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

Quraish Sserwanja1*, Lilian Nuwabaine2, Kassim Kamara3 and Milton W. Musaba4,5

Abstract

Background: Within Sub-Saharan Africa, some countries still report unacceptably high rates of maternal and perinatal morbidity and mortality, despite improvements in the utilisation of maternity care services. 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 7326 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 7326 women, 6625 (90.4, 95% CI: 89.9–91.2) had at least one PNC contact for their newborn, 6646 (90.7, 95% CI: 90.2–91.5) had a postnatal check after childbirth and 6274 (85.6, 95% CI: 85.0–86.6) had PNC for both their babies and themselves. Delivery by caesarean section (aOR 8.01, 95% CI: 3.37–19.07), having a visit by a health field worker (aOR 1.80, 95% CI: 1.46–2.20), having had eight or more ANC contacts (aOR 1.37, 95% CI: 1.08–1.73), having tertiary education (aOR 2.71, 95% CI: 1.32–5.56) and having no big problems seeking permission to access healthcare (aOR 1.51, 95% CI: 1.19–1.90) were associated with higher odds of PNC utilisation. On the other hand, being resident in the Northern (aOR 0.48, 95% CI: 0.29–0.78) and Northwestern regions (aOR 0.54, 95% CI: 0.36–0.80), belonging to a female headed household (aOR 0.69, 95% CI: 0.56–0.85) and being a working woman (aOR 0.66, 95% CI: 0.52–0.84) were associated with lower odds of utilizing PNC.

Conclusion: Factors associated with utilisation of PNC services operate at individual, household, community and health system/policy levels. Some of them can be ameliorated by targeted government interventions to improve utilisation of PNC services.

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

Introduction

Annually, sub-Saharan Africa records the highest maternal deaths at 500 per 100,000 live births, and newborn deaths at 34 per 1000 live births [1], which accounts for 38% of the global neonatal deaths. Within the same region, Sierra Leone is still among the top three countries with the highest maternal mortality ratio (MMR) [2, 3]. 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 6 weeks of childbirth [4]. This MMR is over 10 times higher than the SDG 3 target of 70 deaths per 100,000 live births by 2030.

*Correspondence: qura661@gmail.com; qsserwanja@sd.goal.ie
1 Programmes Department, GOAL Global, Arkaweet Block 65 House No. 227, Khartoum, Sudan
Full list of author information is available at the end of the article
[5]. SLDHS further shows that neonatal mortality ratio (NMR) stands at 31 per 1000 live births, down from 39 per 1000 live births in 2013 [4].

Timely access to maternal health services is an effective intervention aimed at reducing pregnancy and childbirth-related deaths [1, 6]. Over the decade, progress has been reported in ensuring increase in the continuum of maternal healthcare utilisation [7]. However, the progress has been mainly with skilled antenatal care attendance and facility-based deliveries with little progress regarding PNC utilisation [7, 8]. Yet, the immediate postpartum period is critical for the survival of both mothers and newborns because that is when most physiological adaptations occur [1, 5]. In this regard, receipt of timely postnatal care (PNC) is widely used to track progress towards national and international maternal child health goals [9, 10]. PNC is one of the recommended packages in the continuum of maternity care, aimed at reducing maternal and neonatal mortality [1, 11]. This service consist of care given to mothers and neonates right after delivery and up to 6 weeks of postpartum with the aim of ensuring optimum health for the mother and the infant [1]. Timely PNC enables health workers to detect, follow, and quickly manage complications of both the mother and newborn [12]. In addition, timely PNC accords an opportunity to receive health information and support for positive practices such as exclusive breastfeeding, maternal and newborn danger signs, care of the newborn that are key to maternal and child health and survival [13]. Therefore, WHO recommends the first postnatal check to occur within the first 24 h 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 [1, 7]. However, about 63% of mothers and 48% of newborns globally utilise PNC within the recommended timeframe [1] and less than 25% of newborns in less developed countries receive PNC within 2 days of delivery [1].

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 [14, 15]. Sierra Leone's long civil war and Ebola epidemic left the health system fragile and overwhelmed with inadequate skilled health personnel having low and irregular remuneration [16], increasing demand and stock-outs of crucial medical supplies and equipment leading to patients having to pay for services that are meant to be free [17, 18]. Secondary and tertiary care in Sierra Leone is provided by 14 district and regional governmental hospitals and four tertiary referral hospitals which are all located in the Western Area Urban District [19]. The country's nurse density is one of the world’s lowest having approximately 0.2 nurses and midwives per 1000 people [16].

Despite several government interventions to improve maternal and child health services such as Free Health Care Initiative (FHCl) introduced in 2010 to address the issue of cost as a barrier to utilisation of maternal healthcare services [20], not much has been achieved because the MCH indicators have remained unacceptably high. In order to reduce the high maternal and perinatal mortality, there is need for up to date and evidence based information to guide the formulation and implementation of effective strategies. However, there is dearth of information about the level and determinants of PNC utilisation for both mother and baby pair. Prior studies on the same subject by Koroma et al., and Sharkey et al. did not use a nationally representative sample, and they focused on antenatal care (ANC), skilled birth attendance and health facility delivery utilization [21, 22]. On the other hand, Jalloh et al. analysed data from 2008 to 2013 Sierra Leone Demographic Health Surveys (SLDHS) and evaluated wealth related inequity in the utilisation of maternal health services [17]. The study showed increment in PNC utilisation and that PNC reviews were more equally distributed than ANC visits. However, the study was only able to model factors associated with institutional delivery and so did not provide factors associated with PNC utilisation [17]. Therefore, the current study aimed to determine the prevalence and factors associated with PNC utilisation in Sierra Leone. This is among the first studies to use data from the most recent nationally representative survey to determine the level and determinants of PNC utilisation by both the mother and newborn pair in Sierra Leone.

**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 through researchers must register with MEASURE DHS and submit a request before accessing them.

**Study sampling and participants**

The 2019 SLDHS samples were selected using a stratified, two-stage cluster sampling design that resulted in
the random selection of 13,872 households [4]. Detailed sampling procedures were published in the final report [4]. 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 5 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 7326 had given birth within 5 years preceding the survey (Table 1). Of the 7326 women, 126 women had missing data leading to a total of 7200 women for logistic regression analysis (Table 3).

Table 1  (continued)

| Characteristics          | N = 7326 | %   |
|---------------------------|----------|-----|
| **Exposure to TV**        |          |     |
| No                        | 5579     | 76.2|
| Yes                       | 1747     | 23.8|
| **Internet use**          |          |     |
| No                        | 6586     | 89.9|
| 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**            |          |     |
| 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**       |          |     |
| Caesarean section         | 324      | 4.4 |
| Vaginal                   | 6988     | 95.6|
| **Skilled birth attendance** |         |     |
| Yes                       | 6468     | 88.3|
| No                        | 858      | 11.7|

| Characteristics          | N = 7326 | %   |
|---------------------------|----------|-----|
| **Exposure to TV**        |          |     |
| No                        | 5579     | 76.2|
| Yes                       | 1747     | 23.8|
| **Internet use**          |          |     |
| No                        | 6586     | 89.9|
| 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**            |          |     |
| 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**       |          |     |
| Caesarean section         | 324      | 4.4 |
| Vaginal                   | 6988     | 95.6|
| **Skilled birth attendance** |         |     |
| Yes                       | 6468     | 88.3|
| No                        | 858      | 11.7|

| Characteristics          | N = 7326 | %   |
|---------------------------|----------|-----|
| **Exposure to TV**        |          |     |
| No                        | 5579     | 76.2|
| Yes                       | 1747     | 23.8|
| **Internet use**          |          |     |
| No                        | 6586     | 89.9|
| 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**            |          |     |
| 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**       |          |     |
| Caesarean section         | 324      | 4.4 |
| Vaginal                   | 6988     | 95.6|
| **Skilled birth attendance** |         |     |
| Yes                       | 6468     | 88.3|
| No                        | 858      | 11.7|

*missing 113 (1.5%) respondents

*missing 13 (0.2%) respondents
Variables

**Dependent variables**
The outcome variable was PNC utilisation which was considered as at least 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 [1, 7, 11, 14]. Twenty-one explanatory variables were used in this study. Maternal age was categorised as: (15–19 years, 20–34 years and 35–49 years). 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 [23]. 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 on informal unions) and not married. Problems 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 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 and place of delivery were categorised as: (1) if the mother and neonate utilised PNC and zero (0) if no PNC utilisation for both mother and the neonate.

**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 multi-stage sample design inherent in the DHS dataset: individual sample weight, sample strata for sampling errors/design, and cluster number [24–26]. 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 (considered variance inflation factor (VIF) less than 2.5) [27] with other independent variables were considered for multivariable logistic regression to assess the independent effect of each variable on the PNC utilisation. Residence, wealth index, skilled birth attendance and place of delivery were not included in the multivariable model because they had VIFs above 2.5 with many other independent variables. Adjusted odds ratios (AOR), 95% confidence intervals (CI) and p-values were calculated with statistical significance level set at p-value < 0.05. Sensitivity analysis was done including the variables that had VIF above 2.5 but less than 5 and results are shown in Supplementary file 1.

**Results**
A total of 7326 women were included in the analysis (Table 1). Out of 7326 women, 6625 (90.4, 95% CI: 89.9–91.2) had their babies have at least a PNC contact, 6646 (90.7, 95% CI: 90.2–91.5) had a postnatal check after childbirth and 6274 (85.6, 95% CI: 85.0–86.6) had PNC for both their babies and themselves as shown in Table 2.

**Table 2 Utilisation of postnatal care**

| Service                                      | Frequency | %     | 95% CI  |
|----------------------------------------------|-----------|-------|---------|
| Maternal PNC at health facility discharge*   | 5706      | 92.3  | 91.7–93.0 |
| Maternal PNC after discharge from health facility | 2715      | 37.1  | 35.9–38.1 |
| Maternal PNC (any of the above)             | 6646      | 90.7  | 90.2–91.5 |
| Neonatal PNC at health facility discharge*   | 5735      | 92.8  | 92.1–93.4 |
| Neonatal PNC after discharge from health facility | 3329      | 45.5  | 44.6–46.8 |
| Neonatal PNC (any of the above)             | 6625      | 90.4  | 89.9–91.2 |
| Both maternal and neonatal PNC              | 6274      | 85.6  | 85.0–86.6 |

* Missing 1143
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. Regarding content of PNC, 4895 women (66.8, 95% CI: 65.7–67.8) had all the contents of PNC check that included: examining the code, temperature being taken, breastfeeding and newborn danger signs counseling and having a practical breastfeeding session with the health provider as shown in Supplementary file 2.

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 8.01, 95% CI: 3.37–19.07), having a visit by a health field worker (aOR 1.80, 95% CI: 1.46–2.20), having had eight or more ANC contacts (aOR 1.37, 95% CI: 1.08–1.73), having tertiary education (aOR 2.71, 95% CI: 1.32–5.56) and having no big problems seeking permission to access healthcare (aOR 1.51, 95% CI: 1.19–1.90). Exposure to radio (aOR 1.24, 95% CI: 0.99–1.54) was marginally associated with more odds of PNC utilisation compared to non-exposure. On the other hand, being resident in the Northern (aOR 0.48, 95% CI: 0.29–0.78) and Northwestern regions (aOR 0.54, 95% CI: 0.36–0.80), belonging to a female headed household (aOR 0.69, 95% CI: 0.56–0.85) and being a working woman (aOR 0.66, 95% CI: 0.52–0.84) were associated with lower odds of utilizing PNC compared to being a resident in the Western region and not being a working woman.

Discussion

We found that 85.6% of both the women and their neonates had at least one PNC contact, and this was associated with both individual and health system/policy factors. Although, slightly lower than the 90% level of PNC coverage recommended by WHO [28], it is higher than the reported prevalence of 48.4% for Malawi, 63% for Zambia and 78.4% for Indonesia [29–31]. This level of utilisation is commendable and should be further supported by government interventions, aimed at providing free maternal and child health services through the FHCI project. However, with only 66.8% of women being able to have had all the contents of PNC check, there is need to focus on content and quality of PNC.

The odds of PNC utilisation were eight times higher among women that delivered by caesarean compared to those that delivered vaginally. This is not surprising because women who have operative deliveries are at higher risk of suffering a wide range of postoperative complications. Therefore, frequent return to the health facilities for checkup would be a mitigation strategy to minimize the perceived risks and in return get the opportunity to utilise PNC [30, 32]. It is also true that 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 [33, 34].

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 [30, 31, 35–37]. Similarly, in this study the odds of PNC utilisation were higher among women 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, 31, 38]. 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 [39, 40]. 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 [36]. 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.

Women in the Northern region had lower odds of PNC utilisation compared to those 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, 42]. 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 compared to those from the Northern region which is one of the poorest regions with inadequate skilled staff and infrastructure [21, 43, 44]. 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 [31, 39, 45]. Women who had no big problems seeking permission to access...
| Characteristics                  | Crude model cOR (95% CI) | P-value | Adjusted model aOR (95% CI) | P-value |
|---------------------------------|--------------------------|---------|-----------------------------|---------|
| **Caesarean section**           |                          |         |                             |         |
| No                              | 1                        |         |                             |         |
| Yes                             | 7.10 (3.20–15.76)        | <0.001  | 8.01 (3.37–19.07)           | <0.001  |
| **Skilled birth attendance**    |                          |         |                             |         |
| Yes                             | 1                        |         |                             |         |
| No                              | 5.86 (4.60–7.47)         | <0.001  | –                           |         |
| **Visited by fieldworker**      |                          |         |                             |         |
| No                              | 1                        |         |                             |         |
| Yes                             | 1.77 (1.44–2.18)         | <0.001  | 1.80 (1.46–2.20)            | <0.001  |
| **ANC frequency**               |                          |         |                             |         |
| Less than 8 contacts            | 1                        |         |                             |         |
| 8 contacts and above             | 1.42 (1.12–1.81)         | 0.004   | 1.37 (1.08–1.73)            | 0.010   |
| **ANC initiation timing**       |                          |         |                             |         |
| First trimester                 | 1                        |         |                             |         |
| After first trimester            | 1.11 (0.93–1.32)         | 0.255   | 1.10 (0.91–1.32)            | 0.339   |
| **Age**                         |                          |         |                             |         |
| 35 to 49                        | 1                        |         |                             |         |
| 20 to 34                        | 1.26 (1.08–1.48)         | 0.003   | 1.06 (0.87–1.29)            | 0.544   |
| 15 to 19                        | 1.30 (0.98–1.73)         | 0.068   | 0.98 (0.66–1.43)            | 0.898   |
| **Residence**                   |                          |         |                             |         |
| Rural                           | 1                        |         |                             |         |
| Urban                           | 1.41 (1.08–1.84)         | 0.011   | –                           |         |
| **Region**                      |                          |         |                             |         |
| Western                         | 1                        |         |                             |         |
| Southern                        | 1.10 (0.72–1.66)         | 0.668   | 1.31 (0.84–2.04)            | 0.242   |
| Northwestern                    | 0.48 (0.33–0.72)         | <0.001  | 0.54 (0.36–0.80)            | 0.003   |
| Northern                        | 0.48 (0.31–0.74)         | 0.001   | 0.48 (0.29–0.78)            | 0.003   |
| Eastern                         | 0.72 (0.48–1.08)         | 0.110   | 0.83 (0.54–1.28)            | 0.400   |
| **Religion**                    |                          |         |                             |         |
| Christianity and others         | 1                        |         |                             |         |
| Islam                           | 0.82 (0.66–1.02)         | 0.075   | 1.04 (0.84–1.30)            | 0.711   |
| **Sex household head**          |                          |         |                             |         |
| Male                            | 1                        |         |                             |         |
| Female                          | 0.82 (0.68–0.99)         | 0.047   | 0.69 (0.56–0.85)            | <0.001  |
| **Household Size**              |                          |         |                             |         |
| 7 and above                     | 1                        |         |                             |         |
| Less than 7                     | 1.12 (0.93–1.35)         | 0.231   | 1.04 (0.86–1.26)            | 0.672   |
| **Working status**              |                          |         |                             |         |
| Not working                     | 1                        |         |                             |         |
| Working                         | 0.61 (0.49–0.75)         | <0.001  | 0.66 (0.52–0.84)            | 0.001   |
| **Marital status**              |                          |         |                             |         |
| Not married                     | 1                        |         |                             |         |
| Married                         | 0.85 (0.69–1.03)         | 0.095   | 0.96 (0.76–1.21)            | 0.732   |
| **Education Level**             |                          |         |                             |         |
| No Education                    | 1                        |         |                             |         |
| Primary Education               | 1.12 (0.91–1.38)         | 0.268   | 0.97 (0.77–1.23)            | 0.249   |
| Secondary Education             | 1.49 (1.22–1.82)         | <0.001  | 1.16 (0.90–1.48)            | 0.248   |
| Tertiary                        | 3.98 (2.17–7.30)         | <0.001  | 2.71 (1.32–5.56)            | 0.006   |
healthcare had higher odds of utilizing PNC services. 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 [37]. The influence of spouses and family members in the women’s decision making towards seeking health care services has been documented elsewhere as a key factor limiting utilisation of services like PNC [31, 46].

Women who were of working class, and those from female headed households had lower odds of utilising PNC services compared to their counterparts who were not working and those belonging to male headed households. This is not new because maternal employment has been shown by El-gilany et al. to negatively affect utilisation of maternal healthcare which is majorly attributed to unfavorable working conditions such as short or no maternal leave periods and long working hours which give mothers less or no time to seek these services [47, 48]. Male involvement in maternal healthcare has been shown to increase utilisation and positive outcomes due to better decision making, social and financial support [49, 50]. Hence, the lower odds of PNC utilisation among female headed households could be partly attributed to less social and financial strength these women have which affects their ability to seek PNC. Relatedly, women who had attained tertiary level education had higher odds of utilizing PNC services. This is no surprising because educated women are more likely to have safe and better employment opportunities, be more open to

| Characteristics                  | Crude model cOR (95% CI)        | P-value | Adjusted model aOR (95% CI) | P-value |
|----------------------------------|---------------------------------|---------|-----------------------------|---------|
| **Wealth Index**                 |                                 |         |                             |         |
| Poorest                         | 1                               |         |                             |         |
| Poorer                          | 1.27 (1.03–1.57)\(^a\)          | 0.026   |                             |         |
| Middle                          | 1.66 (1.26–2.18)\(^a\)          | <0.001  |                             |         |
| Richer                          | 1.77 (1.28–2.46)\(^a\)          | 0.001   |                             |         |
| Richest                         | 2.05 (1.39–3.02)\(^a\)          | <0.001  |                             |         |
| **Parity**                      |                                 |         |                             |         |
| 5 and above                     | 1                               |         |                             |         |
| 2–4                             | 1.17 (0.99–1.38)                 | 0.07    | 0.95 (0.78–1.17)            | 0.644   |
| 1                               | 1.42 (1.17–1.74)\(^a\)          | <0.001  | 1.06 (0.81–1.40)            | 0.668   |
| **Newspapers’ exposure**        |                                 |         |                             |         |
| No                              | 1                               |         |                             |         |
| Yes                             | 1.47 (0.90–2.38)                 | 0.121   | 0.95 (0.55–1.66)            | 0.861   |
| **Exposure to Radio**           |                                 |         |                             |         |
| No                              | 1                               |         |                             |         |
| Yes                             | 1.31 (1.06–1.62)\(^a\)          | 0.012   | 1.24 (0.99–1.54)            | 0.052   |
| **Exposure to TV**              |                                 |         |                             |         |
| No                              | 1                               |         |                             |         |
| Yes                             | 1.18 (0.93–1.50)                 | 0.178   | 0.77 (0.60–1.00)            | 0.052   |
| **Internet use**                |                                 |         |                             |         |
| No                              | 1                               |         |                             |         |
| Yes                             | 1.76 (1.17–2.66)\(^a\)          | 0.007   | 0.94 (0.59–1.51)            | 0.801   |
| **Permission to access healthcare** |                               |         |                             |         |
| Big problem                     | 1                               |         |                             |         |
| Not big problem                 | 1.51 (1.21–1.90)\(^a\)          | <0.001  | 1.51 (1.19–1.90)\(^a\)     | 0.001   |
| **Distance to health facility** |                                 |         |                             |         |
| Big problem                     | 1                               |         |                             |         |
| Not big problem                 | 1.25 (0.99–1.59)                 | 0.065   | 1.02 (0.78–1.33)            | 0.869   |
| **Delivery place**              |                                 |         |                             |         |
| Home                            | 1                               |         |                             |         |
| Health facility                 | 7.26 (5.74–9.19)\(^a\)          | <0.001  |                             |         |

\(^a\) significant at < 0.05
receiving new health related information positively hence more awareness about available health resources and more knowledge about health behaviors and the healthcare system which leads to better maternal literacy and informed healthcare decision-making abilities, access and utilization [6, 51, 52].

In the sensitivity analysis (Supplementary file 1), 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 [29, 34, 46, 53]. 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 [54, 55]. 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 [54]. Given that Sierra Leone has free maternal healthcare services [42], 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 [56]. The discrepancy may be attributed to the fact that Sierra Leone has not effectively implemented the maternal healthcare services policy like Rwanda [17, 57] mainly due to the higher poverty levels in Sierra Leone. that make [17, 58]. At the individual level, poverty makes direct and indirect maternal healthcare access costs a huge burden while at the health system level, poverty negatively affects service delivery. This is evidenced by the low financial support of the government to health facilities with only 36.6% receiving financial support from the central government and only 4.9% ambulance ownership among health facilities [59]. Inadequate funding further affects availability of medical supplies and equipment and remuneration of healthcare providers leading to low motivation which partly explains the high staff absenteeism [58, 59]. All these factors affect access to care.

**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**

Factors such as type of delivery, frequency of ANC, working status, sex of household head, level of education, and having and having no problems with obtaining permission to access health care services operate at the individual and household levels. While factors such as region of residence and availability of health service providers (field health worker) operate at the health system/policy and community levels respectively. More importantly, there is need to intensify health education among pregnant women by making use of the field health workers. Reducing regional inequalities and empowering women through education will improve maternal health services.

**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.

**Supplementary Information**

The online version contains supplementary material available at https://doi.org/10.1186/s12889-022-12494-5.

**Additional file 1: Supplementary file 1.** Factors associated with PNC utilisation in Sierra Leone as per the 2019 SLDHS.

**Additional file 2: Supplementary file 2.** Content of PNC received by women a per 2019 SLDHS.

**Acknowledgements**

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

**Authors’ 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 modified data set that was used for the final analysis can be availed upon request from the corresponding author. All authors read and approved the final manuscript.

**Funding**

No funding was obtained for this study.

**Availability of data and materials**

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

**Declarations**

**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.

Consent for publication

Not applicable.

Competing interests

All authors declare that they have no competing interests.

Author details

1Programmes Department, GOAL Global, Arkaweet Block 65 House No. 227, Khartoum, Sudan. 2School of Nursing and Midwifery, Aga Khan University, Kampala, Uganda. 3National Disease Surveillance Programme, Ministry of Health and Sanitation, Free town, Sierra Leone. 4Department of Obstetrics and Gynecology, Mbale Regional Referral and Teaching Hospital, Mbale, Uganda. 5Department of Obstetrics and Gynecology, Busitema University, Tororo, Uganda.

Received: 9 September 2021 Accepted: 3 January 2022

Published online: 14 January 2022

References

1. Tessema ZT, Yasschew 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. Ital J Pediatr. 2020;46(1):175.

2. 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.

3. 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. Accessed Mar 2021.

4. Statistics Sierra Leone - StatsSL, ICF. Sierra Leone demographic and health survey 2019. Freetown/Sierra Leone: StatsSL/ICF; 2020.

5. Sserwanja Q, Musaba MW, Mutisya LM, Olai E, Mukunya D. Continuum of maternity care in Zambia: a national representative survey. BMC Pregnancy Childbirth. 2021;21(1):604.

6. Sserwanja Q, Mukunya D, Musaba MW, Kawuki J, Kitutu FE. Factors associated with health facility utilization during childbirth among 15 to 49-year-old women in Uganda: evidence from the Uganda demographic health survey 2016. BMC Health Serv Res. 2021;21(1):1160.

7. Dey T, Ongha 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 Glob Health. 2021;6(4):e004230.

8. Sacks E, Langlois ÉV. Postnatal care: increasing coverage, equity, and quality. Lancet Glob Health. 2016;4(7):e442–5.

9. 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 Glob Health. 2020;5(4):e002133.

10. Moller AB, Newby H, Hanson C, Morgan A. Measures matter: a scoping review of maternal and newborn indicators. PLoS One. 2018;13(10):e0204763.

11. Esopo K, Derby L, Hanus S. Interventions to improve adherence to antenatal and postnatal care regimens among pregnant women in sub-Saharan Africa: a systematic review. BMC Pregnancy Childbirth. 2020;20(1):316.

12. Agho KE, Ezech 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.

13. Ugboaja OJ, Berthaud 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.

14. Benova L, Ovolabi O, Rodovich E, Wong KLM, Macleod D, Langlois EV, et al. 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 Med. 2019;16(10):e1002943.

15. Countdown to 2030 Collaboration. Countdown to 2030 tracking progress towards universal coverage for reproductive, maternal, newborn, and child health. Lancet (London, England). 2018;391(10129):1538–48.

16. Willott C, Boyd N, Wurie H, Smalle I, Kamara TB, Davies JI, et al. Staff recognition and its importance for surgical service delivery: a qualitative study in Freetown, Sierra Leone. Health Policy Plan. 2021;36(1):93–100.

17. Jalilch MB, Bah AJ, James PB, Sevalie S, Flann K, Shmueli A. Impact of the free healthcare initiative on wealth-related inequity in the utilization of maternal and child health services in Sierra Leone. BMC Health Serv Res. 2019;19(1):352.

18. Vallières F, Cassidy EL, McAlufife E, Gilmore B, Bangura AS, Musa J. Can Sierra Leone maintain the equitable delivery of their free health care initiative? The case for more contextualised interventions: results of a cross-sectional survey. BMC Health Serv Res. 2016;16(1):258.

19. Sevalie S, Youkee D, van Duijen AJ, Bailey E, Bangura T, Majumpudi S, et al. The impact of the COVID-19 pandemic on hospital utilisation in Sierra Leone. BMJ Glob Health. 2021;6(10):e005988.

20. UNFPA, Sierra Leone Country Office. Free healthcare initiative: UNFPA support in Sierra Leone. 2013. Available from https://sierraleone.unfpa.org/sites/default/files/UNFPA_support_Free_Health_Care_Initiative.pdf.

21. Koroma MM, Kamara SS, Bangura EA, Kamara MA, Lokossovo V, Keita N. The quality of free antenatal and delivery services in northern Sierra Leone. Health Res Policy Syst. 2017;15(Suppl 1):94.

22. Sharkey A, Yansaneh A, Bangura PS, Kabano A, Brady E, Yunnkella F, et al. Maternal and newborn care practices in Sierra Leone: a mixed methods study of four underserved districts. Health Policy Plan. 2016;31(2):151–62.

23. Sserwanja Q, Musaba MW, Mukunya D. Prevalence and factors associated with modern contraceptives utilization among female adolescents in Uganda. BMC Womens Health. 2021;21(1):61.

24. 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. PLoS One. 2020;15(6):e0231650.

25. Zou D, Lloyd JEV, Baumbusch JL. Using SPSS to analyze complex survey data: a primer journal of modern applied. Stat Methods. 2019;18(1):eP3253. https://doi.org/10.22237/jmasm/155670300.

26. Croft Trevor N, Alieen MJM, Courtney KA, et al. Guide to DHS statistics. Rockville, ICF, 2018.

27. Johnston R, Jones K, Manley D. Confounding and collinearity in regression analysis: a cautionary tale and an alternative procedure, illustrated by studies of British voting behaviour. Qual Quant. 2018;52(4):1957–76.

28. Ahbe A, Gebrimeskesel F, Shewangawzaw M, Desu S, Glogn 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.

29. Chungu C, Makasa M, Chola M, Jacobs CN. Place of delivery with associated postnatal care utilization among childbearing women in Zambia. Front Public Health. 2018:694.

30. 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;25:7.

31. Khaki JJ, Sithole L. Factors associated with the utilization of postnatal care services among married or in-union women in Zambia. Int J Environ Res Public Health. 2020;18(1):193.

32. Akibiu M, Tsegaye W, Megersa T, Nurgi S. Prevalence and determinants of complete postnatal care service utilization in northern Shoa, Ethiopia. J Pregnancy. 2018;2018:8625437.

33. Limesnih 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. Int J Reprod Med. 2016;2016:7095352.

34. Meckonnen T, Dune T, Perz J, Ogbo FA. Postnatal care service utilization in Ethiopia: reflecting on 20 years of demographic and health survey data. Int J Environ Res Public Health. 2020;18(1):193.

35. Atuhaire R, Atuhaire LK, Wamara R, Nansubuga E. Interrelationships between early antenatal care, health facility delivery and early postnatal
care among women in Uganda: a structural equation analysis. Glob Health Action. 2020;13(1):1830463.

36. Ayele B, Woldu M, Gebrehiwot H, Weliay T, Hadgu T, Gebretnsae H, et al. 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.

37. 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):540–8.

38. 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 Childbirth. 2015;15(1):341.

39. Mohan D, Gupta S, Lefevre A, Banjat K, Baqui AH. Determinants of postnatal care use at health facilities in rural Tanzania: multilevel analysis of a household survey. BMC Pregnancy Childbirth. 2015;15(1):282.

40. Edward A, Krishnan A, Ettyang G, Jung Y, Perry HB, Ghee AE, et al. 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 Childbirth. 2020;20(1):514.

41. Wurie HR, Samai M, Witter S. Retention of health workers in rural Sierra Leone: findings from life histories. Hum Resour Health. 2016;14:3–3.

42. Witter S, Wurie H, Bertone MP. The free health care initiative: how has it affected health workers in Sierra Leone? Health Policy Plan. 2016;31(1):1–9.

43. Sserwanja Q, Kamara K, Mutisya LM, Musaba MW, Ziaei S. Rural and urban correlates of stunting among under-five children in Sierra Leone: a 2019 Nationwide cross-sectional survey. Nutr Metab Insights. 2021;14:11786388211047056.

44. UNICEF. Multidimensional Child Poverty Report: Sierra Leone. https://www.unicef.org/sierraleone/reports/multidimensional-child-poverty-report. Accessed Mar 2021.

45. Appiah F, Salihu T, Fenteng JOD, Darteh AO, Djan ET, Takyi M, et al. Factors influencing early postnatal care utilization among women: evidence from the 2014 Ghana demographic and health survey. PLoS One. 2021;16(4):e0249480.

46. Balde M, Diallo A, Soumah A, Sall A, Diallo B, Barry F, et al. Barriers to utilization of postnatal care: a qualitative study in Guinea. Open J Obstet Gynecol. 2021;11:391–402. https://doi.org/10.4236/ojog.2021.1104039.

47. El-Gilany AH, El-Wehady A, El-Hawary A. Maternal employment and maternity care in Al-Hassa, Saudi Arabia. Eur J Contracept Reprod Health Care. 2008;13(3):304–12.

48. Karl M, Schaber R, Kress V, Kopp M, Martini J, Weidner K, et al. Precarious working conditions and psychosocial work stress act as a risk factor for symptoms of postpartum depression during maternity leave: results from a longitudinal cohort study. BMC Public Health. 2020;20(1):1505.

49. Mersha AG. Male involvement in the maternal health care system: implication towards decreasing the high burden of maternal mortality. BMC Pregnancy Childbirth. 2018;18(1):493.

50. Craymah JP, Oppong RK, Tuoyire DA. Male involvement in maternal health Care at Anomabo, central region, Ghana. Int J Reprod Med. 2017;2017:2929013.

51. Trinuh FN, Chuang KY, Chuang YC. Women’s autonomy and maternal healthcare service utilization in Ethiopia. BMC Health Serv Res. 2017;17(1):718.

52. Kawakatsu Y, Sugishita T, Ouenjo K, Wakahle S, Kibosis K, Were E, et al. Determinants of health facility utilization for childbirth in rural western Kenya: cross-sectional study. BMC Pregnancy Childbirth. 2014;14:265.

53. Wudhineh KG, Nguisse AA, Gesese SS, Tesu AA, Beyene FY. Postnatal care service utilization and associated factors among women who gave birth in Debretabor town, North West Ethiopia: a community-based cross-sectional study. BMC Pregnancy Childbirth. 2018;18(1):508.

54. Ekhouloumetale M, Nzopotam CI, Bowar A, Anikkan A. Women’s enlighten-ment 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. J Egypt Public Health Assoc. 2020;95(1):13.

55. Fenta SM, Aynew 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.

56. Rwabugiri BN, Mukamurugo J, Thomson DR, Hedt-Gauthier BL, Semasaka JPS. Factors associated with postnatal care utilisation in Rwanda: a secondary analysis of 2010 demographic and health survey data. BMC Pregnancy Childbirth. 2016;16(1):122.

57. Cancedda C, Binagwaho A. The human resources for health program in Rwanda: a response to recent commentaries. Int J Health Policy Manag. 2019;8(7):459–61.

58. Di Giorgio L, Evans DK, Lindelow M, Nguyen SN, Svensson J, Wane W, et al. Analysis of clinical knowledge, absenteeism and availability of resources for maternal and child health: a cross-sectional quality of care study in 10 African countries. BMJ Glob Health. 2020;5(12):e003377.

59. The World Bank. Service Delivery Indicators Health Survey 2018 - Harmonized Public Use Data. Accessed December 2021. https://microdata.worldbank.org/index.php/catalog/4038.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.