	
Employed	3173 (76.1)	3434 (77.2)	6607 (76.7)	
Difficulty obtaining money for medical care				<0.001*
Major problem	2086 (50.1)	1552 (34.9)	3638 (42.2)	
Not a major problem	2082 (49.9)	2894 (65.1)	4976 (57.8)	
Health insurance coverage				<0.001*
Uninsured	4087 (98.1)	4219 (94.9)	8306 (96.4)	
Insured	81 (1.9)	227 (5.1)	308 (3.6)	
Marital status				0.049*
Never married	171 (4.1)	143 (3.2)	314 (3.6)	
Currently married	3839 (92.1)	4112 (92.5)	7951 (92.3)	
Formerly married	158 (3.8)	191 (4.3)	349 (4.1)	
Exposure to mass media				<0.001*
No exposure	1254 (30.1)	450 (10.1)	1704 (19.8)	
Exposed	2914 (69.9)	3996 (89.9)	6910 (80.2)	
Women's decision-making autonomy				<0.001*
Low	956 (41.1)	842 (28.3)	1798 (33.9)	
Moderate	772 (33.2)	1143 (38.5)	1915 (36.2)	
High	599 (25.7)	985 (33.2)	1584 (29.9)	
Acceptance of wife beating				<0.001*
Not justified	3046 (73.1)	3807 (85.6)	6853 (79.6)	
Justified	1122 (26.9)	639 (14.4)	1761 (20.4)	
Household size				<0.001*
One to four members	1381 (33.1)	1720 (38.7)	3101 (36.0)	
Five or more members	2787 (66.9)	2726 (61.3)	5513 (64.0)	
Household wealth index				<0.001*
Poorest	261 (6.3)	643 (14.5)	904 (10.5)	
Poorer	485 (11.6)	905 (20.4)	1390 (16.1)	
Middle	717 (17.2)	1023 (23.0)	1740 (20.2)	
Richer	1152 (27.6)	985 (22.1)	2137 (24.8)	
Richest	1553 (37.3)	890 (20.0)	2443 (28.4)	
Sex of household head				<0.001*
Male	3614 (86.7)	3736 (84.0)	7350 (85.3)	
Female	554 (13.3)	710 (16.0)	1264 (14.7)	
Age of household head (years)				<0.001*
Below 30	569 (13.6)	428 (9.6)	997 (11.6)	
30–39	1505 (36.1)	1704 (38.3)	3209 (37.2)	
40–49	1066 (25.6)	1314 (29.5)	2380 (27.6)	
50–59	521 (12.5)	518 (11.6)	1039 (12.1)	
60 and above	507 (12.2)	482 (10.8)	989 (11.5)	
Geopolitical region				<0.001*

North Central	1201 (28.8)	695 (15.6)	1896 (22.0)	
North East	699 (16.8)	406 (9.1)	1105 (12.8)	
North West	472 (11.3)	468 (10.5)	940 (10.9)	
South East	641 (15.4)	1082 (24.3)	1723 (20.0)	
South South	578 (13.9)	441 (9.9)	1019 (11.8)	
South West	577 (13.8)	1354 (30.4)	1931 (22.4)	
Community ethnic composition				<0.001*
Single ethnic group	2358 (56.6)	1996 (44.9)	4354 (50.6)	
Multiple ethnic groups	1810 (43.3)	2450 (55.1)	4260 (49.4)	

* significant at P < 0.05.

Figure1 illustrates the prevalence of early maternal discharge by place of residence. Roughly 65.6% of women in rural areas and 50.5% in urban areas reported being discharged early after vaginal birth in Nigeria.
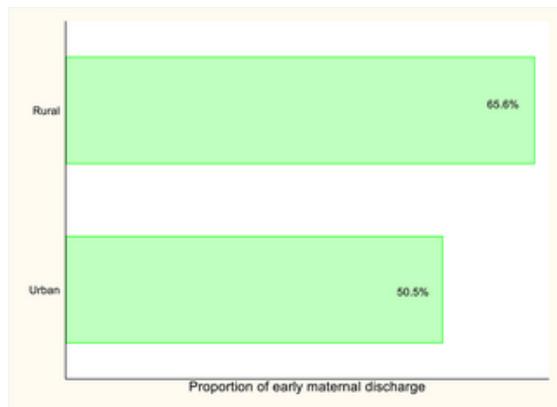
0.0346 (SE = 0.0083; p < 0.001) for urban areas. The z-statistic of -4.53 confirmed a statistically significant urban-rural difference (p < 0.001).
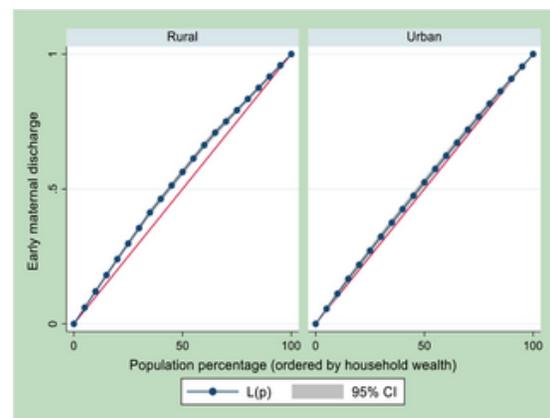

Figure 1. Percentage of early maternal discharge following vaginal delivery by urban-rural differences.

Figure 2. Urban-rural differential in socioeconomic inequalities of early maternal discharge following vaginal delivery.

Figure 2 displays Lorenz curves depicting socioeconomic inequalities in early maternal discharge across urban and rural settings. Findings indicate a pro-poor concentration of early discharge after vaginal delivery in both groups. The concentration index stood at -0.0817 (SE = 0.0063; p < 0.001) for rural areas and -

Table 2 reports the prevalence of early maternal discharge after vaginal delivery stratified by urban-rural residence. Across nearly all categories of women's attributes, rural residents consistently exhibited higher rates of early discharge in Nigeria.

Table 2. Percentage change (Δ%) of early maternal discharge following vaginal delivery.

Characteristic	Rural (%)	Urban (%)	Percentage point difference (Δ%)
Type of birth			
Single birth	65.3	52.5	-12.8
Multiple birth	49.5	37.7	-11.8
Birth sequence			
First birth	62.5	48.3	-14.2
Second or third birth	64.5	50.3	-14.2
Fourth birth or higher	66.3	55.9	-10.4
Infant size at delivery			
Large-sized baby	69.6	56.9	-12.7
Average-sized baby	62.4	49.0	-13.4

Small-sized baby	63.5	52.0	-11.5
Sex of the child			
Male child	65.7	52.0	-13.7
Female child	63.9	52.4	-11.5
Timing of ANC registration			
Early registration	62.8	46.8	-16.0
Late registration	64.5	54.3	-10.2
Number of ANC visits			
No visits	79.0	52.9	-26.1
One to three visits	75.0	63.0	-12.0
Four to seven visits	65.9	55.2	-10.7
Eight or more visits	55.1	46.5	-8.6
Place of delivery			
Public health facility	68.3	57.1	-11.2
Private health facility	52.8	58.0	5.2
Maternal age group (years)			
15–19	66.7	45.9	-20.8
20–24	70.4	54.3	-16.1
25–29	65.5	53.3	-12.2
30–34	62.4	51.0	-11.4
35–39	61.6	53.6	-8.0
40–44	64.1	46.5	-17.6
45–49	54.8	53.6	-1.2
Highest educational attainment			
No formal education	77.1	69.3	-7.8
Primary education	65.2	56.1	-9.1
Secondary education	59.9	48.5	-11.4
Tertiary education	56.9	51.2	-5.7
Number of children ever born			
One to two children	63.8	49.0	-14.8
Three to four children	62.6	53.7	-8.9
Five or more children	68.3	55.1	-13.2
Religious affiliation			
Christianity	58.4	42.3	-16.1
Islam	76.0	67.9	-8.1
Other or none	43.3	40.0	-3.3
Employment status			
Not employed	67.5	58.2	-9.3
Employed	64.0	50.3	-13.7
Ability to obtain money for healthcare			
Major difficulty	66.8	51.2	-15.6
Not a major difficulty	63.0	52.7	-10.3
Health insurance status			
Uninsured	64.9	52.0	-12.9
Insured	60.8	54.9	-5.9
Marital status			
Never married	55.9	32.8	-23.1
Currently married	65.4	52.7	-12.7
Previously married	61.7	54.3	-7.4
Exposure to mass media			
No exposure	72.2	61.2	-11.0
Exposed	61.7	51.1	-10.6

Women's decision-making autonomy			
Low autonomy	65.3	52.9	-12.4
Moderate autonomy	63.6	52.6	-11.0
High autonomy	52.4	45.6	-6.8
Acceptance of wife beating			
Not justified	62.5	50.3	-12.2
Justified	71.2	63.0	-8.2
Household size			
One to four members	61.2	48.5	-12.7
Five or more members	66.6	54.5	-12.1
Household wealth status			
Poorest	78.0	58.2	-19.8
Poorer	78.3	54.4	-23.9
Middle	74.8	51.9	-22.9
Richer	64.7	50.3	-14.4
Richest	54.0	47.9	-6.1
Sex of household head			
Male-headed household	66.2	53.6	-12.6
Female-headed household	56.1	44.5	-11.6
Age of household head (years)			
Below 30	69.2	51.3	-17.9
30–39	66.6	52.5	-14.1
40–49	62.9	52.7	-10.2
50–59	65.3	52.6	-12.7
60 and above	58.6	49.9	-8.7
Geographical region			
North Central	77.6	72.5	-5.1
North East	87.4	80.3	-7.1
North West	78.6	77.5	-1.1
South East	39.2	32.7	-6.5
South South	38.2	36.7	-1.5
South West	50.1	44.1	-6.0
Community ethnic composition			
Single-ethnicity community	64.8	46.0	-18.8
Multi-ethnic community	65.0	57.2	-7.8

Table 3 displays the aggregated decomposition results, detailing the portion attributable to variations in observable characteristics (E) versus differences in effects or unmeasured factors (C), along with the specific contribution of each covariate to the E and C components. The analysis revealed that approximately 17.6% of the urban-rural disparity in early maternal discharge was accounted for by differences in the composition of characteristics (endowments) across residences, whereas 82.4% stemmed from variations in the influence of unexplained elements between urban and rural settings. Within the decomposition, the endowment (E) effects showed values of -0.56%, 10.38%, -6.95%, -15.21%, -7.53%, -4.73%, 4.11%, 10.17%, 26.41%, -18.93%, and 55.36% for multiple births, private facility delivery, secondary education, higher education, moderate decision-making autonomy, high decision-making autonomy, households with 5+ members, North East, South East, South South, and South West regions, respectively. These figures reflect how the unequal distribution of these attributes either exacerbated or reduced the urban-rural difference in early maternal discharge, as indicated by the positive or negative signs

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Table 3. Factors contributing to urban-rural inequality in early maternal discharge following vaginal delivery.

Variable	Unexplained component (C) β (SE)	Contribution (%)	Explained component (E) β (SE)	Contribution (%)
Overall difference	0.0807 (0.0206)	82.4	0.0172 (0.0157)	17.6
Birth type				
Singleton	Ref	Ref	Ref	Ref
Multiple	0.0011 (0.0020)	1.10	-0.0006 (0.0002)*	-0.56
Birth sequence				
First birth	Ref	Ref	Ref	Ref
Second/third	0.0195 (0.0189)	19.92	-0.0024 (0.0021)	-2.47
Fourth or higher	-0.0025 (0.0286)	-2.60	0.0026 (0.0035)	2.70
Size of baby at birth				
Large	Ref	Ref	Ref	Ref
Average	0.0141 (0.0152)	14.42	-0.0006 (0.0001)	-0.66
Small	0.0006 (0.0053)	0.58	-0.0001 (0.0001)	-0.15
Sex of child				
Male	Ref	Ref	Ref	Ref
Female	0.0020 (0.0128)	2.04	-0.0001 (0.0003)	-0.11
Timing of ANC registration				
Early	Ref	Ref	Ref	Ref
Late	-0.0075 (0.0213)	14.42	0.0001 (0.0002)	0.11
Number of ANC visits				
One to three	Ref	Ref	Ref	Ref
Four to seven	0.0088 (0.0202)	9.02	-0.0015 (0.0033)	-1.55
Eight or more	0.0290 (0.0247)	29.63	-0.0109 (0.0061)	-11.11
Place of delivery				
Public facility	Ref	Ref	Ref	Ref
Private facility	-0.0177 (0.0112)	-18.05	0.0102 (0.0032)*	10.38
Maternal age (years)				
15–19	Ref	Ref	Ref	Ref
20–24	0.0062 (0.0117)	6.36	0.0012 (0.0031)	1.18
25–29	0.0006 (0.0279)	0.57	0.0002 (0.0007)	0.19
30–34	0.0001 (0.0317)	0.07	-0.0005 (0.0040)	-0.47
35–39	0.0032 (0.0243)	3.29	-0.0009 (0.0022)	-0.93
40–44	0.0049 (0.0114)	4.98	-0.0001 (0.0008)	-0.09
45–49	-0.0017 (0.0034)	-1.77	-0.0007 (0.0041)	-0.72
Educational attainment				
No schooling	Ref	Ref	Ref	Ref
Primary	-0.0025 (0.0078)	-2.56	0.0029 (0.0028)	2.95
Secondary	0.0120 (0.0285)	12.25	-0.0068 (0.0035)*	-6.95
Higher	0.0142 (0.0152)	14.46	-0.0149 (0.0073)*	-15.21
Children ever born				
One to two	Ref	Ref	Ref	Ref
Three to four	-0.0059 (0.0163)	-6.00	0.0012 (0.0013)	1.22
Five or more	0.0167 (0.0177)	17.06	-0.0007 (0.0042)	-0.73
Religious affiliation				
Christianity	Ref	Ref	Ref	Ref
Islam	-0.0142 (0.0135)	-14.46	0.0001 (0.0006)	0.09
Other/none	-0.0007 (0.0006)	-0.73	-0.0005 (0.0006)	-0.53
Employment status				
Unemployed	Ref	Ref	Ref	Ref

Employed	-0.0019 (0.0731)	-1.97	0.0001 (0.0006)	0.13
Access to money for medical care				
Major difficulty	Ref	Ref	Ref	Ref
Not a major difficulty	0.0244 (0.0185)	24.90	-0.0007 (0.0023)	-0.69
Health insurance coverage				
Not insured	Ref	Ref	Ref	Ref
Insured	0.0059 (0.0042)	6.02	-0.0017	-1.70
Media exposure				
No exposure	Ref	Ref	Ref	Ref
Exposed	-0.0149 (0.0409)	-15.17	-0.0034 (0.0054)	-3.43
Women's decision-making autonomy				
Low	Ref	Ref	Ref	Ref
Moderate	0.0144 (0.0130)	14.71	-0.0074 (0.0020)*	-7.53
High	-0.0086 (0.0122)	-8.74	-0.0046 (0.0023)*	-4.73
Attitude toward wife beating				
Not justified	Ref	Ref	Ref	Ref
Justified	-0.0109 (0.0048)*	-11.08	-0.0019 (0.0024)	-1.98
Household size				
One to four members	Ref	Ref	Ref	Ref
Five or more members	0.0055 (0.0222)	5.59	0.0040 (0.0018)*	4.11
Household wealth index				
Poorest	Ref	Ref	Ref	Ref
Poorer	0.0283 (0.0145)	28.84	-0.0088 (0.0081)	-9.02
Middle	0.0252 (0.0152)	25.75	-0.0005 (0.0048)	-0.51
Richer	0.0167 (0.0151)	17.02	-0.0013 (0.0035)	-1.27
Richest	0.0171 (0.0146)	17.40	-0.0126 (0.0157)	-12.82
Sex of household head				
Male	Ref	Ref	Ref	Ref
Female	-0.0043 (0.0053)	-4.40	0.0002 (0.0003)	0.25
Age of household head (years)				
Below 30	Ref	Ref	Ref	Ref
30–39	-0.0248 (0.0201)	-25.31	0.0013 (0.0009)	1.36
40–49	-0.0199 (0.0186)	-20.31	0.0025 (0.0018)	2.50
50–59	-0.0032 (0.0075)	-3.22	-0.0001 (0.0002)	-0.11
60 and above	0.0034 (0.0062)	3.47	-0.0005 (0.0010)	-0.48
Region				
North Central	Ref	Ref	Ref	Ref
North East	0.0029 (0.0043)	2.96	0.0100 (0.0031)*	10.17
North West	-0.0025 (0.0052)	-2.51	0.0034 (0.0019)	3.47
South East	0.0017 (0.0125)	1.75	0.0259 (0.0044)*	26.41
South South	-0.0109 (0.0053)*	-11.08	-0.0185 (0.0032)*	-18.93
South West	-0.0257 (0.0149)	-26.26	0.0542 (0.0104)*	55.36
Community ethnic composition				
Single-ethnicity	Ref	Ref	Ref	Ref
Multi-ethnic	-0.0062 (0.0152)	-6.34	0.0005 (0.0018)	0.48

β., Decomposition coefficients; Pct., Percentage contribution of each variable category to early maternal discharge following vaginal delivery; Ref., Reference; SE., standard error; * significant at $P < 0.05$.

In Nigeria, early postpartum discharge after vaginal birth occurred more frequently in rural regions, largely because of restricted access to health services, inadequate staffing, and prevailing sociocultural practices. This pattern of early discharge in rural settings aligns with broader observations across sub-Saharan Africa [25, 31], where similar challenges related to infrastructure deficits, personnel shortages, and cultural influences heighten risks for both mothers and infants. Furthermore, early maternal discharge exhibited a pro-poor concentration among women in Nigeria, with those from lower socioeconomic strata experiencing higher rates after institutional delivery, irrespective of urban or rural location.

Our results indicate that the prevalence of multiple births helped reduce the urban-rural disparity in early maternal discharge. Multiple pregnancies are generally regarded as higher-risk, leading providers to advocate for prolonged monitoring postpartum in both settings [32]. This heightened vigilance lowers the chance of early discharge for affected women across locations [25], thereby extending facility stays and partially offsetting location-based inequities in postnatal care through the influence of clinical risk profiles.

The study also found that giving birth in private facilities increased the urban-rural difference in early maternal discharge. Private providers are far more numerous in urban zones than rural ones, and this uneven availability amplifies the disparity. Operating under commercial pressures and efficiency demands [33], private institutions may encourage shorter stays to maximise bed turnover and minimise costs for patients. As a result, urban women delivering in these settings are often discharged sooner than rural women, who rely mainly on public or basic health centres with stricter adherence to guidelines and lower patient volumes [34]. Limited affordability, distance, and scarcity further restrict rural access to private care [35], making urban concentration of private deliveries a key driver that intensifies inequalities in postpartum management.

Additionally, higher educational attainment emerged as a factor that diminished urban-rural inequities in early maternal discharge after vaginal birth. More educated women tend to exercise greater autonomy in health-related choices, enabling them to advocate effectively for appropriate care regardless of location, even amid pressures like rapid patient circulation or protocol deviations by staff [36]. Nevertheless, the marked urban-rural divide in education levels contributes to differences

in service utilisation. Moreover, participation in antenatal care likely enhances women's understanding of the perinatal phase.

Furthermore, greater autonomy in decision-making among women helped reduce the urban-rural disparity in early postpartum discharge after vaginal birth. Enhanced decision-making capacity, regardless of residential location, can contribute to diminishing the difference in early maternal discharge between urban and rural areas. Women with higher levels of autonomy tend to exert more control over their healthcare choices [37, 38], including decisions about discharge timing, prioritising their own assessment of readiness over institutional pressures or constraints such as staffing shortages and infrastructural deficits. In rural contexts, where early discharge is common owing to inadequate follow-up services, traditional expectations, and personnel limitations, autonomous women may more effectively demand adequate postnatal monitoring, including sufficient duration of stay, thereby aligning their experiences closer to those of similarly empowered urban women. Women bolstered by economic resources, schooling, or social standing can better resist untimely discharge when they identify potential risks, even in high-volume facilities pushing for quick turnover. This form of advocacy in both settings moderates variations in discharge practices. Consequently, a wider prevalence of women possessing strong decision-making authority promotes greater uniformity in postpartum experiences, resulting in reduced divergence in early discharge rates across urban and rural communities.

The analysis revealed that larger households exacerbated the urban-rural difference in early maternal discharge following institutional vaginal delivery. Households with many members are predominantly rural, and this uneven distribution can amplify the urban-rural disparity in early maternal discharge [39]. In rural environments, extended families frequently offer robust immediate postpartum assistance, enabling women to return home sooner with assurance of domestic support. Moreover, prevailing rural traditions may favour prompt discharge to allow resumption of household duties within large family units. In contrast, urban women, usually from compact nuclear families, depend more heavily on facility-based recovery support and may opt for extended stays. Healthcare staff in cities might also encourage longer retention when home-based assistance appears insufficient. Thus, rural women supported by extensive households are often discharged earlier, whereas urban women from smaller

units tend to stay longer, thereby intensifying the location-based inequality in postpartum discharge timing. Household composition, therefore, plays a substantial role in shaping discharge behaviours.

Residence in Nigeria's South South geopolitical zone contributed to reducing urban-rural inequities in early maternal discharge after facility-based vaginal birth. The South South zone likely features more equitable urban-rural profiles among childbearing women or comparatively uniform healthcare availability across locations. Regional health systems and cultural practices appear to support standardised postpartum management irrespective of setting, producing comparable discharge trends for urban and rural women, consistent with the present results. In contrast, residence in the North East, South East, and South West zones enlarged the urban-rural divide. These areas exhibit varying patterns of service access and utilisation, with urban facilities often overwhelmed by high delivery volumes, potentially leading providers to expedite discharges for capacity management. Such regional variations further entrench differences in postnatal care quality between urban and rural populations.

Cultural elements in the South South may foster better postpartum results through emphasis on community support, traditional recovery periods, and robust maternal assistance networks. Among ethnic communities like the Urhobo, Ijaw, and Efik, childbirth is treated as a shared family affair, with new mothers receiving dedicated care from relatives over an extended postpartum phase. Practices akin to "omugwo" or "uwe" entail maternal figures or senior women providing comprehensive support—including rest, proper feeding, and emotional care—for weeks post-delivery, which discourages premature discharge and aids complication prevention under guided supervision. Additionally, elevated female literacy and empowerment in certain South-South areas, linked to resource-driven economic growth, strengthen women's healthcare agency. Improved proximity to urban-standard services also supports effective follow-up monitoring. Relative to some northern zones where sociocultural or religious factors may constrain autonomy and encourage limited facility engagement, South South traditions place priority on maternal recovery and collective aid. Together, these sociocultural, educational, and economic aspects drive superior postnatal outcomes for women in the South South.

Strengths and limitations

The credibility of these results is supported by reliance on nationally representative 2018 NDHS data. By examining urban-rural disparities in early maternal discharge, the work offers actionable evidence for enhancing health education, guidance, and initiatives aimed at closing the identified gap. Nevertheless, reliance on self-reported discharge timing introduces potential recall bias or social desirability effects. Furthermore, the asset-derived wealth measure used as a proxy for economic position may lack precision compared to direct income or expenditure assessments. As a secondary data analysis, the study could not assess epidural use among participants. Similarly, delivery complications—which might affect stay duration—were not recorded in the dataset.

Conclusion

This research adds valuable insights to maternal health scholarship in Nigeria by elucidating persistent urban-rural differences in early maternal discharge and their underlying drivers. Evidence showing higher early discharge rates among rural than urban women, coupled with its pro-poor concentration, highlights enduring barriers to fair postnatal service delivery. The negative concentration indices confirm disproportionate burden on low-income groups, emphasising the urgency of economically targeted measures. By isolating factors that either mitigate or aggravate the disparity—including educational attainment, autonomy, and delivery facility type—the analysis provides guidance for localised policy responses. Identifying specific regions and socioeconomic conditions linked to inequities supplies a solid foundation for crafting focused interventions to advance maternal care fairness, bolster postnatal systems, and align national strategies with Sustainable Development Goal 3 targets for lowering maternal morbidity and mortality in Nigeria.

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