Prevalence and factors associated with utilisation of postnatal care in Sierra Leone: a 2019 national survey

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Research Article

Keywords: Postnatal care, Sierra Leone, Women, DHS, Utilisation

Posted Date: September 20th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-891624/v1

Abstract

Background

Globally, about 289,000 maternal deaths are registered annually. Timely access to quality maternal health services is an effective intervention to reduce maternal deaths. Postnatal care (PNC) is one of the recommended packages in the continuum of maternity care aimed at reducing maternal and neonatal mortality. This study aimed to determine the prevalence and factors associated with PNC utilisation in Sierra Leone.

Methods

We used Sierra Leone Demographic and Health Survey (UDHS) 2019 data of 7,326 women aged 15 to 49 years. We conducted multivariable logistic regression to determine the factors associated with PNC utilisation, using SPSS version 25.

Results

Out of 7,326 women, 3,329 (45.5%, 95% CI: 44.6–46.8) had their babies have at least a PNC contact, 6,646 (90.7%, 95% CI: 90.2–91.5) had a postnatal check after childbirth and 3,133 (42.8%, 95% CI: 41.9–44.1) had PNC for both their babies and themselves. Delivery by caesarean section (aOR 1.79, 95% CI: 1.20–2.67), having a visit by a health field worker (aOR 1.77, 95% CI: 1.47–2.13), having had eight or more ANC contacts (aOR 1.79, 95% CI: 1.45–2.22), initiating ANC after first trimester (aOR 1.18, 95% CI: 1.04–1.35), being a Muslim (aOR 1.34, 95% CI: 1.11–1.61), belonging to richer wealth quintile (aOR 1.69, 95% CI: 1.22–2.35), being of low parity (2–4) (aOR 1.20, 95% CI: 1.04–1.39), having no big problems seeking permission to access healthcare (aOR 1.52, 95% CI: 1.27–1.83) and having had delivery at home (aOR 1.75, 95% CI: 1.32–2.32) were associated with more PNC utilisation odds. On the other hand, being resident in the Eastern region (aOR 0.31, 95% CI: 0.21–0.46) and urban areas (aOR 0.71, 95% CI: 0.52–0.98) were associated with lower odds of utilising PNC.

Conclusion

Although maternal PNC utilisation is high, utilisation of PNC by neonates alone and by both the mother and neonatal is low. More focus is needed to mothers and their neonates from the Eastern region, urban areas, Christians, less empowered in terms of healthcare seeking decision making and those who are more parous, utilise less ANC contacts and utilise health facilities for delivery.

Introduction

Globally, over 289,000 women die from complications related to pregnancy and childbirth [1, 2] and over one million neonates die soon after birth [2, 3]. Almost all (99%) of these maternal and neonatal deaths occur in

low and middle income countries in South Asia and Sub-Saharan Africa. Majority (65%) of the maternal and neonatal deaths occur in the first week of life [2, 4]. Sub-Saharan Africa records the highest maternal deaths currently, at 500 per 100,000 live births every year [2]. Timely access to quality maternal health services is an effective intervention to reduce pregnancy and childbirth related deaths [2]. Over the decade, progress has been reported in ensuring increase in the continuum of maternal healthcare utilisation [5]. However, the progress has been mainly with skilled antenatal care attendance and facility-based deliveries with little progress regarding PNC utilisation [5, 6].

The immediate postpartum period is critical for the survival of both mothers and newborns because that is when most physiological adaptations occur [2]. In this regard, receipt of timely postnatal care (PNC) is widely used to track progress towards national and international maternal child health goals [7, 8]. PNC is one of the recommended packages in the continuum of maternity care, aimed at reducing maternal and neonatal mortality [2, 9]. This service consist of care given to mothers and neonates right after delivery and up to six weeks of postpartum with the aim of ensuring optimum health for the mother and the infant [2]. Timely PNC enables health workers to detect, follow, and quickly manage complications of both the mother and newborn [10]. In addition, timely PNC accords an opportunity to receive health information and support for positive practices such as exclusive breastfeeding, danger signs, care of the newborn that are key to maternal and child health and survival [11]. Therefore, WHO recommends the first postnatal check to be done within the first 24 hours of childbirth and then, at least three other postnatal visits are arranged for all mothers and newborns, on day 3, between the 1st and 2nd weeks, and 6 weeks after childbirth [2, 5]. However, about 63% of mothers and 48% of newborns globally utilise PNC within the recommended timeframe [2] and less than 25% of newborns in less developed countries receive PNC within two days of delivery [2].

Although, the benefits of PNC in reducing maternal and neonatal deaths have been well documented, postnatal services have the lowest median national coverage of all the interventions on the continuum of maternal and child healthcare [12, 13]. Despite several government interventions to improve maternal and child health services such as Free Health Care Initiative (FHCI) in 2010 that exempted user fees for maternal healthcare services [14], not much has been achieved. On a global scale, Sierra Leone is still among the top three countries with the highest maternal mortality ratio (MMR) [15, 16]. The 2019 Sierra Leone Demographic and Health Survey (SLDHS) showed that the maternal mortality ratio (MMR) was 717 deaths per 100,000 live births, meaning for every 1000 live births, about seven women (7.17) died during pregnancy, childbirth or within six weeks of childbirth [17].

In order to reduce the high maternal and neonatal mortality, there is need for update and evidence based information to guide the formulation and implementation of effective strategies. However, there is dearth of information about the determinants of PNC utilisation especially considering both maternal and neonatal PNC, prior studies have focused on skilled birth attendance and health facility delivery utilisation. Therefore, the current study aimed to determine the prevalence and factors associated with PNC utilisation in Sierra Leone. Besides being the first study that used data from a national survey to look at postnatal care utilisation in Sierra Leone, it’s also the first study in the region to look at mother-neonate pair utilisation of postnatal care.

Methods

Data source

This study used secondary data from the 2019 Sierra Leone Demographic and Health Survey (SLDHS). Data were accessed from MEASURE DHS database at http://dhsprogram.com/data/available-datasets.cfm. SLDHS was a nationally representative cross-sectional survey implemented by Statistics Sierra Leone (Stats SL) with technical assistance from ICF intern through the DHS Program and funded by the United States Agency for International Development (USAID). The Demographic and Health Survey datasets are freely available to the public though researchers must register with MEASURE DHS and submit a request before accessing them.

Study sampling and participants

The 2016 SLDHS samples were selected using a stratified, two-stage cluster sampling design that resulted in the random selection of 13,872 households [17]. Detailed sampling procedures were published in the final report [17]. DHS uses different questionnaires; household questionnaire collects data on household environment, assets and basic demographic information of household members while women's questionnaire collects data about women's reproductive health, domestic violence and nutrition indicators. The individual record (IR) file used in this study contains all the collected data in the women's questionnaire for de facto women plus some variables from the household questionnaire. This secondary analysis included women aged 15 to 49 years who had a live birth within five years preceding the survey and were either permanent residents or slept in the selected household the night preceding the survey. Out of the total weighted sample of 15,574 women in the data set, only 7,326 had given birth within five years preceding the survey (Table 1). Of the 7,326 women, 126 women had missing data leading to a total of 7,200 women for logistic regression analysis (Table 3).

Variables

Dependent variables

The outcome variable was PNC utilisation which was considered as atleast one postnatal check for both the mother and the neonate within the postpartum period and was constructed into a binary variable coded as one (1) if the mother and neonate utilised PNC and zero (0) if no PNC utilisation for both mother and the neonate.

Independent variables

This study included determinants of ANC initiation timing and frequency based on evidence from available literature and data [2, 5, 9, 12]. Twenty-one explanatory variables were used in this study. Maternal age was categorised as; (15-19 years, 20–34 years and 35–49years). Wealth index is a measure of relative household economic status and was calculated by UDHS from information on household asset ownership using Principal Component Analysis, which was further categorised into poorest, poorer, middle, richer and richest quintiles [4] . Place of Residence was categorised into urban and rural.

Region was categorised into four; Northern, Eastern, Southern, Western and Northwestern while level of Education was categorised into no education, primary education, secondary and tertiary education. Household Size was categorised as less than seven members and seven and above members (based on the dataset average of seven members per household). Sex of household head was categorised as male or female, working status categorized as: not working and working while marital status as married (this included those in formal and informal unions) and not married. Religion was categorised as Muslims and Christians and others, problems seeking permission and distance to health facility were categorised as big problem and no big problem while exposure to mass media and internet use (TV, radio, and newspapers) were categorized as yes and no. In the questionnaire, seeking permission to access healthcare and distance to health facility had three original responses: no problem, no big problem and big problem. However, none of the study participants reported no problem hence we only had two responses. Skilled birth attendance was categorised as yes and no, place of child birth as home and health facility and method of delivery as caesarean section and vaginal.

Statistical analysis

Analysis was carried out based on the weighted count to account for the unequal probability sampling in different strata and to ensure representativeness of the survey results at the national and regional level. In order to account for the multi-stage cluster study design, complex sample package of SPSS (version 25.0) statistical software was used. We used SPSS version 25.0 statistical software complex samples package incorporating the following variables in the analysis plan to account for the multistage sample design inherent in the DHS dataset: individual sample weight, sample strata for sampling errors/design, and cluster number [18-20]. Use of complex samples package ensures that the sample design is incorporated into the analysis leading to accurate and reliable results.

Before multivariable logistic regression, each exposure/predictor (independent variable) was assessed separately for its association with PNC utilisation using bivariable logistic regression and we presented the crude odds ratio (COR), 95% confidence interval (CI) and p-values. Independent variables associated with PNC utilisation with a p-value ≤ 0.25 at the bivariable level, and not strongly collinear with other independent variables were included in the final multivariable logistic regression model to assess the independent effect of each variable on the PNC utilisation. Adjusted odds ratios (AOR), 95% confidence intervals (CI) and p-values were calculated with statistical significance level set at p-value < 0.05.

Results

A total of 7,326 women were included in the analysis (Table 1). Of these, 3,329 (45.5%, 95% CI: 44.6–46.8) had their babies have at least a post-natal care contact, 6,646 (90.7%, 95% CI: 90.2–91.5) had a postnatal check after childbirth and 3,133 (42.8%, 95% CI: 41.9–44.1) had both their babies and themselves have a postnatal check as shown in Table 2. Majority of the women had less than eight ANC contacts (78.0%), had skilled birth attendance (88.3%) were residing in rural areas (61.9%), were Muslims (78.7%), had no education (52.7%), resided in male headed households (75.3%), were married (81.9%), working (77%) and aged between 20 and 34 years (65.9%). Mass media exposure was limited with 57.7% of women not exposed to radio,

76.2% not exposed to TV, 89.9% not using internet and 94.5% not exposed to newspapers. The mean age and household size were 28.97 ± 7.25 and 6.93 ± 3.45 respectively.

Table 1
Socio-demographic characteristics of women in Sierra Leone as per the 2019 SLDHS

Characteristics	N = 7,326	%
Age		
15 to 19	598	8.2
20 to 34	4830	65.9
35 to 49	1898	25.9
Residence		
Urban	2795	38.1
Rural	4531	61.9
Region		
Western	1479	20.2
Eastern	1542	21.0
Northwestern	1380	18.8
Northern	1433	19.6
Southern	1492	20.4
Religion		
Islam	5766	78.7
Christianity and others	1560	21.3
Sex household head		
Male	5520	75.3
Female	1806	24.7
Household Size		
7 and above	3319	45.3
Less than 7	4007	54.7
Working status		
Not working	1683	23.0
Working	5643	77.0
Marital status		

[a]= missing 113 (1.5%) respondents, [b]= missing 13 (0.2%) respondents

Characteristics	N = 7,326	%
Not married	1329	18.1
Married	5997	81.9
Education Level		
No Education	3857	52.7
Primary Education	1033	14.1
Secondary Education	2214	30.2
Tertiary	221	3.0
Wealth Index		
Poorest	1587	21.7
Poorer	1551	21.1
Middle	1487	20.3
Richer	1441	19.7
Richest	1259	17.2
Parity		
1	1989	27.1
2–4	4015	54.8
5 and above	1323	18.1
Exposure to newspapers		
No	6921	94.5
Yes	405	5.5
Exposure to Radio		
No	4224	57.7
Yes	3102	42.3
Exposure to TV		
No	5579	76.2
Yes	1747	23.8
Internet use		
No	6586	89.9

[a]= missing 113 (1.5%) respondents, [b]= missing 13 (0.2%) respondents

Characteristics	N = 7,326	%
Yes	740	10.1
Permission to access healthcare		
Big problem	1827	24.9
Not big problem	5499	75.1
Distance to health facility		
Big problem	3454	47.1
Not big problem	3872	52.9
ANC timing [a]		
Above first trimester	4000	55.4
Within first trimester	3214	44.6
ANC attendance		
8 contacts and above	1610	22.0
Less than 8 contacts	5715	78.0
Method of birth [b]		
Caesarean section	324	4.4
Vaginal	6988	95.6
Skilled birth attendance		
Yes	6468	88.3
No	858	11.7
[a]= missing 113 (1.5%) respondents, [b]= missing 13 (0.2%) respondents		

Table 2
Utilisation of postnatal care

Service	Frequency N = 7,326	%	95% CI
Maternal PNC	6646	90.7	90.2–91.5
Neonatal PNC	3329	45.5	44.6–46.8
Both maternal and neonatal PNC	3133	42.8	41.9–44.1

Factors Associated With Pnc Utilisation

After adjusting for other variables, factors that were positively associated with PNC utilisation as shown in Table 3 were; delivery by caesarean section (aOR 1.79, 95% CI: 1.20–2.67), having a visit by a health field worker (aOR 1.77, 95% CI: 1.47–2.13), having had eight or more ANC contacts (aOR 1.79, 95% CI: 1.45–2.22), initiating ANC after first trimester (aOR 1.18, 95% CI: 1.04–1.35), belonging to Islam (aOR 1.34, 95% CI: 1.11–1.61), belonging to richer wealth quintile (aOR 1.69, 95% CI: 1.22–2.35), being less parous (2–4) (aOR 1.20, 95% CI: 1.04–1.39), having no big problems seeking permission to access healthcare (aOR 1.52, 95% CI: 1.27–1.83) and having had delivery at home (aOR 1.75, 95% CI: 1.32–2.32). Exposure to radio (aOR 1.15, 95% CI: 0.98–1.34) was marginally associated with more odds of PNC utilisation compared to non-exposure.

Belonging to the Eastern region (aOR 0.31, 95% CI: 0.21–0.46) and residing in urban areas (aOR 0.71, 95% CI: 0.52–0.98) were associated with less odds of utilising PNC compared to belonging to the Western region and residing in rural areas respectively.

Table 3
Factors associated with PNC utilisation in Sierra Leone as per the 2019 SLDHS

	Cross tabulation **N = 7,326**			**Logistic regression** **N = 7,200**			
Characteristics	No PNC n (%)	Yes, PNC n (%)	P-value	Crude model cOR (95% CI)	P-value	Adjusted model aOR (95% CI)	P-value
Caesarean section			0.037				
No	4028 (96.4)	2960 (94.5)		1		1	
Yes	151 (3.8)	173 (5.2)		1.55 (1.02–2.36)*	0.038	1.79 (1.20–2.67)*	0.005
Skilled birth attendance			< 0.001				
Yes	3828 (91.3)	2641 (84.3)		1		1	
No	365 (8.7)	492 (15.7)		1.95 (1.57–2.43)*	< 0.001	1.06 (0.77–1.47)	0.703
Visited by fieldworker			< 0.001				
No	3131 (74.7)	2448 (78.1)		1		1	
Yes	1062 (25.3)	685 (21.9)		1.73 (1.43–2.09)*	< 0.001	1.77 (1.47–2.13)*	< 0.001
ANC frequency			< 0.001				
Less than 8 contacts	3435 (81.9)	2281 (72.8)		1		1	
8 contacts and above	758 (18.1)	852 (27.2)		1.69 (1.39–2.06)*	< 0.001	1.79 (1.45–2.22)*	< 0.001
ANC initiation timing			0.003				
First trimester	1919 (46.7)	1294 (41.7)		1		1	

*: significant at < 0.05

	Cross tabulation N = 7,326			Logistic regression N = 7,200			
After first trimester	2192 (53.3)	1808 (58.3)		1.22 (1.07–1.40)*	0.003	1.18 (1.04–1.35)*	0.011
Age			0.756				
35 to 49	1074 (25.6)	824 (26.3)		1			
20 to 34	2781 (66.3)	2049 (65.4)		0.96 (0.85–1.08)	0.507		
15 to 19	338 (8.1)	260 (8.3)		1.01 (0.82–1.23)	0.963		
Residence			0.211				
Rural	2528 (60.3)	2004 (63.9)		1		1	
Urban	1665 (39.7)	1129 (36.1)		0.86 (0.67–1.09)	0.211	0.71 (0.52–0.98)*	0.038
Region			< 0.001				
Western	825 (19.7)	654 (20.9)		1		1	
Southern	854 (20.4)	638 (20.4)		0.95 (0.65–1.38)	0.771	0.70 (0.47–1.04)	0.078
Northwestern	615 (14.7)	765 (24.4)		1.57 (1.01–2.44)*	0.043	0.93 (0.60–1.44)	0.741
Northern	733 (17.5)	700 (22.3)		1.21 (0.80–1.82)	0.366	0.79 (0.51–1.22)	0.290
Eastern	1166 (27.7)	376 (12.0)		0.41 (0.28–0.60)*	< 0.001	0.31 (0.21–0.46)*	< 0.001
Religion			< 0.001				
Christianity and others	1006 (24.0)	554 (17.7)		1		1	
Islam	3187 (76.4)	2579 (82.3)		1.47 (1.22–1.77)*	< 0.001	1.34 (1.11–1.61)*	0.002
Sex household head			0.254				
Male	3192 (76.1)	2328 (74.3)		1			

*: significant at < 0.05

	Cross tabulation N = 7,326			Logistic regression N = 7,200			
Female	1001 (23.9)	805 (25.7)		1.10 (0.93–1.30)	0.254		
Household Size			0.102				
7 and above	1850 (44.1)	1469 (46.9)		1			
Less than 7	2343 (55.9)	1664 (53.1)		0.89 (0.78–1.02)	0.102	0.92 (0.81–1.05)	0.208
Working status							
Not working	979 (23.3)	704 (22.5)		1			
Working	3214 (76.6)	2429 (77.5)		1.05 (0.89–1.23)	0.550		
Marital status			0.990		0.990		
Not married	760 (18.1)	569 (18.2)		1			
Married	3433 (81.9)	2564 (81.8)		0.99 (0.86–1.16)			
Education Level			0.888		0.910		
No Education	2219 (52.9)	1638 (52.3)		1			
Primary Education	590 (14.1)	442 (14.1)		1.02 (0.88–1.19)	0.808		
Secondary Education	1253 (29.9)	962 (30.7)		1.04 (0.89–1.22)	0.622		
Tertiary	132 (3.1)	90 (2.9)		0.92 (0.64–1.34)	0.674		
Wealth Index			< 0.001				
Poorest	991 (23.6)	596 (19.0)		1		1	
Poorer	833 (19.9)	718 (22.9)		1.43 (1.17–1.75)*	< 0.001	1.44 (1.17–1.77)*	0.001
Middle	814 (19.4)	674 (21.5)		1.38 (1.10–1.72)*	0.005	1.37 (1.10–1.70)*	0.005

*: significant at < 0.05

	Cross tabulation N = 7,326			Logistic regression N = 7,200			
Richer	738 (17.6)	703 (22.5)		1.59 (1.22–2.06)*	0.001	1.69 (1.22–2.35)*	0.002
Richest	817 (19.5)	442 (14.1)		0.90 (0.62–1.30)	0.568	0.97 (0.63–1.49)	0.896
Parity			0.224				
5 and above	789 (18.8)	534 (17.0)		1		1	
2–4	2263 (54.0)	1751 (55.9)		1.14 (0.99–1.31)	0.063	1.20 (1.04–1.39)*	0.015
1	1141 (27.2)	848 (27.1)		1.10 (0.93–1.30)	0.287	1.13 (0.96–1.33)	0.153
Newspapers exposure			0.427				
No	3949 (94.2)	2971 (94.8)		1			
Yes	244 (5.8)	162 (5.2)		0.88 (0.65–1.20)	0.427		
Exposure to Radio			0.141				
No	2467 (58.8)	1757 (56.1)		1		1	
Yes	1726 (41.2)	1376 (43.9)		1.12 (0.96–1.30)	0.141	1.15 (0.98–1.34)	0.079
Exposure to TV			0.139				
No	3131 (74.7)	2448 (78.1)		1		1	
Yes	1062 (25.3)	685 (21.9)		0.83 (0.64–1.07)	0.140	0.81 (0.65–1.01)	0.060
Internet use			0.338				
No	3791 (90.4)	2795 (89.2)		1			
Yes	402 (9.6)	338 (10.8)		1.14 (0.87–1.51)	0.338		
Permission to access healthcare			< 0.001				
Big problem	1203 (28.7)	623 (19.9)		1		1	

*: significant at < 0.05

	Cross tabulation N = 7,326			Logistic regression N = 7,200			
Not big problem	2990 (71.3)	2510 (80.1)		1.62 (1.34–1.96)*	< 0.001	1.52 (1.27–1.83)*	< 0.001
Distance to health facility			0.264				
Big problem	2030 (48.4)	1424 (45.5)		1			
Not big problem	2163 (51.6)	1709 (54.5)		1.13 (0.91–1.38)	0.264		
Delivery place			< 0.001				
Health facility	3717 (88.6)	2491 (79.5)		1		1	
Home	476 (11.4)	642 (20.5)		2.01 (1.66–2.43)*	< 0.001	1.75 (1.32–2.32)*	< 0.001
*: significant at < 0.05							

Discussion

Utilisation of Post-natal care services

We found that 42.8% of the participants had at least one PNC contact, which is slightly higher than that recorded in Ethiopia, Rwanda and Ghana [21–25]. On the other hand, it is lower than the reported prevalence of 48.4% for Malawi, 63% for Zambia and 78.4 % for Indonesia [26–28]. This observed PNC utilisation is lower than the 90% recommended PNC coverage by WHO [29], which continues to limit the early identification of postpartum complications among the women and the newborns in the country. This situation is particularly worrying because about 40% of the reported maternal and perinatal morbidity and mortality occur in the immediate postpartum period.

Factors associated with PNC utilisation.

The odds of PNC utilisation were almost two times higher among women that delivered by caesarean compared to those that delivered vaginally. This finding is not surprising and it is in line with many other studies across the globe, this is due to the fear for complications that may arise [23, 28]. Generally, patients that have undergone surgery are in most cases given extra attention by health personnel regarding awareness on the complications which come after delivery thus take the scheduled postnatal visits more seriously [23, 30]. In addition, women who have operative childbirths tend to have greater perceived susceptibility to a wide range of postoperative complications; therefore, frequent return to the health facilities would be the strategy to minimise these perceived risks and in return get the opportunity to utilise PNC [27, 31].

Several studies conducted in Uganda, Ethiopia, Malawi, Zambia and Tanzania, have shown that increased frequency of ANC contacts is associated with higher odds of PNC utilisation [24, 27, 28, 32, 33]. Similarly, in this study the odds of PNC utilisation were two times higher among woman who had eight or more ANC contacts compared to their counterparts who had fewer. This may be attributed to the fact that regular contact with health workers during ANC, accords more opportunities for education and counselling about the need to seek for health care services during and after pregnancy [28, 29, 34]. However, there is need to explore the mechanisms associated with increased odds of PNC utilisation among women who initiate ANC after the first trimester. Mothers who had at least one visit by a health field worker had higher odds of PNC utilisation, a finding similar to that of other studies done in similar contexts [35, 36]. The repeated contact with health workers during pregnancy through ANC services and visits by health field workers promote confidence and familiarity with the health system leading to increased trust in the health system [24]. This emphasizes the need to build capacity among field health workers, so that they are empowered to counsel women to seek PNC services at the community level in addition to strengthening the services in the health facilities.

Belonging to richer wealth quintile was significantly associated with increased utilisation of PNC services, a finding similar to studies done in Guinea, Zambia and Ethiopia [26, 30, 37, 38]. Wealth index being a proxy of financial status means that women in higher wealth indices can easily afford the direct and indirect costs involved in accessing quality and timely healthcare. [39, 40]. Furthermore, women from wealthier households tend to be more enlightened and empowered hence have more decision making powers which enables them to have timely and more frequent healthcare access [39]. Given that Sierra Leone has free maternal healthcare services [41], our results suggest that, apart from the cost of health services, other economic factors play a key role in influencing PNC utilisation. However, studies from countries like Rwanda, did not show any correlation between the financial status of women and their utilisation of PNC [21]. The discrepancy may be attributed to the fact that Sierra Leone has not effectively implemented the free maternal healthcare services policy like Rwanda [42] and the higher poverty levels and the poorer road networks in Sierra Leone that make indirect maternal healthcare access costs a huge burden.

The odds of PNC utilisation among women who had no big problems seeking permission to access healthcare were more compared to their counterparts with big problems seeking permission for healthcare access. It is widely reported that empowering women to individually take decisions concerning their maternal health demands has greatly shown positive impact in the utilisation of services like PNC [33]. The influence of spouses an family members in the women's decision making towards seeking health care services has elsewhere been documented as a key factor limiting utilisation of services like PNC [28, 38].

Regarding mass media exposure, none of the mass media were significantly associated with PNC utilisation. However, exposure to radio and TV were marginally associated with PNC utilisation. Although exposure to media has been shown in previous studies to have a positive association with PNC utilisation [43], the low levels of education evidenced by over 52.7% women having no education and the fact that over 61.9% of the women reside in rural areas where access is hard and not sustainable due to the costs involved might partly explain the non-significant findings.

Women in the Eastern region had lower odds of PNC utilisation compared to women in the Western region. In Sierra Leone, the Western region has the largest concentration of health workers, is the most developed

region, which also houses the capital and economic city of the country and hence has higher quality social amenities compared to other regions [41, 44]. Therefore, women in the Western region have easier access to health care facilities for PNC and are more likely to afford the direct and indirect costs involved in seeking PNC. However, more studies are needed to explore these regional differences in the utilisation of PNC. The role of regional disparities in explaining PNC utilisation has also been documented in previous studies in Malawi, Tanzania and Ghana [25, 28, 35].

Muslim women were more likely to utilise PNC compared to their Christian counterparts which finding was observed in a similar study done in Ghana [25]. Muslims are a majority in Sierra Leone with over 78.7% of the women in our study which could lead to much influence and social support which social support could partly lead to increased utilisation of PNC services. Furthermore, it has also been documented that some Christians rely on spirituality and faith-based practices in seeking healthcare and in coping with illness [25, 45]. Hence, we partly reason that, the Christians might have relied on their faith, hence prioritising their faith over seeking PNC. We however recommend further studies on the influence of religion and PNC utilisation.

Our study revealed a negative association between parity and PNC utilisation, women of low parity had higher odds of utilising PNC compared to those of higher parity (5 and above). This has been observed in similar studies [31, 46, 47]. Women of low parity usually depend on the support of health professionals and their close relatives for postpartum care and they are usually very curious about their health and that of their baby. This may partly explain this observation of increased utilisation of PNC services in this category [31]. On the other hand, multiparous women tend to have a sense of having gained enough experience when it comes to childbirth, hence have less fear for negative pregnancy outcomes associated with limited utilisation of maternal healthcare services [46]. Furthermore, limited availability of time because of the extra responsibilities to take care of the other children might make it hard for these women to access maternal healthcare services for the selves and the newborn [48, 49].

Unexpectedly, women resident in urban areas and those who delivered at health facilities had lower odds of PNC utilisation compared to those who are resident in rural areas and those that had home deliveries respectively. Most studies have shown urban areas to be associated with better PNC utilisation [28, 30, 50] due to factors such as high concentration of health care facilities, having more educated and financially stable women [50]. However, the reverse finding in our study could be partly attributed to the increasing numbers of urban poor population coupled with high standards of living and inequitable distribution of social amenities including public and private health facilities make it hard for low income women to access the services [51]. Furthermore, the documented staff challenges such as poor delegation, favoritism and a lack of autonomy could partly affect quality of services in urban public health facilities which further limits access to these facilities [41, 44]. The efforts of the government to ensure better service delivery in less developed rural areas could also have contributed to this finding [52]. However, more studies are needed to explore these rural-urban differences in the PNC utilisation. Several studies have shown women who utilised health facilities for childbirth to have had higher odds of PNC utilisation [22, 23, 30] contrary to our finding. However, Kante el al. and Mohan et al. found women who had delivered from home to have had higher odds of PNC utilisation compared to those who delivered from health facilities [34, 35]. This could be partly explained by the poor quality of care and experiences from the healthcare workers that women could have had during

childbirth in the health facilities that demotivated them to return for PNC [35]. Secondly, for PNC done in the community, it's possible that the community health workers prioritise women who failed to deliver from a health facility and lastly, the need to get child health for the babies required for immunization and other services could have motivated women who had delivered from home to report to health facilities and end up receiving PNC [35].

Strengths And Limitation

This study used the most recent SLDHS data with a larger sample size and higher quality, which substantially reduces the risk of sampling bias and measurement bias. We used a nationally representative sample and weighed the data for analysis and therefore our results are generalized to all women in Sierra Leone. The cross-sectional nature of the study does not confirm the definitive cause and effect relationship. The other limitation was that the SLDHS did not include information on crucial factors such as uptake on the four recommended PNC visits, male involvement, knowledge of PNC and the perceived quality of childbirth experience which could have an effect on uptake of PNC services.

Conclusion

Less than half (42.8%) of women and neonates in Sierra Leone who had a live birth five years before the survey had a PNC contact, which is very low compared to the WHO recommended utilisation rate. This study revealed that Eastern region, poor, urban, multiparous, Christian women and those who had spontaneous vaginal and health facility delivery, less ANC contacts, not visited by field health workers and having problems seeking permission to seek healthcare were associated with less odds of PNC utilisation. The low PNC service utilisation calls for a need to improve or revise the current strategies being use in ensuring proper maternal healthcare delivery. Further research may be required to decipher the exact mechanism through which factors such as urban women, women who deliver from health facilities and being Christian lead to lesser odds of PNC utilisation. More importantly, there is need to intensify health education among pregnant women during ANC and at discharge after delivery, boost field health workers' activities, improving women's empowerment, improving easier access to internet and reducing wealth and regional inequities.

Abbreviations

EA Enumeration area

AOR Adjusted Odds Ratio

CI Confidence Interval

COR Crude Odds Ratio

DHS Demographic Health Survey

SLDHS Sierra Leone Demographic Health Survey

OR Odds Ratio

SD Standard Deviation

WHO World Health Organization

ANC Antenatal care

PNC Postnatal care

SPSS Statistical Package for Social Science

DECLARATIONS

Declarations

Acknowledgements

We thank the DHS program for making the data available for this study.

Funding information

No funding was obtained for this study.

Availability of data and materials

The data set used is openly available upon permission from MEASURE DHS website (URL: https://www.dhsprogram.com/data/available-datasets.cfm).

Author contributions

QS Conceived the idea, drafted the manuscript, performed analysis and interpreted the results. LN drafted part of the manuscript and reviewed the subsequent versions. KK and MWM reviewed the first draft and drafted the subsequent versions of the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

High international ethical standards are ensured during MEASURE DHS surveys and **the study protocol is performed in accordance with the relevant guidelines.** The SLDHS 2019 survey protocol was reviewed and approved by the Sierra Leone Ethics and Scientific Review Committee and the ICF Institutional Review Board. **Written informed consent was obtained from human participants and written informed consent was also obtained from legally authorized representatives of minor participants.** This data set was obtained from the MEASURE DHS website (URL: https://www.dhsprogram.com/data/available-datasets.cfm) after getting their permission, and no formal ethical clearance was obtained since we conducted a secondary analysis of publicly available data.

Availability of data and materials

The data set used in this study is openly available from MEASURE DHS website and the modified data set that was used for the final analysis can be availed upon request from the corresponding author.

Consent for publication

Not applicable.

Competing interests

All authors declare that they have no competing interests.

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References

1. Abota TL, Atenafu NT: Postnatal Care Utilization and Associated Factors among Married Women in Benchi-Maji Zone, Southwest Ethiopia: A Community Based Cross-Sectional Study. *Ethiopian journal of health sciences* 2018, 28(3):267–276.
2. Tessema ZT, Yazachew L, Tesema GA, Teshale AB: Determinants of postnatal care utilization in sub-Saharan Africa: a meta and multilevel analysis of data from 36 sub-Saharan countries. *Italian journal of pediatrics* 2020, 46(1):175.
3. Chhetri S, Shah R, Rajbanshi L: Factors Associated with Utilization of Complete Postnatal Care Service in Baglung Municipality, Nepal. *International journal of reproductive medicine* 2020, 2020:2892751–2892751.
4. Sserwanja Q, Musaba MW, Mukunya D: Prevalence and factors associated with modern contraceptives utilization among female adolescents in Uganda. *BMC Women's Health* 2021, 21(1):61.
5. Dey T, Ononge S, Weeks A, Benova L: Immediate postnatal care following childbirth in Ugandan health facilities: an analysis of Demographic and Health Surveys between 2001 and 2016. *BMJ global health* 2021, 6(4):e004230.
6. Sacks E, Langlois ÉV: Postnatal care: increasing coverage, equity, and quality. *The Lancet Global Health* 2016, 4(7):e442-e443.
7. McCarthy KJ, Blanc AK, Warren C, Bajracharya A, Bellows B: Validating women's reports of antenatal and postnatal care received in Bangladesh, Cambodia and Kenya. *BMJ global health* 2020, 5(4):e002133.
8. Moller AB, Newby H, Hanson C, Morgan A: Measures matter: A scoping review of maternal and newborn indicators. 2018, 13(10):e0204763.
9. Esopo K, Derby L, Haushofer J: Interventions to improve adherence to antenatal and postnatal care regimens among pregnant women in sub-Saharan Africa: a systematic review. *BMC pregnancy and childbirth* 2020, 20(1):316.

10. Agho KE, Ezeh OK, Issaka AI, Enoma AI, Baines S, Renzaho AMN: Population attributable risk estimates for factors associated with non-use of postnatal care services among women in Nigeria. *BMJ open* 2016, 6(7):e010493-e010493.
11. Ugboaja JO, Berthrand NO, Igwegbe AO, Obi-Nwosu AL: Barriers to postnatal care and exclusive breastfeeding among urbanwomen in southeastern Nigeria. *Niger Med J* 2013, 54(1):45–50.
12. Benova L, Owolabi O, Radovich E, Wong KLM, Macleod D, Langlois EV, Campbell OMR: Provision of postpartum care to women giving birth in health facilities in sub-Saharan Africa: A cross-sectional study using Demographic and Health Survey data from 33 countries. *PLoS medicine* 2019, 16(10):e1002943.
13. Countdown to 2030: tracking progress towards universal coverage for reproductive, maternal, newborn, and child health. *Lancet (London, England)* 2018, 391(10129):1538–1548.
14. UNFPA, Sierra Leone Country Office. Free Health Care Initiative: UNFPA Support In Sierra Leone; 2013. Available from https://sierraleone.unfpa.org/sites/default/files/pubpdf/UNFPA_support_Free_Health_Care_Initiative.pdf.
15. Ameyaw EK, Dickson KS: Skilled birth attendance in Sierra Leone, Niger, and Mali: analysis of demographic and health surveys. *BMC public health* 2020, 20(1):164–164.
16. Trends in maternal mortality. 1990 to 2015: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. ISBN 978 92 4 1565141. Available at https://openknowledge.worldbank.org/bitstream/handle/10986/23550/report.pdf;sequence=1.
17. Statistics Sierra Leone - StatsSL, ICF: Sierra Leone Demographic and Health Survey 2019. In. Freetown/Sierra Leone: StatsSL/ICF; 2020.
18. Agbadi P, Eunice TT: Complex samples logistic regression analysis of predictors of the current use of modern contraceptive among married or in-union women in Sierra Leone: Insight from the 2013 demographic and health survey. 2020, 15(4):e0231630.
19. Zou, D., Lloyd, J. E. V., & Baumbusch, J. L. (2019). Using SPSS to analyze complex survey data: A primer Journal of Modern Applied Statistical Methods, 18(1), eP3253. doi: 10.22237/jmasm/1556670300.
20. Croft Trevor N, Aileen MJM, Courtney KA, al. e (2018) Guide to DHS Statistics. Rockville, Maryland, USA: ICF..
21. Rwabufigiri BN, Mukamurigo J, Thomson DR, Hedt-Gautier BL, Semasaka JPS: Factors associated with postnatal care utilisation in Rwanda: A secondary analysis of 2010 Demographic and Health Survey data. *BMC pregnancy and childbirth* 2016, 16(1):122.
22. Mamuye SA: Magnitude and Determinants of Postnatal Care Service Utilization Among Women Who Gave Birth in the Last 12 Months in Northern Ethiopia: A Cross-Sectional Study. *International journal of women's health* 2020, 12:1057–1064.
23. Limenih MA, Endale ZM, Dachew BA: Postnatal Care Service Utilization and Associated Factors among Women Who Gave Birth in the Last 12 Months prior to the Study in Debre Markos Town, Northwestern Ethiopia: A Community-Based Cross-Sectional Study. *International journal of reproductive medicine* 2016, 2016:7095352–7095352.
24. Ayele B, Woldu M, Gebrehiwot H, Wellay T, Hadgu T, Gebretnsae H, Abrha A, Gebre-Egziabher E, Hurlburt S: Do mothers who delivered at health facilities return to health facilities for postnatal care follow-up? A

multilevel analysis of the 2016 Ethiopian Demographic and Health Survey. *PLoS One* 2021, 16(4):e0249793-e0249793.

25. Appiah F, Salihu T, Fenteng JOD, Darteh AO, Djan ET, Takyi M, Ayerakwah PA, Ameyaw EK: Factors influencing early postnatal care utilisation among women: Evidence from the 2014 Ghana Demographic and Health Survey. *PLoS One* 2021, 16(4):e0249480.
26. Chungu C, Makasa M, Chola M, Jacobs CN: Place of Delivery Associated With Postnatal Care Utilization Among Childbearing Women in Zambia. *Frontiers in Public Health* 2018, 6(94).
27. Idris H, Syafriyanti W. Determinants of Postnatal Care Service Utilization in Indonesia: A Secondary Analysis Using the Indonesian Health and Demographics Survey. Makara J Health Res. 2021;25..
28. Khaki JJ, Sithole L: Factors associated with the utilization of postnatal care services among Malawian women. *Malawi Med J* 2019, 31(1):2–11.
29. Habte A, Gebiremeskel F, Shewangizaw M, Dessu S, Glagn M: Uptake of complete postnatal care services and its determinants among rural women in Southern Ethiopia: Community-based cross-sectional study based on the current WHO recommendation. *PLoS One* 2021, 16(2):e0246243.
30. Mekonnen T, Dune T, Perz J, Ogbo FA: Postnatal Care Service Utilisation in Ethiopia: Reflecting on 20 Years of Demographic and Health Survey Data. *International journal of environmental research and public health* 2020, 18(1):193.
31. Akibu M, Tsegaye W, Megersa T, Nurgi S: Prevalence and Determinants of Complete Postnatal Care Service Utilization in Northern Shoa, Ethiopia. *Journal of pregnancy* 2018, 2018:8625437–8625437.
32. Atuhaire R, Atuhaire LK, Wamala R, Nansubuga E: Interrelationships between early antenatal care, health facility delivery and early postnatal care among women in Uganda: a structural equation analysis. *Global Health Action* 2020, 13(1):1830463.
33. Kearns AD, Caglia JM, Ten Hoope-Bender P, Langer A: Antenatal and postnatal care: a review of innovative models for improving availability, accessibility, acceptability and quality of services in low-resource settings. *Bjog* 2016, 123(4):540–548.
34. Kanté AM, Chung CE, Larsen AM, Exavery A, Tani K, Phillips JF: Factors associated with compliance with the recommended frequency of postnatal care services in three rural districts of Tanzania. *BMC pregnancy and childbirth* 2015, 15(1):341.
35. Mohan D, Gupta S, LeFevre A, Bazant E, Killewo J, Baqui AH: Determinants of postnatal care use at health facilities in rural Tanzania: multilevel analysis of a household survey. *BMC pregnancy and childbirth* 2015, 15(1):282.
36. Edward A, Krishnan A, Ettyang G, Jung Y, Perry HB, Ghee AE, Chege J: Can people-centered community-oriented interventions improve skilled birth attendance? Evidence from a quasi-experimental study in rural communities of Cambodia, Kenya, and Zambia. *BMC pregnancy and childbirth* 2020, 20(1):514.
37. Wudineh KG, Nigusie AA, Gesese SS, Tesu AA, Beyene FY: Postnatal care service utilization and associated factors among women who gave birth in Debretabour town, North West Ethiopia: a community- based cross-sectional study. *BMC pregnancy and childbirth* 2018, 18(1):508.
38. Balde, M., Diallo, A., Soumah, A., Sall, A., Diallo, B., Barry, F., Touré, A., Barry, A. and Camara, S. (2021) Barriers to Utilization of Postnatal Care: A Qualitative Study in Guinea. Open Journal of Obstetrics and

Gynecology, 11, 391–402. doi: 10.4236/ojog.2021.114039..

39. Ekholuenetale M, Nzoputam CI, Barrow A, Onikan A: Women's enlightenment and early antenatal care initiation are determining factors for the use of eight or more antenatal visits in Benin: further analysis of the Demographic and Health Survey. *Journal of the Egyptian Public Health Association* 2020, 95(1):13.
40. Fenta SM, Ayenew GM, Getahun BE: Magnitude of antenatal care service uptake and associated factors among pregnant women: analysis of the 2016 Ethiopia Demographic and Health Survey. *BMJ open* 2021, 11(4):e043904.
41. Witter S, Wurie H, Bertone MP: The free health care initiative: how has it affected health workers in Sierra Leone? *Health policy and planning* 2016, 31(1):1–9.
42. Cancedda C, Binagwaho A: The Human Resources for Health Program in Rwanda: A Response to Recent Commentaries. *International Journal of Health Policy and Management* 2019, 8(7):459–461.
43. Fatema K, Lariscy JT: Mass media exposure and maternal healthcare utilization in South Asia. *SSM - Population Health* 2020, 11:100614.
44. Wurie HR, Samai M, Witter S: Retention of health workers in rural Sierra Leone: findings from life histories. *Human resources for health* 2016, 14:3–3.
45. Hussen SA, Tsegaye M, Argaw MG, Andes K, Gilliard D, del Rio C: Spirituality, social capital and service: factors promoting resilience among Expert Patients living with HIV in Ethiopia. *Global public health* 2014, 9(3):286–298.
46. Tarekegn SM, Lieberman LS, Giedraitis V: Determinants of maternal health service utilization in Ethiopia: analysis of the 2011 Ethiopian Demographic and Health Survey. *BMC pregnancy and childbirth* 2014, 14(1):161.
47. Chakraborty N, Islam MA, Chowdhury RI, Bari W, Akhter HH: Determinants of the use of maternal health services in rural Bangladesh. *Health Promotion International* 2003, 18(4):327–337.
48. Simkhada B, Teijlingen ERv, Porter M, Simkhada P: Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. *Journal of Advanced Nursing* 2008, 61(3):244–260.
49. Pallikadavath S, Foss M, Stones RW: Antenatal care: provision and inequality in rural north India. *Social science & medicine (1982)* 2004, 59(6):1147–1158.
50. Perera UAP, Assefa Y, Amilani U: Postnatal care coverage and its determinants in Sri Lanka: analysis of the 2016 demographic and health survey. *BMC pregnancy and childbirth* 2021, 21(1):299.
51. Atusiimire LB, Waiswa P, Atuyambe L, Nankabirwa V, Okuga M: Determinants of facility based–deliveries among urban slum dwellers of Kampala, Uganda. *PLoS One* 2019, 14(4):e0214995.
52. Sierra Leone Ministry of Health and Sanitation. Sierra Leone National Reproductive, Maternal, Newborn, Child and Adolescent Health Strategy 2017–2021. https://www.afro.who.int/publications/sierra-leone-national-reproductive-maternal-newborn-child-and-adolescent-health.