

# Early Postnatal Home Visit by Health Extension Workers and Associated Factors Among Mothers Who Deliver in Dita Woreda, Gamo Zone, South Ethiopia Region, Ethiopia. 2024, Community-Based-Cross Sectional Study

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## Abstract

**Objective:** This study aimed to assess the magnitude of early postnatal home visits and identify factors associated with early postnatal care among mothers who delivered within the past six months in Dita District, Gamo Zone, Southern Ethiopia.

**Design:** A community-based cross-sectional study.

**Setting:** The study was conducted in Dita District, Gamo Zone, Southern Ethiopia, from August 1–30, 2024.

**Population or Sample:** A total of 464 mothers who had given birth in the previous six months were selected using a multistage sampling technique.

**Methods:** Data were collected using interviewer-administered questionnaires. Data entry and analysis were performed using SPSS version 26. Binary logistic regression was used to identify factors associated with early postnatal home visits by Health Extension Workers (HEWs), with statistical significance declared at  $p < 0.05$ .

**Main Outcome Measures:** The primary outcome was the coverage of early postnatal home visits, defined as receiving at least one home visit by a Health Extension Worker between 24 hours and 7 days postpartum, and associated maternal, household, and service-related factors.

**Results:** The magnitude of early postnatal home visits was 17.8% (95% CI: 14.3%–21.1%). Factors significantly associated with receiving an early postnatal home visit included living within 30 minutes of a health post (AOR = 3.82, 95% CI: 1.94–7.55), being from a model family household (AOR = 2.46, 95% CI: 1.17–5.16), attending antenatal care (AOR = 2.88, 95% CI: 1.22–6.82), delivering in a health facility (AOR = 2.16, 95% CI: 1.18–3.94), and having a cesarean or instrumental delivery (AOR = 3.34, 95% CI: 1.27–8.74).

**Conclusions:** Early postnatal home visit coverage in Dita District remains low. Strengthening health extension services, improving access in remote areas, enhancing antenatal care awareness, promoting institutional delivery, and ensuring targeted follow-up for assisted births are crucial for improving early postnatal care utilization in Southern Ethiopia.

**Keywords:** Early Postnatal Home Visits, Health Extension Workers (HEWs), Maternal and Newborn Health, Postnatal Care Utilization, Community-Based Cross-Sectional Study

## 1. Introduction

Postnatal care (PNC) is the care that is given to the mother and her newborn baby after birth and up to 6 weeks after birth [1]. According to the World Health Organization (WHO), a total of four visits should occur. The first visit starts within the first 24 hours after delivery, followed by subsequent visits within 48 to 72 hours, Between days 7-14, and at six weeks [2]. During the postnatal period after childbirth, it is essential for protecting the health of both mothers and newborns [3]. Early postnatal care is a critical component of maternal and child health, significantly influencing health outcomes for both mothers and newborns [4]. The period immediately following childbirth is important for preventing disease and managing postpartum and neonatal complications [5]. Early postnatal care visit provides an opportunity for healthcare providers to educate mothers on essential practices, such as exclusive breastfeeding, proper maternal nutrition, and family planning, to promote the health and well-being of both mother and newborn [6].

The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) released a statement recommending home visits as a key strategy to reduce neonatal deaths, especially during the first week after birth (days 1, 3, and 7) [7, 8]. Early postnatal home visits improve newborn care practices, including clean umbilical cord care, delayed bathing, thermal care or kangaroo mother care for preterm and/or low birth weight babies, and early initiation of breastfeeding [2]. Community-based interventions play an important role in a comprehensive approach to accelerating improvements in maternal health [9]. Home visits by community health workers (CHWs) are essential for enhancing newborn survival, particularly in high-mortality settings [10, 11]. Following research in South Asia, WHO, and UNICEF recommended postpartum home visits in 2009, which has led over 50 countries to adopt policies supporting early postnatal visit through home visits, primarily utilizing community health workers [12]. In many countries, especially those with limited healthcare infrastructure and personnel, health extension workers (HEWs) are delivering essential maternal and child health services, including antenatal, during deliver, and postnatal care [13]. In 2003, Ethiopia launched the Health Extension Program (HEP) to enhance the utilization of prenatal care and institutional delivery services among community members. As part of this initiative, the Federal Ministry of Health (FMOH) assigned HEWs to deliver postnatal care. Within the first 24 hours after childbirth, HEWs assess critical health indicators such as vaginal bleeding, uterine contractions, and body temperature. They also conduct follow-up visits to monitor the physical and mental well-being of mothers during the postpartum period, aiming to reduce maternal and newborn mortality in low-resource settings [14-16].

Delays in the first postnatal care visit may result in missed opportunities to identify and manage health concerns during the postpartum period, ultimately increasing the risk of morbidity for both mothers and infants [17].

Globally, each year, around 4 million newborns and 287,000 mothers die within the first 24 hours after birth due to complications [18]. In 2022, 2.3 million newborns died during their first month of life, with 1 million of these deaths occurring on the first day [19]. In Sub-Saharan Africa, 1212 deaths occurred within 42 days after giving birth [20]. Developing countries, notably Ethiopia, face a disproportionate burden, with maternal and neonatal mortality rates reaching 412 per 100,000 and 30 per 1,000 live births, respectively [21]. Studies indicate that home-based interventions can significantly reduce neonatal morbidity and maternal health complications, with home-based newborn care preventing 30-60% of newborn deaths in high-mortality regions and reducing neonatal mortality by 24% [22]. Particularly in Ethiopia, HEWs play an essential role in reducing adverse maternal and neonatal outcomes by providing postnatal care (PNC) services, such as monitoring blood pressure, checking temperature, offering guidance on newborn danger signs, promoting skin-to-skin care, and measuring newborn weight [23]. Most rural women experience inadequate postnatal care, reflecting significant disparities in PNC utilization across diverse regions [24, 25]. In high-income countries like Canada reported that 3.2% of women had no postnatal visits within the first 6 weeks [26]. In contrast, in rural Myanmar, only 25.2% of women accessed full PNC services [25]. Across Sub-Saharan Africa, PNC utilization rates across urban and rural areas in low-resource regions show stark differences, with urban communities reporting higher rates 37.5% compared to rural areas (33%) respectively [27]. Postnatal care home visits by community health extension workers reported rates of 50% in Nepal and 62.8% in Uganda [28, 29]. Only 11% of mothers and newborns in Malawi and 6.4% in Kenya received home visits by community health workers within three days of birth [30, 31]. In Ethiopia, early postnatal home visit coverage is similarly limited, with just 14.5% of mothers in rural Northern Ethiopia and 15.13% in the Amhara region receiving early PNC home visits [32, 33]. In Southern Ethiopia, only 12.4% of mothers and their newborns received visits from health extension workers during the first month postpartum [34]. Key factors influencing early postnatal home visit coverage by HEWs include previous home visits during pregnancy, women's education, income, skilled assistance at delivery, access to health posts, participation in pregnant women's forums, the time taken to reach health posts, participation in pregnant women forums, having access to a HEW's cell phone were major contributors to early postnatal home visits [32-34]. Yet, early postnatal home visit services still face challenges in Ethiopia, including resource limitations, infrastructure issues, cultural barriers, inadequate training, and poor monitoring and communication, all of which contribute to persistent gaps in early postnatal care visits by community health extension workers [35]. Therefore this study aims to assess magnitude of early postnatal home visits by health extension workers and associated factors among mothers who delivered in the past six months in dita Woreda, Gamo zone, southern Ethiopia region, Ethiopia, 2024.

## 2. Methods and Materials

### 2.1. Study Area Setting and Period

The study was conducted in dita District, one of the fourteen districts in the Gamo Zone, located in the Southern Ethiopia region. The district is situated 559 km south of the capital city of Ethiopia, Addis Ababa, and consists of twenty-four rural kebeles and one urban kebele. The estimated population of the area is 124,065, comprising approximately 63,472 females and about 60,593 males. These figures are based on population projections derived from the 2007 census through 2024. Additionally, there are 25,319 households in the district, as reported in the 2024 statistics of the Woreda Health Office. Health services in the district are provided by four health centers, twenty-five health posts, two private clinics, and two private drugstores. The study was carried out from August 1 to August 30, 2024.

#### 2.1.1. Study Design

A community-based cross-sectional study was conducted.

#### 2.1.2. Source Populations

All the mothers who had given birth in the past six months in dita Woreda, Gamo Zone.

#### 2.1.3. Study Populations

All mothers who had given birth within the past six months in the selected kebeles.

#### 2.1.4. Sample Populations

All Selected mothers from selected kebeles.

#### 2.1.5. Study Unit

An individual mother from the selected kebeles who delivered within the past six months.

#### 2.1.6. Inclusion Criteria

The study included mothers who had resided in the selected kebeles for at least six months before the study.

#### 2.1.7. Exclusion Criteria

Mothers who were seriously ill were excluded from the study during the data collection period.

### 2.1.8. Sample Size Determination

The sample size for early postnatal home visits was determined using the single population proportion formula. The calculation was based on several statistical assumptions: a margin of error of 5% (0.05), a Z-value of 1.96 corresponding to a 95% confidence level, and a design effect of 1.5. The estimated proportion of PNHV by HEW in rural areas of Ethiopia was taken to be 24.1%[32]. Therefore, the sample size was calculated in the following manner.

$$N = \frac{(Z\alpha / 2)^2 * P (1 - P)}{d^2}$$

$$N = \frac{(1.96)^2 * 0.241 (1 - 0.241)}{(0.05)^2} = 281$$

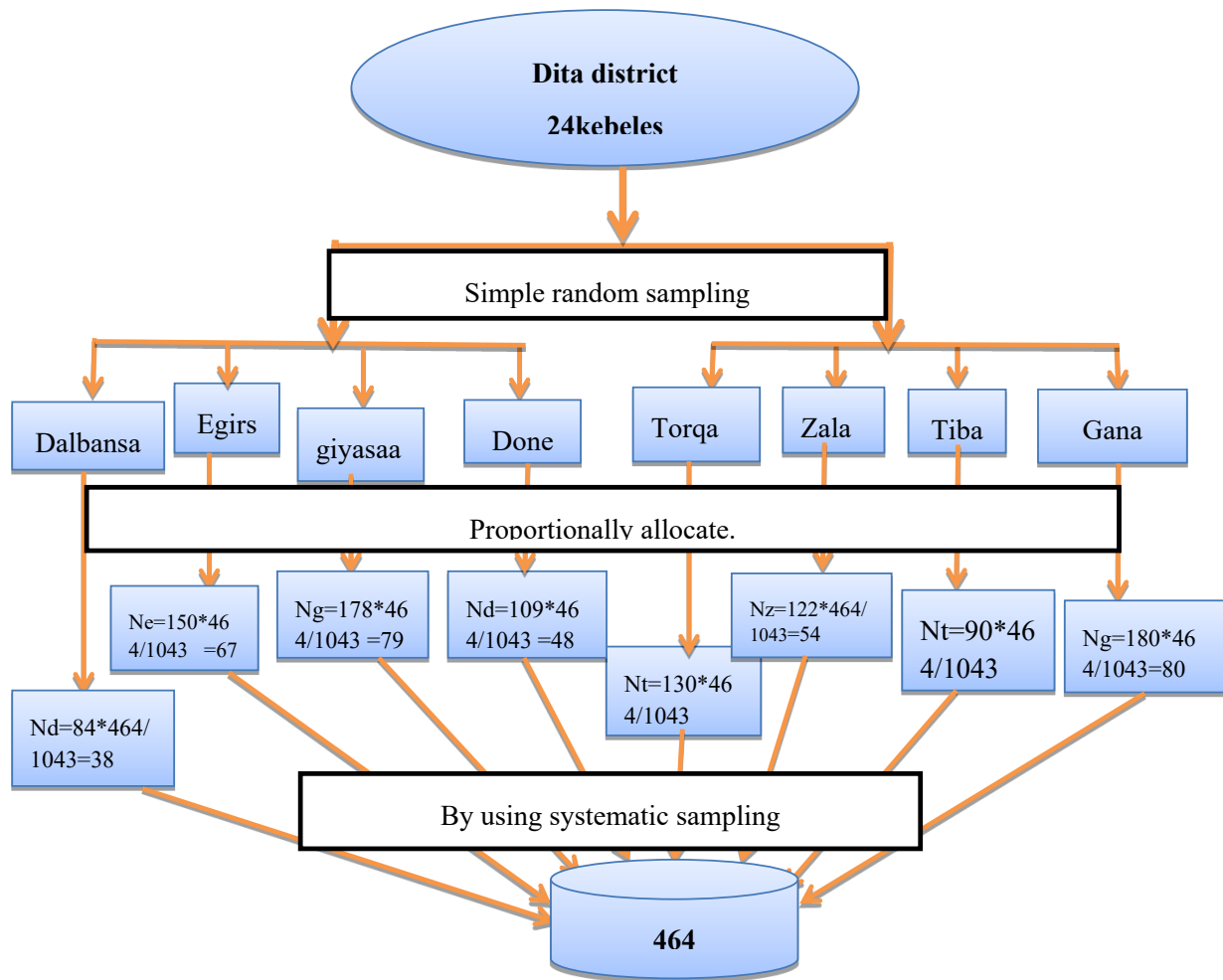
$$N = 281 * 1.5 = 421.5$$

$$N \approx 422$$

The total sample size for this study was determined to be 464 mothers. This was calculated by applying a design effect of 1.5 to the initial sample size of 281, resulting in approximately 422. To account for potential non-response, a 10% increase was added, bringing the final sample size to 464.

### 2.1.9. Sampling Procedure

The study was carried out using a multi-stage sampling method to ensure a representative sample. dita District, which consists of 24 kebeles, randomly selected 30% (eight kebeles) for participation. A final sample size of 464 was proportionally distributed across these eight kebeles, focusing on mothers who had given birth in the past six months. The Integrated Maternal and Child Care Card, using the mother's ID, were used to identify eligible participants. Respondents were then systematically selected from the health extension workers' registration books in each kebele. The process of selecting mothers from households with multiple eligible respondents involved randomly choosing one mother from the five households using a lottery method. In cases where two selected study participants were unavailable at their homes during the initial data collection, the data collector made up to three additional attempts to locate them. If, after these three attempts, the participants could still not be found, the next eligible household was included in the study. The detailed multistage sampling procedure used in this study is illustrated in Figure 1.



**Figure 1: A Diagram Illustrating the Sampling Procedure for the Study was Conducted Among Mothers Who Delivered in the Past six Months in Dita District, Southern Ethiopia, 2024**

## 2.2. Data Collection Procedures

Data collection was carried out in the participants' homes to create a comfortable and familiar environment. The face-to-face interviews were scheduled during working hours to ensure that the mothers were available and could provide thoughtful responses without feeling rushed. A multi-stage sampling approach was used to select participants for the study. To locate these mothers, the Integrated Maternal and Child Care Card were used, specifically utilizing the mother's ID. Trained data collectors, who were diploma-level nurses and midwives, conducted the interviews. The data collectors were trained to ensure consistency and accuracy in the data collection process. Supervisors with a BSc in nursing, proficient in both Gamogna and Amharic, oversaw the process to maintain quality and promptly address any issues that emerged during the data collection period. For open-ended questions, data collectors waited patiently for the mothers to complete their responses to ensure that answers were comprehensive and reflected the participants' full thoughts. The responses to open-ended questions were recorded by the data collectors, ensuring that the participant's answers were accurately captured for analysis.

## 2.3. Dependent Variable

### 2.3.1. Early Postnatal Home Visit

Independent variables Socio-demographic Factors Age of the mother, Education level, Income and Distance of healthcare facilities. Maternal Knowledge and Perception Awareness of obstetric danger sign and mother aware early postnatal care. Earlier Obstetric History Earlier pregnancies and childbirth experiences, Antenatal care, history of obstetric complications, the mode of delivery for past pregnancies and Desired pregnancy.

## 2.4. Operational Definition

Early postnatal home visit: A health care service provided to a mother and her newborn between 24 hours to 7 days after childbirth [7, 8]. Distance to Healthcare Facilities: A health care facility that can be reached by public transportation within 5 kilometers or 30 minutes in urban areas and 10 kilometers or 60 minutes in rural areas is considered accessible [36]. History of Obstetric Complications: A woman experienced one or more of these refer to serious health problems or difficulties that a woman has encountered in her past pregnancies during her pregnancy, labor, or postpartum. These include complications that

arise before, during, or after childbirth, such as gestational hypertension, diabetes, prolonged labor, and fetal distress, as well as hemorrhage and infection [37].

**Awareness of obstetric danger signs:** This refers to pregnant women's ability to recognize life-threatening complications during pregnancy, childbirth, or postpartum, including identifying at least two of the following danger signs: severe abdominal pain, heavy bleeding, severe headache or blurred vision, reduced fetal movement, high fever, foul-smelling discharge, and signs of deep vein thrombosis [38]. **Awareness of the importance of early postnatal care visits:** This refers to a mother's understanding of the importance of early postnatal visits for maternal and infant health, measured through responses about recovery, infant development, mental health, feeding support, and preventive care like vaccinations. The awareness is considered present if the participant can identify two or more of these questions [39]. A model family is a household that has been trained in key health areas, including maternal health, malaria prevention and control, and hygiene and environmental sanitation [40].

## 2.5. Data Collection Tools

Data were collected using an interviewer-administered structured questionnaire, which was adopted after a thorough review of pertinent literature [41-49].

## 2.6. Data Quality Control

A pre-test was conducted on 23 study participants, representing 5% of the sample size, in the Chenchä district (outside the study area) to verify translation accuracy and refine the data collection tool based on feedback. The pre-test results demonstrated that while the questionnaire was generally effective, some revisions were necessary. Based on participant feedback, amendments included rephrasing ambiguous questions, simplifying complex language, and modifying the format to improve the flow. Comprehensive training sessions covered the study's objectives, the importance of confidentiality, respondent rights, and techniques for conducting respectful interviews. The principal investigator and supervisors reviewed the questionnaires daily to confirm that no essential information was overlooked. Additionally, a multivariable analysis using a binary logistic model was employed to account for potential confounding variables, ensuring a thorough understanding of the data and accurate conclusions.

## 2.7. Data Processing and Analysis

The collected data was coded and entered into Epi-Data Statistical Software and subsequently exported to SPSS Statistics version 26 for further processing, including data cleaning, recoding, and analysis. Descriptive statistics frequencies, percentages, means, and standard deviations were computed to provide a comprehensive overview, presented through tables, figures, and explanatory text for better understanding. Binary logistic regression analysis was performed to identify factors associated with early postnatal home visits by health extension workers. Variables with a p-value  $\leq 0.25$  from the bivariate analysis were entered into a multivariable logistic regression model to control for potential confounders.

Before conducting the multivariable analysis, multicollinearity was assessed using the Variance Inflation Factor (VIF) for each predictor variable. The VIF values ranged from 1.002 to 1.080, all well below the threshold of 5, indicating no significant multicollinearity among the variables. Additionally, tolerance values ranged from 0.926 to 0.998, close to 1, further confirming the absence of multicollinearity. The model's goodness of fit was then evaluated using the Hosmer and Lemeshow test, which yielded a p-value of 0.481. Since this value is greater than 0.05, it suggests that the model fits the data well, indicating a good alignment between the observed and predicted outcomes. During the data collection phase, participants were first briefed about the study's objectives, purpose, and the voluntary nature of their involvement. After receiving the necessary information, participants were asked to provide written informed consent, confirming their understanding and agreement to participate. Data collection only began after obtaining explicit consent from all participants. Throughout the process, confidentiality was maintained, and the data collection team ensured that all personal information was stored securely and used only for the purpose of the study.

## 3. Result

### 3.1. Socio-Demographic and Economic Characteristics of The Respondents

Approximately 460 mothers participated, indicating a response rate of 99.14%. The mean age of the participants was 27.93 years (SD  $\pm$  5.58). Nearly all participants, 451 (98.0%), were married. Regarding education, 216 (47.0%) of the mothers had no formal education, 172 (37.4%) completed primary education, and 72 (15.7%) had secondary education or higher. Additionally, 35.0% of respondents lived within a 30-minute to 1-hour distance from a health facility [Table: 1].

Variable		Frequency	Percentage
Marital Status	Married	451	98.0%
	Divorced	8	1.7%
	Widowed	1	0.2%
Mothers Educational Status	Uneducated	212	46.1%
	Primary	171	37.2%
	Secondary and above	77	16.7%
Husband's Educational Status	Primary	182	39.6%
	Uneducated	170	37.0%
	Secondary and above	108	23.5%
Mothers Occupation	Housewife	213	46.3
	Merchant	133	28.9
	Farmer	91	19.8
	Government employ	21	4.6
	Others	2	0.4
Wealth Status	Less than 1000birr	295	64.1%
	1000-1500 bur	120	26.1%
	More than 1500 birr	45	9.8%
Distance To Health Facility	<30minut	155	33.7%
	30minut to 1 hour	161	35.0%
	More than 1 hour	144	31.3%
Age	15-24	151	32.8%
	25-34	243	52.8%
	35 years and above	66	14.3%

**Table 1: Socio-Demographic Characteristics of Mothers and Their Newborns in Dita District, Southern Ethiopia, 2024. (n=460)**

### 3.2. Obstetric, Awareness of Obstetric Danger Signs and Health Institution-Related Characteristics of the Respondents.

Among the 460 participants, the study demonstrated that a large proportion of respondents 78.0% attended antenatal care visits, and the majority 58.9% delivered in health institutions, with spontaneous vaginal deliveries being the most common mode of delivery 95.0%. Most pregnancies 59.8% were planned, and 428 mothers (93.0%) did not experience complications after delivery. However,

awareness of life-threatening complications during pregnancy, childbirth, and the postpartum period was notably low, with only 38 mothers (8.3%). Similarly, just 76 mothers (16.5%) were aware of the importance of early postnatal care visits. In terms of household involvement in community health initiatives, 115 households (25.0%) had graduated as model families, and 217 respondents (47.2%) were members of the Women's Development Army [Table: 2].

Variables		Frequency (N)	Percent %
Antenatal visits	No	101	22.0%
	Yes	359	78.0%
Number of pregnancies	One	154	33.5%
	Two	161	35.0%
	Three	76	16.5%
	Four	45	9.8%
	≥ 5	24	5.2%
Place of birth	Home	189	41.1%

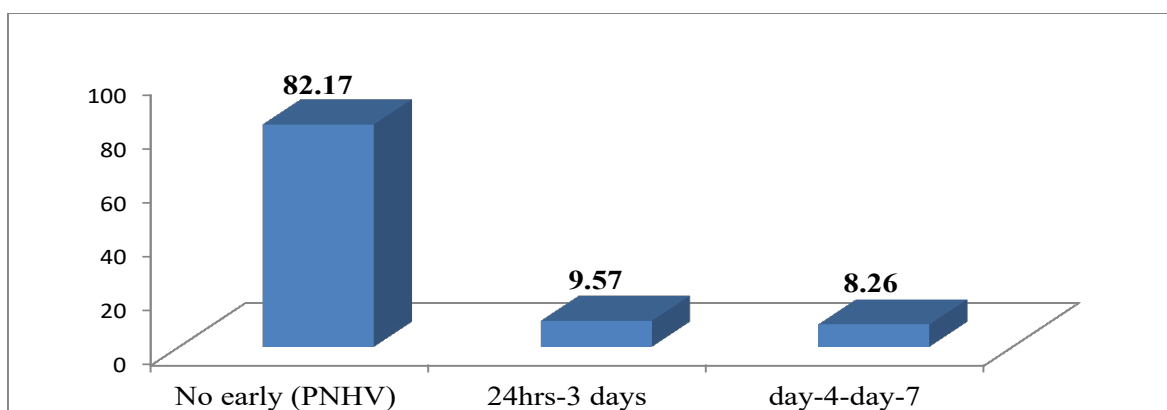
	Health institution	271	58.9%
Developed complications after delivery	No	428	93.0%
	Yes	32	7.0%
Mode of delivery	(SVD)	437	95.0%
	ID (C/S)	23	5.0%
Condition of pregnancy	Planned	275	59.8%
	Unplanned	185	40.2%
Experienced complications in past pregnancies	No	434	94.3%
	Yes	26	5.7%
Awareness of life-threatening complications during pregnancy, childbirth, and the postpartum period	Yes	38	8.3%
	No	422	91.7%
Awareness of the importance of early postnatal care visits	Yes	76	16.5%
	No	384	83.5%
Household model status	Never heard about the model family	125	27.2
	Heard about the model family but have not worked towards becoming one	78	17.0
	Actively working towards becoming a model family.	142	30.9
	Graduated as a model family.	115	25.0
Member of the Women's Development Army	No	243	52.8
	Yes	217	47.2

**Table 2: Obstetric, Awareness of Obstetric Danger Signs, And Health Institution-Related Characteristics of the Respondents of Mothers and Their Newborns in The Dita District, Southern Ethiopia (2024) (N=460)**

### 3.3. Early Postnatal Home Visit Coverage

The coverage of early postnatal home visits among mothers in dita district was 17.8% (95% CI: 14.3% to 21.1%), with mothers and newborns receiving visits from Health

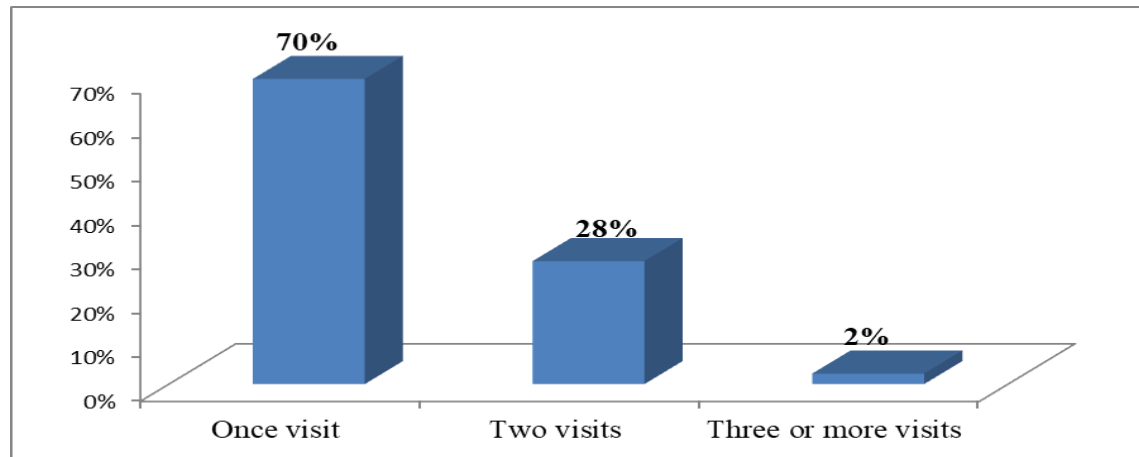
Extension Workers within 24 hours to 7 days after birth. Among those who received visits, 9.57% (44 mothers) were seen within the first 24 hours to 3 days, while 8.26% (38 mothers) were visited between days 4 and 7 (Fig. 2).



**Figure 2: Proportion of Mothers and Newborns Who Received A Postnatal Home Visit by Health Extension Workers Within 7 Days After Birth in The Dita District, Southern Ethiopia (2024, N=460)**

Among the 82 mothers who received early postnatal home visits the majority, 57 mothers (69.5%), had only one visit. About one-fourth, or 23 mothers (28.0%), had two visits,

while just 2 mothers (2.4%) received three or more visits [Fig: 3].



**Figure 3: Proportion of the Mothers Who Give Birth by the Number of Visits Received in Dita District Gamo Zone, Southern Ethiopia in (2024, N=82)**

The bivariate analysis identified several factors associated with early postnatal home visits by Health Extension Workers at  $p < 0.25$ , including maternal educational status, proximity to the nearest health post, ANC follow-up, place of delivery, mode of delivery, post-delivery complications, and model household status. However, in addition to these statistically identified variables, several factors were included a priori in the multivariable logistic regression model based on strong theoretical, clinical, and empirical evidence from previous studies. Variables such as maternal education, ANC attendance, and place of delivery are well-established determinants of maternal health service utilization and are known confounders in PNC research. Similarly, proximity to health services and model household status are structural factors that consistently influence the likelihood of receiving community-based services, regardless of their statistical significance in bivariable screening.

For these reasons, the multivariable model incorporated both variables meeting the statistical threshold ( $p \leq 0.25$ ) and variables selected a priori due to their conceptual importance. This approach ensured that the final model adequately controlled for known confounders, minimized omitted-variable bias, and strengthened the validity

and interpretability of the adjusted associations. After adjusting for these factors, only five variables proximity to a health post, model household status, ANC follow-up, health facility delivery, and cesarean or instrumental delivery—remained significantly associated with early PNHV by HEWs at  $p < 0.05$ . Mothers who took less than 30 minutes to reach the health post were almost four times more likely to receive early PNHV from HEWs compared to those who traveled for over an hour. [AOR (95% CI) = 3.82(1.94–7.55)]. Additionally, mothers who graduated from the model family program were two times more likely to receive early PNHV than those who had never heard about the program [AOR (95% CI) = 2.46(1.17–5.16)]. Furthermore, mothers who attended antenatal care visits during pregnancy were almost three times more likely to receive early PNHV compared to those who did not attend ANC [AOR (95% CI) = 2.88(1.22–6.82)]. Mothers who gave birth in a health institution were two times more likely to receive early PNHV than those who had home births [AOR (95% CI) = 2.16(1.18–3.94)]. Lastly, mothers who had a cesarean or instrumental delivery were three times more likely to receive PNHV compared to those who had spontaneous vaginal deliveries [AOR (95% CI) = 3.34 (1.27–8.74)] [Table: 3].

Variables	Categories	Received (PNHVS)		COR (95%CI)	AOR (95% CI)	P-value
		Yes	No			
Distance to the health post	<30 minute	<30 minute	107	4.17(2.18,7.96)	3.82(1.94,7.55)	<b>0.000</b>
	30 min-1 hour	20	141	1.32(0.64,2.72)	1.21(0.56,2.61)	0.621
	>1 hour	14	130	1	1	
Household model status	Never heard about the model family	14	14	1	1	

	Heard about the model family but have not worked towards becoming one	13	65	1.59(0.70,3.58)	1.25(0.53,2.95)	0.612
	Actively working towards becoming a model family.	18	124	1.15(0.55,2.42)	0.84(0.38,1.85)	0.66
	Graduated as a model family.	37	78	3.76(1.91,7.42)	2.46(1.17,5.16)	<b>0.017</b>
Antenatal care ANC	Yes	75	284	3.55(1.58,7.96)	2.88(1.22,6.82)	<b>0.016</b>
	No	7	94	1	1	
Place of delivery	Health Institute	63	208	2.71(1.19,3.37)	2.16(1.18,3.94)	<b>0.013</b>
	Home	19	170	1	1	
Mode of delivery	(C/S)	12	11	5.72(2.43,13.48)	3.34(1.27,8.74)	<b>0.014</b>
	(SVD)	70	367	1	1	

**Table 3: Bivariate and Multi-Variable Logistic Regression for Factors Associated with Early Postnatal Home Visit (PNHV) Mothers in Southern, Ethiopia (2024) (N=460)**

#### 4. Discussion

The overall prevalence of early postnatal home visits was 17.8% (95% CI: 14.3%–21.1%). Unlike previous Ethiopian studies, this study introduces new evidence by examining model household status as an important determinant of early postnatal home visit uptake a factor that has not been adequately explored in earlier research. These findings highlight key factors that significantly influence the utilization of early postnatal care services in the study area. This prevalence is consistent with results from studies conducted in rural areas of the Tigray and Amhara regions of Ethiopia [32,33]. The result is higher than those reported in studies conducted globally 10% [50], 8% in Tanzania [51], 6.4% in Kenya [31], and 11% in Malawi [28]. Within Ethiopia, the Rural Sidama Zone in Southern Ethiopia is at 12.4% [34], 15% in northern Ethiopia [32], and 6.7% in Ambo Town, Oromia Region [52]. This variation may be attributed to several factors, including the active involvement of health extension workers in promoting early postnatal care, the community's participation in health programs such as the model family initiative, enhanced outreach efforts by HEWs, and improved access to local healthcare services [53,54]. This finding is low compared to other studies, which reported rates of 50% in Nepal [28], and 62.8% in Uganda [29]. This disparity may be due to differences in early postnatal care PNC strategies, socioeconomic factors, geographic challenges, and as well as community health workers variety of activities and limited resources [55, 56]. Furthermore, many HEWs live in neighboring towns rather than in the areas for which they are assigned, meaning they are not working full-time [57].

This study found that the time to reach the health post significantly affected early postnatal home visits by HEWs. Mothers who took less than 30 minutes to reach the health post were 3.82 times more likely to receive early PNHVs from HEWs compared to those who traveled for over an hour. Furthermore, various studies have identified physical factors, such as distance and topographically difficult areas, as barriers to home visits by CHWs [58]. The lack of transportation, and challenging geographical and seasonal conditions, hinder HEWs from visiting women after childbirth and create significant obstacles that discourage women from accessing maternal health care services [59]. This finding is supported by the studies conducted in Tigray and Oromia region of Ethiopia [41, 42]. In this study Mothers from model households are 2.46 times more likely to utilize early PNHV by HEWs compared to women from non-model households, this increased likelihood may be attributed to the heightened awareness of the importance of early postnatal care among model households, encouraging more frequent use of these services [44, 60]. Furthermore, HEWs may prioritize model households and develop stronger relationships with them, leading to more consistent follow-ups and improved access to postnatal care [61]. Which aligns with finding from the Oromia region in Ethiopia and the community health extension program of Ethiopia [44, 62].

The findings of this study revealed that women who attended antenatal care were 2.88 times more likely to receive early PNHVS than those who did not. This might be due to the fact that during ANC visits, women are educated about the importance of PNC, making them more aware of

the need for follow-up after delivery. Related results were observed in southern Ethiopia [47]. Antenatal care fosters trust and communication between healthcare providers and pregnant women, making it easier to refer them for postnatal visits after childbirth [37, 63]. Additionally, ANC helps identify women who have complications, prompting health extension workers to prioritize these women for early home visits to monitor their health and that of their newborn [64]. Analogous results were presented from various studies in Afghanistan northern Ethiopia and southern Ethiopia [47, 65, 66]. In this study, mothers who delivered in health facilities were 2.16 times more likely to utilize early postnatal home visits provided by health extension workers. The possible reason for this might be that women who give birth in health institutions receive counseling on the importance of postnatal care and often get referred by healthcare providers for early postnatal home visits [67]. Additionally, Health facilities have established systems for monitoring and referring postpartum women to community health extension workers for follow-up visits, ensuring continuity and consistency of care [2]. This result is supported by research carried out in the rural Gidan District, Northeast Ethiopia and study conducted in the rural Sidama Zone of southern Ethiopia [34,68]. In this study, Women who had cesarean sections or other assisted deliveries are notably 3.34 times more likely to seek early PNHV by HEW compared to those who had unassisted vaginal births. This may be due to the increased need for post-surgical care, which aligns with previous research and suggests a pattern observed in rural settings [69]. In developed countries, regular home visits for post-surgical care are routine to help manage complications and support recovery [24]. Regular home visits for post-surgical care important in rural areas of developing countries, where postnatal home visits by community health workers [11]. For mothers recovering from surgical deliveries, these early home visits provide essential support that can help reduce the risk of complications and enhance overall health outcomes [70]. These findings are similar to those of other studies in Amhara Regional State, Ethiopia and Tanzania [55,70].

#### 4.1. Interpretation

The low coverage of early PNHVs indicates gaps in maternal and newborn health services in rural Ethiopia. Accessibility, household engagement, ANC attendance, institutional delivery, and type of delivery strongly influence service uptake. These findings suggest that strengthening HEWs' capacity, improving access to health posts, promoting ANC and institutional deliveries, and prioritizing follow-up for surgical deliveries are crucial for increasing early postnatal care utilization. Comparisons with other regions highlight the importance of local programmatic factors, such as community participation and HEW deployment strategies, in improving early PNHV coverage [53, 54]. Strengths and limitations of this study the strength of this community-based study in a rural area lies in its ability to capture real, context-specific data on maternal healthcare, providing valuable understanding to address local challenges and

improve early postnatal care services. However, several limitations should be considered. First, the cross-sectional design restricts the ability to establish temporality or causal relationships between early postnatal home visits and associated factors. Second, early PNHVs were self-reported, which may introduce recall bias and social desirability bias, especially regarding interactions with Health Extension Workers. Third, the study was conducted solely in Dita District, which may limit the generalizability of the findings to other districts with different health system contexts or community characteristics. Finally, although multiple confounders were controlled for, the possibility of unmeasured confounding variables influencing the observed associations cannot be excluded.

#### 5. Conclusion

This study shows that the coverage of early postnatal home visits by Health Extension Workers is relatively low in the study area, compared to data from the Ethiopia Mini Demographic and Health Survey and the performance targets outlined in the Ethiopia Health Sector Transformation Plan one. Several factors influence early PNHV utilization, including proximity to health posts, maternal status as part of model households, antenatal care attendance, place of delivery, and mode of delivery. The study emphasizes the need to improve access to early PNHVs by: increasing the availability of mobile health services and increasing the number and accessibility of health posts in geographically hard-to-reach areas; providing targeted health education and ensure equitable access for mothers from non-model households. Additionally, enhancing antenatal care by educating women on the importance of regular ANC visits, encouraging institutional deliveries through the provision of maternal waiting rooms and ensuring the availability of ambulance services for timely transportation to health, and offering targeted follow-up care for mothers who undergo cesarean sections or other assisted deliveries are essential strategies to reduce barriers and improve maternal and newborn health outcomes in rural communities.

#### Recommendation

For Health Extension Workers: To improve postnatal care coverage, prioritizing visiting mothers from remote areas, non-model households, and those who have had assisted deliveries is crucial to increasing postnatal care coverage because these groups may be at higher risk for health issues. HEWs can more effectively access these difficult-to-reach locations by using mobile health solutions and transportation options like motorbikes or bicycles. For the Woreda Health Office: In remote locations, expanding the number and accessibility of health posts to improving maternal and newborn health outcomes. Strengthening ANC services, promoting the use of maternal waiting homes, and enhancing ambulance services for institutional deliveries are important steps to address barriers to care and improve health outcomes. For Gamo Zone Health Department: allocate sufficient resources to improve healthcare access in hard-to-reach areas. This includes constructing health posts to enhance service delivery in

remote locations and providing transportation materials, such as motorbikes to enable Health Extension Workers to conduct timely postnatal home visits. Additionally, implementing mobile health services can bridge the gap for mothers and newborns in these areas. For Researchers: Future studies should investigate detailed qualitative research to explore the challenges and motivations faced by Health Extension Workers in delivering postnatal home visits.

### Abbreviation

AMU Arba Minch University  
 ANC Antenatal Care  
 AOR Adjusted Odds Ratio  
 CI Confidence Interval  
 EDHS Ethiopia Demographic Survey  
 EM DHS Ethiopia Mini Demographic Survey  
 EPNHV Early Postnatal Home Visit  
 FMOM Federal Minister of Health  
 HEW Health Extension Workers  
 IRB Ethical Review Board  
 HEP Health Extension Program  
 PNC Postnatal Care  
 NGO Non-Government Organization  
 SDGs United Nations Sustainable Development Goals  
 SERS Southern Ethiopia Regional State  
 UNICEF United Nations Children's Fund  
 VIF Variance Inflation Factors  
 WHO World Health Organization

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### Ethics Declaration

Ethical approval was obtained from the Institutional Review Board (IRB) of Arba Minch University, College of Medicine and Health Sciences (Reference number: IRB/23186/2024). Written informed consent was obtained from all study participants prior to data collection. Confidentiality and

anonymity were strictly maintained throughout the study.

### Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

### Author Contributions

**Habtamu girma (BSc, MSc):** Conceived and designed the study, supervised data collection, conducted data analysis, and drafted the manuscript.

**Gesila Endashaw (MSc, Asst. professor):** and Tegegn mulatu (BSc, MSc), Contributed to study design, supported manuscript writing, assisted with data collection supervision, and critically reviewed the manuscript.

**Bitew Mekonen (BSc, Asst. professor):** Assisted with data collection supervision and manuscript review.

**Dessalegn Daishole (BSc, MSc):** Supported statistical analysis, interpreted the findings, and reviewed the manuscript.

### Competing Interests

The authors declare that they have no competing interests.

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