



# Level of Postnatal Care Attendance and Associated Factors among Postnatal Mothers at Kyegegwa Hospital, Western Uganda

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## Research Article

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## Abstract

Globally, postnatal care (PNC) utilization remains low, with less than 50% of mothers and babies receiving essential postnatal care. In developed countries, PNC utilization exceeds 75%, resulting in a maternal mortality ratio (MMR) of 12 deaths per 100,000 live births. However, in low- and middle-income countries, PNC utilization is only at 36.0%, contributing to significant maternal and neonatal mortality within the first month post-delivery, with an estimated 18 neonatal deaths per 1,000 live births. Kyegegwa district, despite its critical need for postnatal care, has limited published research on this topic. An unpolished report from 2021 to 2022 revealed a PNC attendance of 5.5% at one week and 5.4% at six weeks, with a troubling neonatal mortality rate of 65 deaths per 1,000 live births and an MMR of 50 deaths per 100,000 live births. These statistics highlight the urgent need for improved postnatal care in the district to prevent both maternal and neonatal mortalities.

This cross-sectional study enrolled 246 mothers attending the Young Child Clinic at Kyegegwa Hospital. Quantitative analysis using SPSS Version 20. Bivariable and multivariable logistic regression model was used to identify factors associated with PNC service utilization. The study aimed to establish the level of PNC utilization and associated factors among postnatal mothers. The study findings revealed that only 22% had a good level of PNC utilization. Low utilization was associated with various maternal factors, including husband's occupation, economic status, Antenatal Care visits attended, lack of support for childcare, knowledge of PNC, Village Health Team visits during pregnancy, husband's education, and having adequate time for PNC. Health facility factors, such as distance to the hospital, availability of PNC supplies/medications, road conditions to the hospital, and poor communication within the hospital with P Values < 0.05, also played a significant role. To enhance maternal and infant healthcare utilization of PNC services, a comprehensive approach is essential. Implementing a combination of interventions and strategies tailored to each community's specific needs and challenges can significantly improve PNC utilization and lead to better health outcomes for both mothers and infants.

**Keywords:** Robotic Technologies; Automation; Artificial Intelligence; Machine Learning; Industry 4.0; Healthcare Robotics; Space Exploration; Human-Robot Interaction; Challenges; Future Prospects

**Abbreviations:** PNC: Postnatal Care; WHO: World Health Organization; MMR: Maternal Mortality Ratio; ANC: Antenatal Care; SSA: Sub Saharan Africa; UNICEF: United Nations International Children's Emergency Fund; UBOs: Uganda Bureau of Statistics; HIV: Human Immunodeficiency Virus; AIDS: Acquired Immunodeficiency syndrome; SDG: Sustainable Development Goals; VHT: Village Health Team.

## Introduction

Postnatal Care (PNC) is a critical aspect of maternal and neonatal healthcare, focusing on the well-being of both mothers and newborns during the first six weeks after childbirth [1-3]. Despite its importance, global PNC utilization remains alarmingly low, with over 30% of mothers and newborns not receiving the necessary postnatal care services [4]. This deficiency in PNC services has significant implications for maternal and neonatal health, contributing to preventable morbidity and mortality with 18 deaths per 1,000 live births neonatal death [5] and maternal mortality ratio (MMR) is 158.8 deaths per 100,000 live births [6]. In developed countries, PNC utilization stands at more than 75%, resulting in lower maternal mortality rates and neonatal mortality rates as reflected by its MMR of 12 death per 100 000 live births [3] and the neonatal mortality rate for example United States of America in 2023 is 5.480 deaths per 1000 live births, a 1.21% decline from 2022 [7]. This high utilization can be attributed to factors such as comprehensive Antenatal Care (ANC) services, family planning (FP) initiatives, well-staffed healthcare facilities, and improved living standards.

However, in low and middle-income countries, PNC utilization is as low as 36.0% [8] although there is limited data published on pooled estimates for the most current years. This is a concerning statistic, as it mirrors the picture of their MMR being 430 per 100 000 live births this then account for 95% of all the maternal death globally [3]. The underutilization of PNC in these regions is linked to inadequate utilization of ANC services and family planning, among other factors [9-17]. Sub-Saharan Africa (SSA) faces particularly challenging circumstances, with PNC utilization at 52.48% [18]. This region has the highest neonatal mortality rate globally with 27 deaths per 1000 live births and it accounted for 43% of the newborn deaths globally [19] and the MMR of 545 deaths per 100,000 live births [20] it alone accounting for around 70% of global maternal deaths and almost every 800 mothers die of preventable causes that would be achieved through PNC [3] Low utilization of ANC services and family planning, coupled with socio-economic factors, further exacerbates the issue [18,21,22].

Uganda, as a representative example, reports PNC utilization rates ranging from 53% to 64%, with a substantial

disparity between hospital deliveries and home deliveries [23,24]. This underutilization has resulted in a high MMR of 336 deaths per 100,000 live births [25]. The level of ANC attendance and family planning uptake, as well as socio-economic factors and education, play significant roles in this low PNC utilization [26,27]. Kyegegwa District in Uganda faces specific challenges in PNC, with limited published research. Recent data suggests that PNC attendance is 5.5% at one week and 5.4% at six weeks with the neonatal mortality rate of 65 death per 1,000 live birth and the MMR of 50 death per 100,000 live birth [28]. This district's neonatal and maternal mortality rates are troubling, reflecting the urgent need for improved PNC services.

This study investigated the Level of PNC Attendance and factors influencing Postnatal Care attendance at one week and six weeks in Kyegegwa District. By shedding light on the quality of PNC services and the barriers to attendance, this research seeks to inform stakeholders and develop evidence-based interventions to enhance PNC utilization. Ultimately, the goal is to contribute to achieving Sustainable Development Goal 3, which aims to reduce maternal mortality and neonatal mortality rates by 2030.

## Materials and Methods

### The Study Location

The study location is Kyegegwa District in the western region of Uganda. Kyegegwa District shares its borders with Kibaale District to the North, Mubende District to the East, Kiruhura District to the South, Kamwenge District to the South-West, and Kyenjojo District to the North-West. Kyegegwa is situated approximately 110 kilometers to the East of Fort Portal, which is the largest town in the Toro sub-region.

### Study Design and Setting

It was a cross-sectional study design, and quantitative approaches were applied in this study. The setting was Kyegegwa District's largest hospital, Kyegegwa Hospital. The hospital has a bed capacity of 71 and receives all referrals from the district. It is staffed by 78 healthcare workers, including 18 nurses, 11 midwives, and 6 doctors.

### Study Population (Participants)

The study population for this study where mothers attending Young Child Clinic services in the hospital these respondents gave us the inside why mothers came for PNC and also provided us with the inside why mothers do not come for PNC Care services in the hospital.

## Sample Size and Sampling Technique

The sample size was 246 mothers, calculated using the Kish and Lisle formula with a confidence interval set at 95%. The participants were chosen through a simple random sampling procedure and were interviewed prospectively at the Young Child clinic.

## Data Collection Technique

The quantitative data was collected using a questionnaire, with the outcome variable being the level of utilization of postnatal care services. This study aimed to investigate how independent variables influenced mothers' attendance at postnatal care services. Postnatal care service utilization was assessed with a binary outcome, represented by a "yes" or "no" response. A mother was considered to have completely utilized postnatal care services if she had attended all three postnatal care visits within the six weeks post-delivery. The attendance and services received were verified using the mothers' PNC books.

## Ethical Consideration and Quality Control

Ethical approval was obtained from Mountains of the Moon University Research Ethics Committee, and administrative clearance was obtained from Kyegegwa Hospital. Human Subject Protection (HSP) and Good Clinical Practice (GCP) training was done before data collection and informed consent was obtained from each participant. Quality control measures for this study included pre-testing the tools, ensuring reliability and validity, and training research assistants in the protocol, tools, Data were cleaned, edited, and stored with limited access to the study team.

## Data Analysis

Data analysis was performed using SPSS version 20.0, utilizing logistic regression modeling. Variables underwent bivariate analysis, and all variables with a P-value  $\leq 0.05$  were subjected to multivariate analysis. The Chi-square test, odds ratio (OR), and P-values were used to determine measures of associations. The level of significance was set at a P-value of 0.05 as the cutoff point.ss

## Results

### Demographic Characteristics of the Mothers.

The Table 1 presents demographic characteristics of the respondents. The majority were in the 17-27 age group (54.5%), followed by the 28-38 group (41.5%), with a small portion in the 39-49 range (4.1%). Education-wise, most completed primary (36.2%), followed by secondary (31.3%), tertiary (27.2%), and a few had no formal education (5.3%). Rural residents dominated (63%), with urban (24.4%) and semi-urban (12.6%) minorities. Informal employment was prevalent (60.6%), followed by formal (24.4%) and unemployed (15%). Religiously, Catholics led (41.9%), followed by Protestants (28.9%), Muslims (24%), Pentecostals (4.9%), and a few Orthodox (0.4%). Batooro formed the majority tribe (46.3%), trailed by Banyankole (16.3%), and other tribes (12.6%). Parity-wise, 1-2 children were common (47.2%), followed by 3-4 (45.1%), and 5 or more (7.7%). HIV-positive participants in the PMTCT Program were 13.4%, while seronegative individuals comprised 86.6%. Marital status revealed 81.7% married and 18.3% unmarried respondents. Place of delivery saw most at Kyegegwa Hospital, followed by home births (31.3%), private clinics (15%), and Health Centre III (5.7%).

Demographic	Frequency (%age)	Demographics	Frequency (%age)
<b>Age</b>		<b>Tribe</b>	
17-27	134 (54.5%)	Mutooro	114 (46.3%)
28-38	102 (41.5%)	Mukiga	23 (9.3%)
39-49	10 (4.1%)	Mukonjo	14 (5.7%)
<b>Education Level</b>		Muganda	24 (9.8%)
None	13 (5.3%)	Munyankole	40 (16.3%)
Primary (1-7)	89 (36.2%)	Others	31 (12.6%)
Secondary (S1-S6)	77 (31.3%)	<b>Parity</b>	
Tertiary	67 (27.2%)	2-Jan	116 (47.2%)
<b>Residence</b>		4-Mar	111 (45.1%)
Urban	60 (24.4%)	5+	19 (7.7%)
Rural	155 (63.0%)	<b>Enrolled PMTCT Program</b>	

Semi Urban	31 (12.6%)	Yes	33 (13.4%)
<b>Occupation</b>		N/A	213 (86.6%)
Unemployed	37 (15.0%)	<b>Marital Status</b>	
Informal Employment	149 (60.6%)	Married	201 (81.7%)
Formal Employment	60 (24.4%)	Not Married	45 (18.3%)
<b>Religion</b>		<b>Delivery Place</b>	
Muslims	59 (24.0%)	Kyegegwa Hospital	118 (48.0%)
Catholics	103 (41.9%)	Home	77 (31.3%)
Protestants	71 (28.9%)	Private Clinic	37 (15.0%)
Pentecostal	12 (4.9%)	Health Centre III	14 (5.7%)
Orthodox	1 (0.4%)		

Source: Primary field data 2023.

Table 1: Demographic Characteristics of the Mothers (n=246).

### Level of Postnatal Care Attendance.

Figure 1 illustrates the level of PNC attendance by mothers. The majority, 192 (78%), had a poor level of PNC attendance,

while the minority, 54 (22%), had a good level of PNC attendance.

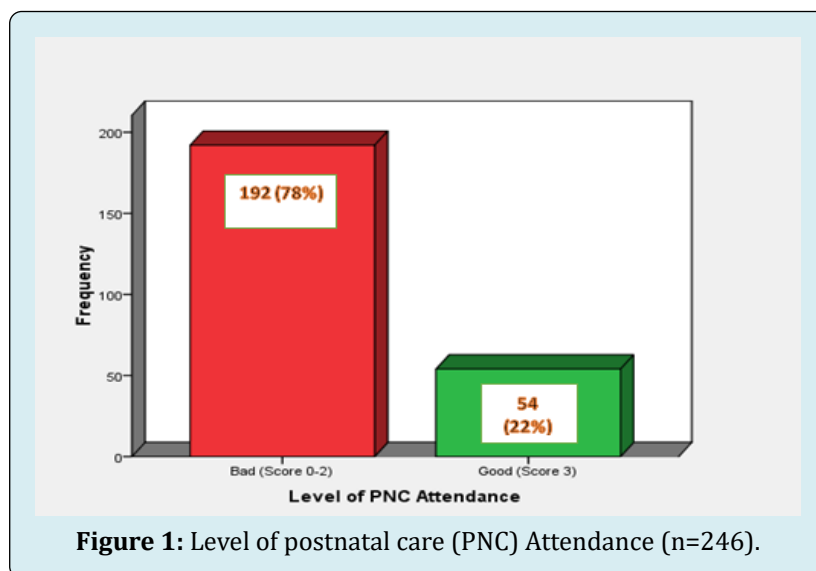


Figure 1: Level of postnatal care (PNC) Attendance (n=246).

### Maternal Related Factors Influencing Postnatal Care Attendance

Table 2 Maternal Related Factors Influencing Postnatal Care Attendance. The occupation of mothers' husbands strongly influenced their PNC utilization (Chi-square 53.620, COR 0.441, AOR 0.05,  $P < 0.001$ ). Most, 153 (62.2%), had husbands in informal employment; 123 (50.1%) had poor PNC utilization, and 30 (12.1%) had good utilization. Unemployed husbands, 55 (22.4%), had poor PNC utilization. A minority, 38 (15.4%), had husbands in formal employment, with 14 (5.7%) having poor utilization, and 24 (9.7%) having good utilization.

Economic status correlated with PNC utilization (Chi-square 33.312, COR 0.348, AOR 0.128,  $P < 0.001$ ). Most, 165 (67.1%), had low economic status; 144 (58.6%) had poor PNC utilization, and 21 (8.5%) had good utilization. High economic status, 51 (20.7%), saw 25 (10.2%) with poor utilization, and 26 (10.7%) with good utilization. The minority, 30 (12.2%), had middle economic status, with 23 (10.3%) having poor utilization, and 7 (2.8%) having good utilization. ANC visits significantly affected PNC attendance (Chi-square 27.293, COR 0.326, AOR 0.019,  $P < 0.001$ ). Most, 111 (45.1%), attended 3-4 ANC visits; 91 (37%) had poor PNC utilization, and 20 (8.1%) had good utilization. Those with 5+ ANC visits, 71 (28.9%), had 41 (16.6%) with poor

utilization and 30 (12.1%) with good utilization. A minority, 64 (26.0%), attended 1-2 ANC visits, all with poor utilization.

Lacking childcare support related to PNC attendance (Chi-square 14.910, COR 0.246, AOR 0.102,  $P < 0.001$ ). Most, 165 (67.1%), lacked support, with 117 (47.6%) having poor PNC utilization and 48 (19.5%) having good utilization. The minority, 81 (32.9%), had support; 75 (30.5%) had poor utilization, and 6 (2.4%) had good utilization. Having enough time for PNC correlated with attendance (Chi-square 6.939, COR 0.168, AOR 0.016,  $P = 0.008$ ). A majority, 116 (47.2%), had enough time; 82 (33.4%) had poor utilization, and 34 (13.8%) had good utilization. The minority, 130 (52.8%), lacked time; 110 (44.7%) had poor utilization, and 20 (8.1%) had good utilization.

Mothers' knowledge influenced PNC attendance (Chi-square 10.118, COR 0.203, AOR 0.057,  $P = 0.001$ ). Most, 150 (61%), were knowledgeable; 107 (43.6%) had poor

utilization, and 43 (17.4%) had good utilization. The minority, 96 (39%), were not knowledgeable; 85 (34.6%) had poor utilization, and 11 (4.4%) had good utilization. Being visited by VHT during pregnancy affected PNC attendance (Chi-square 10.118, COR 0.203, AOR 0.057,  $P = 0.001$ ). Most, 155 (63%), were not visited; 114 (46.4%) had poor utilization, and 41 (16.6%) had good utilization. A minority, 91 (37%), were visited; 78 (31.6%) had poor utilization, and 13 (5.4%) had good utilization. Husbands' education was associated with wives' PNC attendance (Chi-square 8.149, COR 0.151, AOR 0.195,  $P = 0.017$ ). Most, 125 (50.8%), had husbands with primary education; 99 (40.5%) had poor utilization, and 26 (10.5%) had good utilization. Those with husbands having tertiary education, 73 (29.7%), had 50 (19.4%) with poor utilization and 23 (10.3%) with good utilization. A minority, 42 (17.1%), had husbands with no education; 37 (15.1%) had poor utilization, and 5 (2.0%) had good utilization. The minority, 6 (2.4%), had husbands with secondary education; all had poor utilization.

Maternal Related Factors	Level of PNC Utilization			Bivariate		Multivariate	
	Bad	Good	Total	Ch2 Test	COR	AOR	P Value
<b>Husband Occupation</b>				53.62	0.441	0.05	<0.001***
Unemployed	55 (22.4%)	0	55 (22.4%)				
Informal Employment	123 (50.1%)	30 (12.1%)	153 (62.2%)				
Formal Employment	14 (5.7%)	24 (9.7%)	38 (15.4%)				
<b>Economic Status</b>				33.312	0.348	0.128	<0.001***
Low Status	144 (58.6%)	21 (8.5%)	165 (67.1%)				
Middle Status	23 (10.3%)	7 (2.8%)	30 (12.2%)				
High Status	25 (10.2%)	26 (10.5%)	51 (20.7%)				
<b>ANC Visits Attended</b>				27.293	0.326	0.019	<0.001***
1-2	60 (24.1%)	4 (1.9%)	64 (26.0%)				
3-4	91 (37%)	20 (8.1%)	111(45.1%)				
5+	41 (16.6%)	30 (12.1%)	71 (28.9%)				
<b>Lack of Support/ person keep children</b>				14.91	0.246	0.102	< 0.001**
Yes	117(47.6%)	48 (19.5%)	165 (67.1%)				
No	75 (30.5%)	6 (2.4%)	81 (32.9%)				
<b>Had Adequate Time For PNC</b>				6.939	0.168	0.016	0.008
Yes	82 (33.4%)	34 (13.8%)	116 (47.2%)				
No	110 (44.7%)	20 (8.1%)	130 (52.8%)				

<b>Knowledge on PNC</b>							
Not Knowledgeable	85 (34.6%)	11 (4.4%)	96 (39%)	10.118	0.203	0.057	0.001
Knowledgeable	107 (43.6%)	43 (17.4%)	150 (61%)				
<b>VHT Visited during Pregnancy</b>							
Yes	78 (31.6%)	13 (5.4%)	91 (37%)	4.953	0.142	0.037	0.026
No	114 (46.4%)	41 (16.6%)	155 (63%)				
<b>Husband Education</b>							
None	37 (15.1%)	5 (2.0%)	42 (17.1%)	8.149	0.151	0.195	0.017
Primary (1-7)	99 (40.5%)	26 (10.5%)	125 (50.8%)				
Secondary (S1-S6)	6 (2.4%)	0	6 (2.4%)				
Tertiary	50 (19.4%)	23 (10.3%)	73 (29.7%)				

**Source:** Primary field data 2023.

**Table 2:** Maternal Related Factors Influencing Postnatal Care Attendance (n=246).

The occupation of mothers' husbands strongly influenced their PNC utilization (Chi-square 53.620, COR 0.441, AOR 0.05,  $P < 0.001$ ). Most, 153 (62.2%), had husbands in informal employment; 123 (50.1%) had poor PNC utilization, and 30 (12.1%) had good utilization. Unemployed husbands, 55 (22.4%), had poor PNC utilization. A minority, 38 (15.4%), had husbands in formal employment, with 14 (5.7%) having poor utilization, and 24 (9.7%) having good utilization. Economic status correlated with PNC utilization (Chi-square 33.312, COR 0.348, AOR 0.128,  $P < 0.001$ ). Most, 165 (67.1%), had low economic status; 144 (58.6%) had poor PNC utilization, and 21 (8.5%) had good utilization. High economic status, 51 (20.7%), saw 25 (10.2%) with poor utilization, and 26 (10.7%) with good utilization. The minority, 30 (12.2%), had middle economic status, with 23 (10.3%) having poor utilization, and 7 (2.8%) having good utilization.

ANC visits significantly affected PNC attendance (Chi-square 27.293, COR 0.326, AOR 0.019,  $P < 0.001$ ). Most, 111 (45.1%), attended 3-4 ANC visits; 91 (37%) had poor PNC utilization, and 20 (8.1%) had good utilization. Those with 5+ ANC visits, 71 (28.9%), had 41 (16.6%) with poor utilization and 30 (12.1%) with good utilization. A minority, 64 (26.0%), attended 1-2 ANC visits, all with poor utilization. Lacking childcare support related to PNC attendance (Chi-square 14.910, COR 0.246, AOR 0.102,  $P < 0.001$ ). Most, 165 (67.1%), lacked support, with 117 (47.6%) having poor PNC utilization and 48 (19.5%) having good utilization. The minority, 81 (32.9%), had support; 75 (30.5%) had poor utilization, and 6 (2.4%) had good utilization.

Having enough time for PNC correlated with attendance (Chi-square 6.939, COR 0.168, AOR 0.016,  $P = 0.008$ ). A majority, 116 (47.2%), had enough time; 82 (33.4%) had

poor utilization, and 34 (13.8%) had good utilization. The minority, 130 (52.8%), lacked time; 110 (44.7%) had poor utilization, and 20 (8.1%) had good utilization. Mothers' knowledge influenced PNC attendance (Chi-square 10.118, COR 0.203, AOR 0.057,  $P = 0.001$ ). Most, 150 (61%), were knowledgeable; 107 (43.6%) had poor utilization, and 43 (17.4%) had good utilization. The minority, 96 (39%), were not knowledgeable; 85 (34.6%) had poor utilization, and 11 (4.4%) had good utilization.

Being visited by VHT during pregnancy affected PNC attendance (Chi-square 10.118, COR 0.203, AOR 0.057,  $P = 0.001$ ). Most, 155 (63%), were not visited; 114 (46.4%) had poor utilization, and 41 (16.6%) had good utilization. A minority, 91 (37%), were visited; 78 (31.6%) had poor utilization, and 13 (5.4%) had good utilization. Husbands' education was associated with wives' PNC attendance (Chi-square 8.149, COR 0.151, AOR 0.195,  $P = 0.017$ ). Most, 125 (50.8%), had husbands with primary education; 99 (40.5%) had poor utilization, and 26 (10.5%) had good utilization. Those with husbands having tertiary education, 73 (29.7%), had 50 (19.4%) with poor utilization and 23 (10.3%) with good utilization. A minority, 42 (17.1%), had husbands with no education; 37 (15.1%) had poor utilization, and 5 (2.0%) had good utilization. The minority, 6 (2.4%), had husbands with secondary education; all had poor utilization.

### Health System Factors Influencing Postnatal Care Utilization.

Table 3 Health System Factors Influencing Postnatal Care Utilization. The analysis reveals significance (Chi-square 13.553, COR 0.154, AOR 0.020,  $P = 0.015$ ). Most mothers, 118 (48%), lived 0-5 kilometers away; 81 (33%) had poor PNC utilization, and 37 (15%) had good utilization. For those 6-11

kilometers away, 39 (15.9%) had poor PNC utilization, while 4 (1.7%) had good utilization. In the 12-17 kilometers range, 44 (17.9%) had poor utilization, and 4 (1.7%) had good utilization. Finally, 45 (18.3%) mothers lived 18 kilometers or more; 36 (14.6%) had poor utilization, and 9 (4.2%) had good utilization.

PNC supplies and medications' availability was linked to PNC utilization (Chi-square 4.00, COR 0.128, AOR 0.012, P = 0.046). Of those, 185 (75.2%) reported no issues; 150 (61%) had poor utilization, and 35 (14.2%) had good utilization. Meanwhile, 61 (24.8%) mothers faced shortages; 42 (17.1%) had poor utilization, and 19 (7.7%) had good utilization.

The condition of roads to the hospital mattered (Chi-square 6.884, COR 0.151, AOR 0.019, P = 0.018). Among those with fair roads (166, 67.5%), 130 (52.9%) had poor utilization, and 36 (14.6%) had good utilization. For those with good roads (62, 25.2%), 44 (17.9%) had poor utilization, and 18 (7.3%) had good utilization. Those with poor roads (18, 7.3%) all had poor utilization. Hospital communication affected PNC service utilization (Chi-square 3.860, COR 0.125, AOR 0.012, P = 0.050). Most, 233 (94.7%), reported no communication issues; 179 (72.8%) had poor utilization, and 54 (21.9%) had good utilization. The minority (13, 5.3%) with communication problems all had poor utilization.

Health Factors Facility	Level of PNC Utilization		Total	Bivariate		Multivariate	
	Bad	Good		Ch2 Test	COR	AOR	P Value
<b>Distance to Hospital</b>							
0-5	81 (33%)	37(15%)	118 (48%)	13.553	0.154	0.02	0.015
6-11	35 (14.2%)	4 (1.7%)	39 (15.9%)				
12-17	40 (16.2%)	4 (1.7%)	44 (17.9%)				
18+	36 (14.6%)	9 (4.2%)	45 (18.3%)				
<b>PNC Supplies/Medication</b>							
Yes	42 (17.1%)	19 (7.7%)	61 (24.8%)	4	0.128	0.012	0.046
No	150 (61%)	35 (14.2%)	185 (75.2%)				
<b>Road Status to Hospital</b>							
Bad	18 (7.3%)	0	18 (7.3%)	6.884	0.151	0.019	0.018
Fair	130 (52.9%)	36 (14.6%)	166 (67.5%)				
Good	44 (17.9%)	18 (7.3%)	62 (25.2%)				
<b>Poor Communication in Hospital</b>							
Yes	13 (5.3%)	0	13 (5.3%)	3.86	0.125	0.012	0.05
No	179 (72.8%)	54 (21.9 %)	233 (94.7%)				

**Source:** Primary field data 2023.

**Table 3:** Health System Factors Influencing Postnatal Care Attendance (n=246).

## Discussion

The study identified a concerning issue of low postnatal care (PNC) attendance among mothers, with 78% having poor attendance and only 22% showing good attendance. This trend aligns with findings from various regions. For example, in Hoima District, Uganda, only 23% of adolescent mothers utilized PNC services [24], and in Wolkite town, Southern Ethiopia, PNC utilization was as low as 23.3% [16]. A broader study across 66 low- and middle-income countries revealed that over 15% of mothers and infants

did not receive essential PNC services despite dedicated funding [1]. Baglung Municipality in Nepal also had low PNC completion rates at 22% [29]. Although Malawi showed slightly better utilization at 48.4% for skilled PNC, it still falls short of optimal levels [30]. In Dembecha district, Northwest Ethiopia, PNC utilization was reported at 34.8% [31], and Maiduguri, Nigeria, had a utilization rate of only 16.9% [32]. These consistent findings highlight the widespread challenges in achieving sufficient PNC attendance and emphasize the need for targeted interventions and strategies to improve maternal and infant healthcare utilization during

the postnatal period.

### On Maternal Related Factors

The occupation of the mothers' husbands showed a strong association with their level of PNC utilization (Chi-square 53.620, COR 0.441, AOR 0.05, and P-value < 0.001). None of the women whose husbands were unemployed came for PNC, and 50.1% of women whose husbands had informal employment also did not come for PNC. This finding is consistent with a cross-sectional study conducted in Baglung Municipality, Nepal, where women whose husbands had formal employment were more likely to seek PNC [29].

The economic status of the mothers strongly correlated with their level of PNC utilization (Chi-square 33.312, COR 0.348, AOR 0.128, and P-value < 0.001). The majority of the mothers, 165 (67.1%), had a low economic status, with 144 (58.6%) exhibiting poor PNC utilization and only 21 (8.5%) having good PNC utilization among this group. This finding is consistent with a systematic review and meta-analysis conducted in Ethiopia, which found that middle-income earners and the rich had significantly increased odds of postnatal care utilization [33]. It also aligns with a study conducted in Nigeria, which demonstrated that women with low income status were less likely to utilize PNC services [30,34].

The number of ANC visits the mother attended exhibited a strong association with the level of PNC utilization (Chi-square 27.293, COR 0.326, AOR 0.019, and P-value < 0.001). Mothers who had not attended all the ANC visits were less likely to come for PNC. This finding aligns with a study in Malawi, which utilized secondary data from the 2015 to 2016 Demographic and Health Survey and indicated that the uptake of the recommended number of ANC visits was associated with better utilization of PNC services by mothers [30]. It is also consistent with a study conducted in Nigeria, which highlighted that women who attend antenatal care were more likely to utilize PNC services [34]. Furthermore, a systematic review and meta-analysis conducted in Ethiopia showed that a poor history of ANC uptake was a contributing factor to underutilization of PNC services [33].

The lack of support or a person to care for the children at home was associated with the level of PNC utilization (Chi-square 14.910, COR 0.246, AOR 0.102, and P-value < 0.001). The majority, comprising 165 (67.1%) of the mothers, lacked support or a person to care for their children at home. Among them, 117 (47.6%) had a poor level of PNC utilization, while 48 (19.5%) had a good level of PNC utilization. This finding aligns with a community-based cross-sectional study conducted in Debre Birhan town, North Shoa, Ethiopia, which revealed that the lack of family support prevented mothers

from accessing PNC services [35].

Having adequate time for PNC was associated with the level of PNC attendance (Chi-square 6.939, COR 0.168, AOR 0.016, and P-value 0.008). A majority, 116 (47.2%), claimed they had adequate time for PNC, but 82 (33.4%) of them showed a poor level of PNC attendance, while 34 (13.8%) had a good level of PNC attendance. A minority, 130 (52.8%), reported they did not have adequate time for PNC. Among them, 110 (44.7%) had a poor level of PNC attendance, and 20 (8.1%) had a good level of PNC attendance.

Mothers' knowledge of PNC significantly affected their attendance (Chi-square 10.118, COR 0.203, AOR 0.057, P-value 0.001). Among the majority (61%) who were knowledgeable, 43.6% had poor PNC attendance, and 17.4% had good attendance. Conversely, among the minority (39%) with poor knowledge, 34.6% attended poorly, but 4.4% attended well. This aligns with studies in Indonesia, Nigeria, and Ethiopia, where low knowledge hindered PNC utilization. Mothers in Klaten, Indonesia, lacked awareness and skills for PNC [36]. Maiduguri, Nigeria, reported low PNC uptake due to inadequate knowledge [32]. Ethiopian findings linked low obstetric danger sign knowledge to poor PNC utilization [33]. In Baglung, Nepal, PNC knowledge correlated with PNC service use [29].

Being visited by VHTs post-delivery correlated with PNC attendance (Chi-square 10.118, COR 0.203, AOR 0.057, P-value 0.001). Most (63%) not visited had poor attendance (46.4%), while 16.6% had good attendance. Conversely, the minority (37%) visited had 31.6% poor attendance and 5.4% good attendance. This differs from a study in Hoima District, Uganda, where adolescent mothers visited by VHTs three or more times were more likely to use PNC services [24].

The husbands' education level correlated with wives' PNC attendance (Chi-square 8.149, COR 0.151, AOR 0.195, P-value < 0.017). Most (50.8%) had husbands with primary education [1-7], of which 40.5% had poor attendance, and 10.5% had good attendance. Next, 29.7% had husbands with tertiary education, with 19.4% showing poor attendance and 10.3% having good attendance. 17.1% had husbands with no education, with 15.1% poor attendance and 2.0% good attendance. The minority (2.4%) had husbands with secondary (s1-s6) education, all with poor attendance. This aligns with a study in Maiduguri, Nigeria, which found that higher educational attainment of husbands was linked to better postnatal care-seeking behaviour [32].

### Health Facility Factors

The study revealed a significant association between the distance from the hospital to the mothers' homes and



their level of PNC utilization. The statistical analysis showed a significant relationship with a Chi-square value of 13.553, COR of 0.154, AOR of 0.020, and a P-value of 0.015. Mothers who had to travel long distances to reach the hospital were less likely to attend all the scheduled PNC services. This finding is consistent with similar studies, including a community-based cross-sectional study conducted in Ethiopia [35], and a study conducted in Nigeria which found that women who had to travel long distances to the hospital were less likely to return for PNC services [34].

The availability of PNC supplies and medications was found to be associated with the mothers' level of PNC utilization (Chi-square 4.00, COR 0.128, AOR 0.012, and P-value 0.046). Mothers who came to the hospital during periods when supplies and medications were unavailable were less likely to return for PNC. This finding is consistent with a study conducted in rural Zambia [17] and aligns with the results of a cross-sectional study conducted in Hoima District, Uganda, which showed that a negative experience at the facility discouraged mothers from returning to the hospital [24].

The condition of the roads leading to the hospital was found to be associated with the utilization of PNC services (Chi-square 6.884, COR 0.151, AOR 0.019, and P-value 0.018). The majority of mothers who came from areas where the roads were in poor condition were less likely to return for PNC. This finding is consistent with a study conducted in Debre Birhan town, North Shoa, Ethiopia, where poor transport services hindered mothers from seeking PNC services [35]. Communication within the hospital for the mothers was also associated with their level of PNC service utilization (Chi-square 3.860, COR 0.125, AOR 0.012, and P-value 0.050). Mothers who had poor rapport with healthcare workers or received inadequate information concerning PNC were less likely to seek PNC services. This finding is consistent with a study conducted in four districts in Southern and Eastern provinces in Zambia, which found that ineffective communication about the new PNC guidelines and non-adherence of service providers to quality standards regarding respect and preservation of dignity made mothers less likely to seek PNC services [17].

## Conclusion

This study revealed that the level of PNC attendance was low, with only 22% of the mothers attending all the PNC schedules as recommended by the Ministry of Health (MoH). Low PNC attendance was found to be associated with both maternal-related factors and health facility factors. Among the maternal factors linked to low PNC attendance were husband's occupation and education level, economic status, the number of ANC visits attended, the absence of support or

a caregiver for their children, insufficient time for PNC and knowledge about PNC. Additionally, health facility factors were identified as contributors to low PNC attendance. These factors included the distance to the hospital, the condition of the roads leading to the hospital, the availability of PNC supplies and medications, and the quality of communication within the hospital.

## Recommendations

To enhance maternal and infant healthcare utilization of postnatal care (PNC) services, a comprehensive approach encompassing several interventions and strategies is imperative:

- **Community Awareness and Education:** Launch community awareness campaigns to enlighten mothers, families, and communities about the significance of postnatal care, emphasizing its benefits. Stress the importance of early PNC visits within 48 hours of delivery and follow-up visits within the first six weeks.
- **Health Education and Counseling:** Provide health education during antenatal care appointments, preparing expectant mothers for the postnatal phase. Offer counseling on the advantages of breastfeeding, newborn care, family planning, and recognition of danger signs in both mothers and infants.
- **Task Shifting and Training:** Empower community health workers, midwives, and nurses with specialized training to offer essential PNC services. Encourage task shifting to enable lower-level healthcare providers to deliver PNC services effectively.
- **Mobile Health (mhealth) Services:** Utilize mobile technology for appointment reminders, health tips, and follow-up care instructions. Develop mobile applications for easy access to PNC information.
- **Incentives and Conditional Cash Transfers:** Implement incentive programs or conditional cash transfers to motivate mothers to seek PNC services. Provide transportation vouchers or subsidies to overcome geographical barriers.
- **Community-Based Care:** Establish community-based PNC services, enabling healthcare workers to visit homes, especially in remote areas. Foster the creation of support groups for new mothers to share experiences and knowledge.
- **Quality Improvement Initiatives:** Ensure that health facilities deliver high-quality PNC services, including skilled attendance during childbirth and essential newborn care. Conduct regular assessments and audits to identify and address service quality gaps.
- **Integration of Services:** Integrate PNC services with other healthcare interventions, such as immunization

programs, family planning services, and HIV care, to streamline care for mothers and infants.

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The research study was approved by Mountains of the Moon University Research Ethics committee.

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