



■ Original Article

Factors Associated with Compliance with the Recommended Frequency of Postnatal Care Services in Four Rural Districts of Tigray Region, North Ethiopia

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Background: The postpartum period has been advocated as a way to improve the survival of mothers and newborns. However, the status of the recommended number of postnatal care (PNC) services has not been well studied. The purpose of this study was to assess the level of full PNC visits and factors associated with it among mothers.

Methods: A community-based cross-sectional study was performed among 1,109 women from March to April 29, 2017. Data were collected via face-to-face interviews, recorded using EPI INFO ver. 7.0 (Centers for Disease Control and Prevention, Atlanta, GA, USA) and analyzed by STATA ver. 12.0 (Stata Corp., College Station, TX, USA). Multivariate logistic regression was applied to assess the predictors of the recommended frequency of PNC services. Adjusted odds ratios (aORs) at 95% confidence interval (CIs) were performed. P-values <0.05 were declared statistically significant.

Results: Status of compliance with the use of full PNC services was found to be 16.1%. Women who had antenatal care follow-up (aOR, 5.60; 95% CI, 2.50 to 12.55) and women who delivered at health institutions (aOR, 3.66; 95% CI, 1.74 to 7.70) were more likely to have full PNC visits. Proximity of women to health facilities was found to lower the odds of complete PNC visits (aOR, 0.24; 95% CI, 0.10 to 0.56). Moreover, district of residence remains a predictor of service use.

Conclusion: The percentage of women with full PNC visits was found to be low. Therefore, to achieve the recommended frequency of PNC in the study area, the results of this study suggest a need to strengthen the uptake of ANC and institutional delivery services.

Keywords: Postnatal Care; Compliance; World Health Organization; Tigray; Ethiopia

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INTRODUCTION

The third Sustainable Development Goal (SDG 3) calls for the reduction of maternal mortality ratio (MMR) to less than 70 between 2015 and 2030.^{1,2)} Globally, 303,000 maternal deaths occurred in 2015 due to complications related with pregnancy or child birth. This was a slight increment from deaths reported in 2013 (289,000) by World Health Organization (WHO), two-thirds of which occurred in Sub-Saharan Africa alone. This high maternal mortality in developing countries has been largely attributed to the low coverage of skilled postnatal care (PNC).³⁾

High maternal and neonatal mortality persists in Ethiopia.^{4,5)} This in turn is also explained by the low utilization of skilled care during postnatal care in the country.^{4,6,7)} The Ethiopian government has set national targets; to reduce MMR from 420 to 199 per 100,000 live births, to reduce child (<5 years), infant and neonatal mortality rates from 64, 44, and 28 to 30, 20, and 10 per 1,000 live births, respectively.⁵⁾

Human rights-based strategies to reduce maternal mortality promote increased access to comprehensive sexual and reproductive health information and services including contraception and safe abortion, as well as, pre-natal, intra-partum, postnatal, and emergency obstetric care.⁸⁾ Research evidence revealed that achieving the WHO three clinical visit regimen of service use at a 90% level of coverage could avert up to 310,000 newborn mortalities per year in Africa.⁹⁾ However, recent estimates show that the prevalence of PNC services use in Ethiopia has remained below 17%.⁴⁾ Moreover, its status, in relation to the WHO recommended number of PNC services, has not been well studied. The purpose of this study was to assess the level of WHO-recommended PNC and factors associated with it among mothers in Tigray region, Ethiopia. Findings from this research could provide insight to planners, programmers and policy makers on the determinants of PNC use, for appropriate intervention which may result in increased use of full postnatal services and a reduction in neonatal and maternal morbidity and mortality in the Tigray region.

METHODS

1. Study Design and Setting

A community-based cross-sectional study was conducted from March 29, 2017 to April 29, 2017 in the central zone of Tigray. The four districts were selected via lottery method. According to the 2015 Tigray Regional Health Bureau annual report, there were one specialist hospital, one infant referral hospital, 17 general hospitals, 224 health centers, and 668 health posts. Tigray regional state has made tremendous achievements in improving reproductive health indicators: the current unmet need for family planning dropped to 18%, ≥ 4 antenatal care visits (56.5%), institutional delivery (56.9%), and the prevalence of women age 15–49 years who have had an obstetric fistula is 1.1%. In addition, each 'kebele' (the smallest administrative unit) in Tigray region has one health post for providing maternal and child health services.⁴⁾

2. Sample Size and Sampling Procedure

All postpartum women who gave birth within 12 months prior to the study period in a randomly selected cluster were included in the study population. A multistage cluster sampling technique was applied to select the study participants. Initially, four districts of the zone, namely Rural Adwa, Tanquae Abergelle, Tahtay Maychew, and Laelay Maychew were randomly selected. A total of 12 clusters or kebeles (three clusters per district) were randomly selected. Women located within the randomly selected clusters who had given birth within the year preceding the survey were taken as the study population during data collection. These women were studied using house-to-house survey.

A single population proportion formula was applied to calculate the sample size considering the following assumptions: since there was no a study in rural Ethiopia, the percentage of postpartum women using full postnatal visits was assumed to be 50%, 95% confidence interval (CI), 5% margin of error,¹⁰⁾ and 3-design effect. In addition, a no response rate of 5% was utilized and finally, a sample size of 1,109 was determined.

3. Operational Definitions

1) World Health Organization recommended frequency of postnatal care services

Postnatal contacts are recommended for all mothers and newborns, on day 3 (48–72 hours), between days 7–14 after birth, and 6 weeks after birth.^{11,12)}

2) Wealth quintile

This was computed by principal component analyses based on 10 variables (ownership of a farmland, toilet facility, bank account, mobile phone, electricity, corrugated iron sheet roof, number of cows/oxen, horses/mules/donkeys, goats/sheep, and chicken). The wealth quintile (index) is categorized into five groups and ranked from poorest (first) to wealthiest (fifth) quintile.

3) Proximity of women to health facility (distance)

Distance in kilometer of villages in each cluster (kebele) to the nearest health facility. This was grouped into three: <1 km, 1–5 km, and >5 km.

4) Model household (family)

This is a household (family) that applied all the 16 health extension packages at their home and received certificates of appreciation from health extension workers.

5) Complication during delivery

This was defined as individual study participants who had severe pre-eclampsia, eclampsia, bleeding intrapartum, abnormal presentation of the fetus, prolonged or obstructed labor, breech delivery, or cervical tear. Study participants who experienced at least any one of the above were categorized as 1 (yes), and if not, 0 (no).

6) Postnatal complication

This was defined as individual study participants who had hypertension, postpartum hemorrhage, retained placenta (delayed placenta delivery), eclampsia, or sepsis. Study participants who experienced at least any one of the above were categorized as 1 (yes), if not, 0 (no).

4. Data Quality Control

Structured and pre-tested questionnaires were prepared, first in English, and then translated into Tigrigna, the local language. The questionnaire was adopted and developed with modifications from related studies.¹³⁾ Twelve trained (BSc) nurses conducted the face to face interviews and four master of science were supervised the data collection process. The data quality was monitored via training of the data collectors and supervisors, pretesting of the tools, and tight supervision by principal researchers and resident supervisors.

5. Ethical Issues

Ethical approval was granted by the Institutional Review Board (IRB) of College of Health Sciences, Aksum University with the reference number of IRB 005/2017. Official letters were obtained from the respective district administrative health offices. Informed written consent from the participants was taken prior to the study. To ensure confidentiality, names were not used in depicting the results of the study. Health education about the importance of compliance with PNC was provided at the end of the interviews for those who had not completed the WHO recommended frequency of PNC service.

6. Data Processing and Analysis

Data were entered using EPI INFO ver. 7.0 (Centers for Disease Control and Prevention, Atlanta, GA, USA).¹⁴⁾ After checking for consistency and completeness, the data were exported to STATA ver. 12.0 for analysis (Stata Corp., College Station, TX, USA).¹⁵⁾ Descriptive statistical analysis was performed to characterize the study participants in relation to key variables. Multivariate logistic regression model was applied to assess the predictors of compliance with the WHO recommended frequency of PNC services. Adjusted odds ratios (aORs) along with 95% CIs were calculated. P-values <0.05 were declared statistically significant. Goodness of fit of the model was assessed by using the Hosmer-Lemeshow test, which yielded a large P-value (0.71). Regression analysis indicated that evidence for model adequacy fitted well with the predictors.

RESULTS

1. Socio-Demographic Characteristics

A total of 1,109 postpartum women were interviewed. All the study participants were between 16–49 years old. The women's mean±standard deviation age was 28.7±6.4 years. All the women were Tigraian by ethnicity. Forty-two percent of mothers did not have any formal education, 42.7% had primary education and only 15.7% had secondary or higher education. The majority of the interviewed mothers (80%) and their

partners (86.1%) were farmers by occupation (Table 1).

2. Characteristics of Maternal Health Services Use

Table 2 shows the distribution of maternal health services use. One thousand and eighteen (91.79%) made at least one antenatal visit and 547 (49.3%; 95% CI, 46.3–52.3) made the WHO recommended four visits. Nine hundred and forty-five mothers (85.2%) reportedly delivered

Table 1. Socio-demographic characteristics in four rural districts of Tigray, northern Ethiopia, 2017 (n=1,109)

Characteristic	Frequency (%)
Maternal age (y)	
16–19	52 (4.7)
20–24	278 (25.1)
25–29	302 (27.2)
30–34	228 (20.6)
35–39	182 (16.4)
≥40	67 (6.0)
Maternal education	
Uneducated	462 (41.7)
Primary school	473 (42.7)
Secondary school	162 (14.6)
Diploma and above	12 (1.1)
Partner/husband education	
Uneducated	364 (32.8)
Primary school	541 (48.8)
Secondary school	176 (15.9)
Diploma and above	28 (2.5)
Marital status	
Currently married	1,047 (94.4)
Unmarried	62 (5.6)
Maternal occupation	
House wife	126 (11.4)
Farmer	900 (81.2)
Others*	83 (7.5)
Husband/partner occupation	
Farmer	955 (86.1)
Private worker	62 (5.6)
Others*	92 (8.3)
Wealth quintile	
Lowest	220 (19.8)
Second	227 (20.5)
Middle	213 (19.2)
Fourth	225 (20.3)
Highest	224 (20.2)
Sex of infant	
Male	470 (42.4)
Female	639 (57.6)
Birth order	
1–2	417 (47.6)
3–4	427 (38.5)
≥5	265 (23.9)

Values are presented as numbers (%). Wealth quintile was calculated by principal component analyses from 10 variables (based on the ownership of a farmland, toilet facility, bank account, mobile phone, electricity, corrugated iron sheet roof, and number of cows/oxen, horses/mules/donkeys, goats/sheep, and chicken). The wealth quintile (index) was categorized in to five categories and ranked from poorest (first) to wealthiest (fifth) quintile.

*Daily labor, private worker, student, and teacher.

Table 2. Maternal health service characteristics in four rural districts of Tigray, northern Ethiopia, 2017

Variable	Frequency (%)
Birth interval (mo) (n=905)	
<24	172 (15.5)
24–36	565 (50.9)
>36	168 (15.1)
ANC visit (n=1,109)	
Yes	1,018 (91.8)
No	91 (8.2)
No. of ANC visits (n=1,109)	
None	91 (8.2)
1	36 (3.2)
2–3	435 (39.2)
≥4	547 (49.3)
Place of delivery	
Health institution	945 (85.2)
Home	164 (14.8)
Mode of delivery (n=945)	
Normal	882 (79.5)
Instrumental (forceps, vacuums)	43 (3.9)
Cesarean section	20 (1.8)
Complication during delivery	
Yes	193 (17.4)
No	916 (82.6)
Where PNC was received (n=497)	
Health center	291 (58.5)
Hospital	34 (6.8)
Health post	172 (34.7)
No. of PNC visits (n=497)	
1–2	417
≥3	80
Postnatal complications	
Yes	150 (13.5)
No	959 (86.5)
Counseled for PNC by health extension worker	
Yes	802 (72.3)
No	307 (27.7)

ANC, antenatal care; PNC, postnatal care.

at health institutions. A total of seven hundred and two hundred forty five (22.1%) of women gave birth at health center and hospitals, respectively. Of all the interviewed women, 157 (14.2%; 95% CI, 12.3–16.3) reportedly experienced prenatal complications, 193 (17.4%; 95% CI, 15.1–19.6) and 150 (13.5%; 95% CI, 11.5–15.6) reported having complications during delivery and in the puerperium period, respectively, and 6.7% reported a complicated mode of delivery (caesarean section or instrumental delivery). PNC services were most frequently received from the health center. About 96.9% of the mothers and 68.1% of partners were tested for human immunodeficiency virus (HIV), seven and five of whom were infected with HIV, respectively. Eight hundred and two study participants (72.3%) received home-based PNC and counseling from health extension workers.

3. Compliance with the Recommended Frequency of Postnatal Care Services

In our study, compliance with the the WHO recommended postnatal care was found to be 16.1% (95% CI, 13.1–19.1). Majority of the women received PNC from health center.

4. Determinants of the World Health Organization Recommended Frequency of Postnatal Care Services Use

As clearly shown in the multivariate logistic regression analysis, Table 3, ANC follow-up, place of delivery, history of complication during PNC, distance (proximity of women to health facility), and districts of residence were significant predictors and independently associated with compliance with the recommended frequency of use of PNC services.

Women who have ANC follow-up were 5.6 times more likely to adhere to the WHO recommended frequency of PNC services use than women who did not (aOR, 5.60; 95% CI, 2.50–12.55). Delivery at a health institution was found to be an important predictor of compliance with the recommended frequency PNC service use (aOR, 3.66, 95% CI, 1.74–7.70). Compliance with this recommendation was lower among women located close to health facilities (<1 km) (aOR, 0.24; 95% CI, 0.10–0.56).

Women who lived in rural Adwa, Tahtay Maychew, and Laelay Maychew districts (aOR, 4.74; 95% CI, 1.52–14.72; aOR, 5.19; 95% CI, 1.86–14.46; and aOR, 11.24; 95% CI, 3.71–34.03, respectively) were more likely to receive PNC service than those who lived in Tanquae Abregelle district (Table 3). Wealth quintiles of the household, marital status, health insurance, and model household factors were not found statistically associated with the outcome variables.

DISCUSSION

Postpartum period have been advocated as a way to improve the survival of mothers and newborns.¹⁶⁾ It is believed to offer an important opportunity to assess the physical and psychosocial well-being of postpartum mothers.^{17–19)} This study is the first to assess the extent to which postpartum mothers received WHO recommended PNC services in Ethiopia, particularly in Tigray regional state. Therefore, this study was conducted to determine the WHO recommended frequency of PNC services use and its associated factors in Tigray regional state, northern Ethiopia. After adjusting for the other factors in the regression analysis model, ANC follow-up, place of delivery, proximity to health facility, and districts of residence were found to be associated with PNC completion in the study area.

This study found that there was a 16.1% rate of compliance with the recommended frequency of PNC service use; this finding was slightly higher than was observed in Tanzania (10.4%).¹³⁾ The higher rate of completion of PNC visits in this study may be attributed to coordinated efforts made by the Ethiopian Federal Ministry of Health and its partners, particularly through the health extension program. Since 2003, more than 39,000 health extension workers have been trained,

Table 3. Factors associated with compliance with the recommended frequency of PNC services in four rural districts of Tigray region, northern Ethiopia

Variable	Recommended frequency of PNC		Crude OR (95% CI)	Adjusted OR (95% CI)	P-value
	Yes	No			
ANC					
Yes	61 (13.5)	389 (86.5)	4.32 (2.27–8.22)*	5.60 (2.50–12.55)*	0.000
No	19 (40.4)	28 (59.6)	1	1	
Place of delivery					
Home	21 (38.9)	33 (61.1)	1	1	
Health institution	59 (13.3)	384 (86.7)	4.14 (2.24–7.63)*	3.66 (1.74–7.70)*	0.001
History of complications during PNC					
Yes	8 (7.3)	102 (92.7)	2.91 (1.35–6.25)*	2.18 (0.94–5.07)	0.069
No	72 (18.6)	315 (81.4)	1	1	
Model household					
Yes	13 (9.4)	126 (90.6)	2.23 (1.18–4.18)*	1.57 (0.79–3.13)	0.197
No	67 (18.7)	291 (81.3)	1	1	
Distance (km)					
<1	17 (10.1)	152 (89.9)	0.34 (0.17–0.68)*	0.24 (0.10–0.56)*	0.001
1–5	39 (16.9)	191 (83.0)	0.63 (0.35–1.11)*	0.69 (0.35–1.35)	0.282
>5	24 (24.5)	74 (75.5)	1	1	
District of residence					
Tanquae Abergelle	13 (17.1)	63 (82.9)	1	1	
Tahtay Maychew	40 (24)	127 (76)	5.57 (1.90–16.30)*	4.74 (1.52–14.72)*	0.007
Laelay Maychew	22 (19.3)	92 (80.7)	8.50 (3.25–22.22)*	5.19 (1.86–14.46)*	0.002
Rural Adwa	5 (3.6)	135 (96.4)	6.45 (2.36–17.66)*	11.24 (3.71–34.03)*	0.000

Values are presented as numbers (%), unless otherwise stated. Adjusted ORs and 95% CI were calculated using a multivariate logistic regression analysis after adjusting the following variables: wealth quintile, ANC, place of delivery, mode of delivery, complication during delivery, history of complication during PNC, counseled for PNC by health extension worker, model house hold, where PNC received, distance, and district residence.

PNC, postnatal care; OR, odds ratio; CI, confidence interval; ANC, antenatal care; 1, reference category.

* $P < 0.05$.

each for a 1-year period. These workers educate the public and provide basic health services, including maternal health care. Additionally, the current house-to-house health education strategy through these workers and free maternal health services in rural communities could be enabling factors.^{5,20}

Our findings revealed that the frequency of PNC is significantly associated with the utilization of ANC, suggesting that ANC service providers found important windows of opportunity to provide counseling to women, encouraging them to have full PNC follow-up visit. This is consistent with a study conducted in Tanzania.¹³ Therefore, this research finding underscores the need for service integration within public health facilities in order to take advantage of ANC time to increase the compliance of PNC visits.

The effect of the place of delivery on completion of PNC visits was statistically significant. This indicates that delivery facilities have a good opportunity to promote PNC benefit to mothers and their newborns. In addition, this finding suggests that there is a need to improve maternal health care service quality during childbirth, to include counseling or health education and promotion to tackle the low level of complete PNC compliance. However, these findings contradict another study in Tanzania where the place of delivery had no effect on the uptake of PNC.¹³

Surprisingly, this study shows that proximity of women to health care facilities had a negative effect on the frequency of PNC service usage. Study participants living within close proximity to health institu-

tions were 76% less likely to make full PNC visits. This contradicts findings from the other study in Tanzania¹³ and could be due to several reasons. For example, it may be linked to the fact that people living close to health facilities tend to have a low health-seeking behavior. They may not be motivated to visit health institutions to receive services. In this case, distance may not a key driving factor for the compliance with PNC requirements.

District of residence was also significantly associated with compliance with the recommended frequency of PNC service utilization. This finding is similar to a study conducted in Tanzania.¹³ Our research showed that women living in rural Adwa, Tahtay Maychew, and Laelay Maychew districts were more likely to utilize PNC. The uptake of full PNC in Tanquae Abergelle was very low when compared with other districts. This scenario could be explained by the fact that 53.2% of uneducated study participants were from Tanquae Abergelle district. Uneducated or poorly educated women are less likely to have a better understanding of the value of full PNC visits and are, thus, less likely to visit the health facility.

The fact that this research project was done at the community level with a large sample size could be seen as the strength of the study. However, this study is faced with the limitation of analytical cross-sectional studies i.e., since the responses and factors were assessed simultaneously, it may not be possible to establish cause-effect relationships between the outcome variables and associated factors. Additionally, recall bias is another possible limitation of this study. Despite these

limitations, we believe that our study project contributes to a better understanding of compliance and related factors affecting postpartum care in the rural district of Tigray, Ethiopia.

In conclusion, the percentage of women compliant with full PNC visits was low in the Tigray region. Principal factors affecting PNC completion were ANC follow-up, place of delivery, proximity to health facility, and districts of residence. Therefore, in order to achieve the WHO recommended frequency of PNC services use in the rural Tigray region, we suggest that the uptake of antenatal care and institutional delivery services should be encouraged.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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