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St. Paul's Hospital Millennium Medical College

SCHOOL OF PUBLIC HEALTH

**Prevalence of early antenatal care visit and its associated
factors among pregnant women attending at Selam Health
Center in 2025 Addis Ababa, Ethiopia**

BY – HANNA ASCHENAKI (MEDICAL INTERN)

**A Research thesis submitted to the School of Public Health, St. Paul's
Hospital Millennium Medical College in Partial Fulfillment of the
Requirements for the Degree of Doctor of Medicine**

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ADDIS ABABA, ETHIOPIA

**ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL
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ADVISORS

- 1) YosephWorku(MD, MPH, MBA)**
- 2) MeseretOlana (MD, GYNECOLOGIC ONCOLOGIST)**

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Abstract

Background:

Antenatal care (ANC) is a cornerstone of maternal health services and plays a critical role in reducing pregnancy-related complications and improving maternal and neonatal outcomes. The World Health Organization recommends that the first ANC visit should occur before 12 weeks of gestation to enable timely screening, preventive interventions, and birth preparedness. Despite improvements in overall ANC coverage in Ethiopia, early initiation of ANC remains low. Limited facility-level evidence, particularly in urban settings such as Selam Local Health Center (LHC), constrains the development of targeted strategies to improve early ANC utilization.

Objective:

To determine the prevalence of early first ANC initiation and identify associated factors among pregnant women attending Selam LHC ANC Outpatient Department in Addis Ababa over a one-year period.

Methods:

A facility-based cross-sectional study was conducted at Selam Local Health Center ANC Outpatient Department in Addis Ababa, Ethiopia, using records from August 1, 2024, to July 31, 2025. A total of 422 pregnant women who initiated their first ANC visit during the study period were selected using systematic random sampling from ANC registration logbooks. Data were extracted using a structured checklist and entered into SPSS version 27 for analysis. Descriptive statistics were used to estimate the prevalence of early ANC initiation. Bivariate and multivariable logistic regression analyses were performed to identify factors associated with early ANC initiation. Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI) were calculated, and a p-value of less than 0.05 was considered statistically significant.

Results:

Among the 422 pregnant women included in the study, only 118 (27.3%) initiated ANC early (≤ 12 weeks of gestation), while 304 (72.7%) initiated ANC late. In the multivariable logistic regression analysis, pregnancy intention, history of pregnancy complications, known medical condition and Age were identified as independent predictors of early ANC initiation.

Conclusion:

The prevalence of early ANC initiation at Selam Local Health Center was low. Pregnancy intention, previous pregnancy complications and known medical conditions were key determinants of early ANC initiation. Strengthening family planning services, improving female education, and providing targeted counseling for women without prior obstetric complications may enhance timely ANC uptake and improve maternal health outcomes.

Keywords: Early antenatal care, ANC initiation, pregnancy intention, maternal health, Addis Ababa, Ethiopia

Abbreviations-

ANC – Antenatal Care

AOR – Adjusted Odds Ratio

CI – Confidence Interval

DHS – Demographic and Health Survey

EDHS – Ethiopian Demographic and Health Survey

ETB – Ethiopian Birr

G.A. – Gestational Age

HCP – Health Care Provider

IRB – Institutional Review Board

LHC – Local Health Center

MoH – Ministry of Health

OPD – Outpatient Department

SDG – Sustainable Development Goal

SPHMMC – St. Paul’s Hospital Millennium Medical College

UNFPA – United Nations Population Fund

WHO – World Health Organization

1. Introduction

1.1. Background

Antenatal care (ANC) is a critical intervention for maternal and child health, aiming to prevent adverse pregnancy outcomes and ensure the well-being of both mother and child. The World Health Organization (WHO) defines ANC as care provided by skilled healthcare professionals to pregnant women, encompassing health promotion, screening, disease prevention, and treatment of complications (1).

The timing of the first ANC visit is crucial. The WHO strongly recommends initiating the first ANC contact before 12 weeks of gestational age, known as early antenatal care (2). This early initiation provides optimal opportunities for comprehensive health assessments, accurate gestational age determination, early screening for medical conditions (e.g., diabetes, hypertension, infections), and timely provision of essential preventive interventions like folic acid and iron supplementation, and immunization. (3,4) It also fosters a therapeutic relationship between the pregnant woman and her healthcare provider.

Globally, despite significant improvements in maternal health and overall ANC coverage, the utilization of early antenatal care remains suboptimal, particularly in low- and middle income countries. A substantial proportion of pregnant women worldwide still do not initiate their first ANC visit within the recommended timeframe (1).

In Ethiopia, maternal health indicators have improved, reflecting government commitment to maternal and child health goals. The country has expanded health facilities, trained healthcare workers, and implemented community-based programs(5). Ethiopia has adopted the WHO's focused antenatal care model, recommending a minimum of four ANC visits, with the first ideally before 12 weeks of gestation. (6)However, challenges persist in ensuring universal access to quality ANC services, especially in rural and underserved areas.

Ethiopian Demographic and Health Survey data show increased overall ANC visits, but the timing of the first visit remains a concern, with many women initiating ANC later than recommended (7). Regional disparities exist, with urban areas generally showing better coverage and earlier initiation. Addis Ababa, as a major urban center, typically has better healthcare

access, yet utilization disparities persist due to socioeconomic status, education, and cultural beliefs (8).

Early ANC is not just about timing but also the quality and comprehensiveness of care. It allows for establishing baseline health parameters, identifying risk factors, and developing individualized care plans, which is vital given varying health literacy and cultural perspectives(1). Research consistently shows that early ANC initiation leads to better pregnancy outcomes, improved adherence to subsequent visits, higher rates of skilled birth attendance, and reduced risks of complications (1). It also provides opportunities for health education on nutrition, birth preparedness, and danger signs.

The Ethiopian healthcare system operates through primary, secondary, and tertiary levels. Primary healthcare units, including health centers like Selam Local Health Center, are crucial first points of contact for pregnant women seeking ANC. These facilities are staffed by trained professionals providing comprehensive ANC services(1).

SelamLHC, located in Addis Ababa, serves a diverse population. Its ANC outpatient department (OPD) is a key entry point for pregnant women, offering routine ANC and managing complications (1). Understanding the prevalence of early ANC initiation at facilities like Selam LHC is vital. It provides insights into local health-seeking behaviors, identifies barriers to timely care, and helps assess the effectiveness of current service delivery models. This localized data contributes to a broader understanding of ANC utilization in urban Ethiopia, informing national and regional health policies (1).

For this study, early ANC is defined as the initiation of the first ANC visit before 12 weeks of gestational age, aligning with WHO recommendations for consistency and comparability (1). Focusing on the past year provides a recent snapshot of service utilization. Studying early ANC coverage has practical implications for health service planning, resource allocation, and staff deployment. Understanding influencing factors can help develop targeted interventions to improve service uptake and quality (1).

This study also contributes to national and global efforts to monitor progress towards maternal health targets, including the Sustainable Development Goals (SDGs) related to maternal

mortality reduction and universal access to reproductive health services (1). Facility-level data on early ANC coverage provides important indicators for tracking progress. Given the.

In conclusion, this study on early ANC coverage at Selam LHC ANC OPD will significantly contribute to understanding maternal health service utilization in urban Ethiopia. Its findings will offer valuable insights for healthcare providers, facility managers, and policymakers, aiding efforts to improve maternal health outcomes and achieve universal access to quality antenatal care services.

1.2. Statement of the Problem

Despite global and national efforts to improve maternal and child health, the timely initiation of antenatal care (ANC) remains a significant challenge, particularly in low- and middle-income countries. The World Health Organization (WHO) recommends that pregnant women initiate their first ANC visit before 12 weeks of gestational age to maximize the benefits of preventive and promotive health interventions (1). However, a substantial proportion of pregnant women worldwide, and specifically in Ethiopia, continue to delay their first ANC contact, often missing critical opportunities for early detection and management of potential complications (3,5).

Late initiation of ANC is associated with several adverse outcomes for both the mother and the fetus. When ANC is delayed, there is a missed window for accurate gestational age assessment, early screening for medical conditions (e.g., hypertension, diabetes, infections), and timely provision of essential micronutrient supplementation (e.g., folic acid, iron) (3,4). This delay can lead to increased risks of maternal and neonatal morbidity and mortality, as complications may go undetected or untreated until later stages of pregnancy, when interventions may be less effective or more complex (1,5).

In Ethiopia, while overall ANC coverage has shown an upward trend, the proportion of women initiating ANC within the first trimester remains suboptimal. Studies conducted in various parts of Ethiopia highlight this persistent issue. For instance, a study in Addis Ababa revealed that nearly half (47%) of pregnant women initiated their first ANC visit late (5). Another study in Gondar city reported an even higher prevalence of delayed ANC, at 63.8% (6). These figures are

concerning, as they indicate that a large number of pregnant women are not fully benefiting from the comprehensive care that early ANC provides.

Specifically, at Selam LHC ANC OPD, there is a lack of current, localized data regarding the prevalence of early ANC 1st coverage before 12 weeks of gestational age. Without this specific information, it is challenging for the facility to accurately assess the extent of late ANC initiation within its catchment area, identify specific barriers faced by the local population, and develop targeted interventions to improve timely access to care. The absence of such data hinders effective planning, resource allocation, and monitoring of maternal health programs at the facility level. While national and regional data provide a general overview, they may not accurately reflect the unique dynamics and challenges present at a specific health center like SelamLHC, which serves a distinct urban population with its own socio-demographic characteristics and health-seeking behaviors.

Therefore, the problem is the insufficient understanding of the current prevalence of early ANC 1st coverage before 12 weeks of gestational age at Selam LHC ANC OPD over the past one year. This knowledge gap limits the ability of healthcare providers and policymakers at the facility and higher levels to implement evidence-based strategies aimed at promoting early ANC initiation, thereby potentially contributing to preventable maternal and neonatal complications and suboptimal health outcomes within the community served by Selam LHC.

1.3. Significance of the Study

The timely initiation of antenatal care (ANC) is a critical determinant of positive maternal and child health outcomes. Despite clear global recommendations from the World Health Organization for the first ANC visit to occur before 12 weeks of gestation, late presentation remains a pervasive issue in many settings, including Ethiopia (1,3). This study is justified by the pressing need to understand the local context of early ANC uptake at Selam LHC ANC OPD, thereby informing targeted interventions and improving maternal and neonatal health within its service area.

Firstly, this study addresses a critical knowledge gap at the facility level regarding ANC coverage. Existing national/regional data often obscure localized variations and challenges. By

focusing on Selam LHC ANC OPD's distinct urban population, this research will provide current, highly relevant data on early ANC 1st coverage over the past year. This localized information is vital for facility management to accurately assess late ANC initiation and tailor services to community needs.

Secondly, This study's findings will directly impact healthcare planning and resource allocation at Selam LHC. By quantifying early ANC initiation, the facility can assess existing strategies and develop new approaches. This data will guide decisions on staffing, training, educational materials, and outreach programs. For example, low prevalence would necessitate intensified community engagement and health education.

Thirdly, This study will contribute evidence-based insights to improve maternal and child health. Its data will aid local health authorities, NGOs, and policymakers in developing effective strategies to enhance early ANC utilization. It will also serve as a baseline for future studies and interventions in similar urban settings

Finally, this research aligns with national and global health priorities, including the Sustainable Development Goals (SDGs), which emphasize reducing maternal mortality and ensuring universal access to reproductive health services. By focusing on early ANC, a key indicator of quality maternal healthcare, the study directly contributes to these broader health objectives. The findings will highlight areas requiring attention and provide actionable recommendations to improve the health and well-being of pregnant women and their children at LHC and potentially beyond.

2. Literature Review

2.1. Early ANC: Purposes and Documented Benefits

Early initiation of antenatal care (ANC), ideally within the first 12 weeks of gestation, is a cornerstone of maternal and child health, as recommended by the World Health Organization (1,3). This timely engagement with healthcare providers offers a critical window for health promotion, disease prevention, and the provision of comprehensive care for both the pregnant woman and her unborn fetus (3). The benefits extend beyond the immediate pregnancy, influencing long-term maternal and neonatal outcomes.

Key purposes and documented benefits of early ANC include:

- **Prevention of Adverse Feto-Maternal Outcomes:** Early ANC enables healthcare providers to identify and address potential risks and complications promptly, thereby reducing the incidence of poor feto-maternal outcomes (3). The WHO emphasizes that increased frequency of antenatal contacts (from four to eight or more) is associated with a reduced likelihood of stillbirths and other pregnancy complications, primarily due to enhanced opportunities for early detection and management (1). Specifically, eight or more contacts can reduce perinatal deaths by up to 8 per 1000 births compared to four visits (1).
- **Comprehensive Health Interventions:** Early ANC serves as a platform for delivering a wide array of essential health interventions. These include accurate assessment of gestational age, which is crucial for precise treatment of preterm labor; screening for genetic and congenital disorders; provision of folic acid supplementation to reduce the risk of neural tube defects; and screening and treatment for iron deficiency anemia and sexually transmitted infections (3).
- **Risk Behavior Modification:** Healthcare providers can use early ANC visits to counsel pregnant women on modifying risky behaviors such as smoking, alcohol consumption, drug abuse, obesity, malnutrition, and occupational exposures, all of which can negatively impact pregnancy outcomes (3).
- **Improved Maternal and Neonatal Health Outcomes:** By facilitating early detection and treatment of issues, providing essential supplements (e.g., iron and folate for anemia,

Intermittent Preventive Treatment for malaria in pregnancy), and offering immunizations (e.g., tetanus, tuberculosis), early ANC significantly contributes to improved maternal and neonatal health (3). It also plays a vital role in the detection and management of HIV/AIDS and other STIs (3).

- **Preparation for Birth and Complication Readiness:** Antenatal care prepares families for the upcoming birth and post-delivery life, including planning for potential complications (1). This readiness can significantly improve outcomes in emergency situations.

In essence, early ANC fosters an active connection between a pregnant woman and her healthcare provider, ensuring the uptake of preventive measures, timely detection of risks, reduction of complications, and addressing health inequalities, all of which are fundamental for a healthy pregnancy and positive birth experience (1).

2.2. Magnitude of Early ANC Coverage

Despite the clear and life-saving benefits, the global coverage of early ANC remains suboptimal, with profound disparities between high- and low-income countries. A systematic analysis of global data from 1990 to 2013 revealed that while worldwide coverage of early ANC (first visit within the first trimester) had increased to 58.6%, it was still far from universal(2). The disparity is stark when comparing developed regions (84.8%) with developing regions (48.1%). Sub-Saharan Africa, in particular, lags significantly, with an estimated early ANC coverage of only 24.9% in 2013.(2)

In Ethiopia, the magnitude of the problem is particularly severe. The 2019 Ethiopian Mini-Demographic and Health Survey (EMDHS) reported that only 28% of women had their first ANC visit within the first trimester, a figure that has shown slow improvement over the years (9). This national average masks significant regional variations but is consistently reflected in numerous local studies. For instance, research in Ambo town, Central Ethiopia, found that only 30.5% of pregnant women initiated their first ANC visit in a timely manner (10). Studies in other regions show similarly low or varied rates: a study in Bahir Dar Zuria Woreda reported a 46.8% prevalence of early ANC initiation(11), while a study in Gondar city found a high prevalence of delayed care at 63.8% (6). In the capital, Addis Ababa, a 2021 study found that 47% of pregnant women started their first ANC visit late (12). These statistics consistently underscore a critical

public health failure in Ethiopia, where a large proportion of pregnant women miss the window of opportunity for essential early interventions.

2.3. Factors Associated with Early ANC Coverage

Numerous studies have identified a complex interplay of individual and community-level factors that influence the timely initiation of antenatal care (ANC). Understanding these determinants is crucial for designing effective interventions to improve early ANC uptake.

Individual-level factors:

- **Maternal age:** Both younger and older maternal ages have been associated with delayed ANC initiation. For instance, a study in Addis Ababa found that women aged 30 years and above were significantly associated with late ANC initiation (5).
- **Wealth status:** Women from higher wealth quintiles are consistently more likely to initiate ANC early (3,6). Conversely, women in the lowest wealth quantile remain disadvantaged in accessing timely ANC (6).
- **Educational attainment:** Higher levels of maternal education are strongly linked to earlier ANC uptake (3,6). Uneducated mothers are less likely to fully attend the recommended number of ANC contacts (6,13).
- **Parity:** The number of previous pregnancies can influence the timing of ANC initiation. Some studies suggest that multiparous women may delay care (4,14).
- **Working status of mothers:** Employment status can affect a woman's ability to access early ANC, potentially due to time constraints or financial independence (4).
- **Pregnancy intention:** Unplanned pregnancies are significantly associated with late ANC initiation (6). Planned pregnancies, conversely, are often associated with earlier ANC booking (4,10)

- **Perception of ANC timing:** A wrong perception about the appropriate timing of the first ANC visit is a significant predictor of late initiation (7,12). Lack of correct knowledge of the recommended ANC schedule leads to delayed initiation (7).
- **Previous ANC experience:** Not having received ANC for a previous pregnancy is significantly associated with late ANC initiation in subsequent pregnancies (12).
- **Marital status:** Being married has been identified as a factor significantly associated with late ANC initiation in some contexts (12).

Community-level factors:

- **Region of residence:** Geographical location, including urban versus rural settings, significantly impacts access to health facilities and information (4,6). Rural areas often face greater challenges in early ANC coverage (6).
- **Distance to health facility and transportation:** Longer distances to healthcare providers and lack of reliable and affordable transportation are significant barriers to early ANC(15) . Poor road networks can further hinder access, especially in remote areas (4,16).
- **Healthcare provider factors:** The availability of skilled personnel, quality of care, and effective communication between providers and pregnant women can influence early ANC uptake (4). Satisfaction with health services has also been identified as an associated factor(6) .
- **Health literacy and awareness:** Community-level awareness campaigns and health education initiatives play a crucial role in promoting the importance of early ANC (4).
- **Cultural beliefs and norms:** Sociocultural factors can influence when and how women seek antenatal care (4).

These factors often interact, creating complex barriers or facilitators to early ANC initiation. Addressing these multifaceted determinants requires comprehensive interventions at both individual and community levels to improve early ANC coverage and ultimately, maternal and neonatal health outcomes.

3. Objective

3.1. General Objective

- To assess the prevalence of early antenatal care visit and its associated factors among pregnant women attending at Selam Health Center ANC clinic in 2025Addis Ababa, Ethiopia

3.2. Specific Objectives

- To determine the proportion of pregnant women initiating their first ANC visit before 12 weeks of gestational ageSelam Health Center ANC clinic at over the past one year.
- To identify the factors associated with initiation of first ANC visit before 12 weeks of gestational age among pregnant women attending ANC clinic at Selam Health Center in 2025Addis Ababa, Ethiopia

4. Materials and Methods

4.1 Study Area and Period

Study Area: The study was conducted at Selam Local Health Center (LHC) Outpatient Department, located in Addis Ababa, Ethiopia. Selam LHC is a primary healthcare facility serving a diverse urban population within its catchment area. It provides comprehensive maternal health services, including antenatal care, delivery services, and postnatal care. The ANC OPD served as a key entry point for pregnant women seeking routine antenatal care and management of pregnancy-related complications in the surrounding community.

Study Period: The study will cover data from the past one year, specifically from August 1, 2024, to July 31, 2025. This period will allow for the collection of recent and relevant data on early ANC 1st coverage at Selam LHC ANC OPD.

4.2 Study Design

A facility-based cross-sectional study design was employed. This design was appropriate for assessing the prevalence of early ANC first-visit coverage within a defined population at a specific point in time (retrospectively over the past year) at Selam LHC ANC OPD.

4.3 Population

Source Population: All pregnant women who attended ANC services at Selam LHC ANC OPD during the study period (August 1, 2024, to July 31, 2025).

Study Population: All pregnant women who initiated their first ANC visit at Selam LHC ANC OPD during the study period and meet the inclusion criteria.

Study Unit: Each pregnant woman who initiated her first ANC visit at Selam LHC ANC OPD during the study period and is included in the sample.

Sampling Frame/Unit: The ANC registration logbook and patient records at Selam LHC ANC OPD for the specified study period will serve as the sampling frame. These records contain information on pregnant women attending ANC, including their gestational age at first visit and other relevant demographic and clinical data.

4.4 Eligibility Criteria

Inclusion Criteria:

- All pregnant women who initiated their first ANC visit at Selam LHC ANC OPD between August 1, 2024, and July 31, 2025..

Exclusion Criteria:

- Pregnant women whose medical records are incomplete or missing crucial information regarding gestational age at first ANC visit or other relevant variables.

4.5 Sample Size Determination and Sampling Technique

Sample Size Determination:

The sample size for this study was calculated using the single population proportion formula to ensure the results were sufficiently precise to meet the study's primary objective (10).

$$n = (Z\alpha/2)^2 * p(1-p) / d^2$$

Where:

- **n** = Required minimum sample size.
- **Z $\alpha/2$** = The standard normal value for a 95% confidence level, which is 1.96.
- **p** = The estimated prevalence of early ANC initiation in Addis Ababa. A recent facility-based cross-sectional study conducted in Addis Ababa by Girma et al. (2023) found that the prevalence of late ANC initiation (after 12 weeks) was 47%. This implies that the prevalence of timely (early) ANC initiation was **53% (p = 0.53)** (5). This is the most current and locally relevant estimate for this calculation.
- **d** = The desired margin of error, set at 5% (0.05).

Calculation: $n = (1.96)^2 * 0.53 * (1 - 0.53) / (0.05)^2$ $n = 3.8416 * 0.53 * 0.47 / 0.0025$ $n = 0.957 / 0.0025$ $n = 382.8$

After Rounding up, the required sample size was **383**.

To account for a potential non-response rate of 10%, the final sample size was adjusted to 422 pregnant women.

Sampling Technique:

A systematic random sampling technique was used to select the study participants. A sampling frame was created by compiling a complete list of all pregnant women who attended the ANC clinic at Selam Health Center between August 1, 2024, and July 31, 2025.

4.6 Data Collection Tools and Procedures

Data were collected using a structured data extraction checklist developed based on the study variables and adapted from previous similar studies conducted in Ethiopia (10,12). The checklist was designed to capture all necessary information from patient ANC cards and registration logbooks.

The checklist included sections on:

- Socio-demographic characteristics (age, marital status, educational level, occupation)
- Obstetric history (parity, gravidity, date of last menstrual period)
- Current ANC details (gestational age at first visit)

Data Collection Procedures:

Data were collected by two trained data collectors with experience in data handling. They received a one-day training on the study objectives, data extraction tools, and ethical considerations related to patient confidentiality. Data were extracted retrospectively from existing records. Each selected record was assigned a unique identification number to ensure anonymity and confidentiality

4.7 Study Variables

- **Dependent Variable:** Timing of the first ANC visit. This will be categorized as:
 - **Early initiation:** First ANC visit at or before 12 weeks of gestation.

- **Late initiation:** First ANC visit after 12 weeks of gestation.

Independent Variables:

- **Sociodemographic factors:** Age, marital status, occupation, educational level (as recorded).
- **Obstetric factors:** Parity (primigravida vs. multigravida), gravidity.

4.8 Operational definitions

- **Early ANC initiation:** first ANC contact ≤ 12 completed weeks of gestation (by reliable LMP or first-trimester ultrasound when available)(1).
- **Late ANC initiation:** first ANC contact > 12 weeks.
- **Prevalence of early ANC initiation:** proportion of pregnant women attending ANC at Selam Health Center during the study period whose **first** contact met the early criterion.
- **Planned pregnancy:** a pregnancy that is intended and consciously decided by a women or couple before conception.

4.9 Data Quality Control

To ensure data quality, comprehensive training was provided to data collectors. The data abstraction tool was pre-tested on 5% of records not included in the main study, and necessary revisions were made. Close supervision was conducted throughout data collection, and daily checks were performed for completeness and consistency. Data cleaning was carried out to identify missing values, outliers, and inconsistencies.

4.10 Data Processing and Analysis

The collected data were checked manually for completeness and entered into SPSS version 27 for analysis. Descriptive statistics were used to summarize the study population.

Data Analysis:

Descriptive statistics (frequencies, percentages, means, standard deviations) were used to describe study variables and estimate early ANC coverage.

- Bivariate logistic regression analysis was performed to identify candidate variables.
- Multivariable logistic regression analysis was conducted to identify independent predictors.

Adjusted Odds Ratios (AOR) with 95% Confidence Intervals were calculated. A p-value < 0.05 was considered statistically significant.

4.11 Ethical Considerations

Ethical clearance was obtained from SPHMMC, and permission was secured from Selam LHC administration. Individual informed consent was not required due to retrospective data use. Confidentiality and anonymity were strictly maintained.

4.12 Dissemination Plan

The findings were submitted to the SPHMMC public health department and shared with Selam Health Center administration. Results were also disseminated through seminars and conferences.

5. Results

5.1. Socio-demographic Characteristics

A total of 422 pregnant women who attended antenatal care (ANC) at Selam Health Center over the past year were included in the study. The majority of participants were married (n = 383, 90.8%), while 31 (7.3%) were single.

Regarding age, most participants were between 26–30 years (n = 178, 42.2%), followed by 31–35 years (n = 128, 30.3%). Women aged 19–25 accounted for 15.9% (n = 67), 35–40 years (n = 38, 9%)

In terms of educational status, nearly half of the participants had a college/university education or higher (n = 193, 45.7%). Secondary school education was reported by 125 women (29.6%), primary school by 52 (12.3%), and no formal education by 47 (11.1%). A small proportion (n = 5, 1.2%) had missing educational data (Table 1).

Table 1 Socio-demographic characteristics of pregnant women attending ANC at Selam Health Center, Addis Ababa, Ethiopia, 2025 (n = 422)

Variable	Category	Frequency (n)	Percent (%)
Age group	19–25	67	15.9
	26–30	178	42.2
	31–35	128	30.3
	35–40	38	9.0
	41–45	11	2.6
Educational status	No formal education	47	11.1
	Primary school	52	12.3
	Secondary school	125	29.6
	College/University or higher	193	45.7
	Not recorded	5	1.2
Marital status	Single	31	7.3
	Married	383	90.8
	Divorced/widowed/separated	6	1.4

	Not recorded	2	0.5
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5.2. Gestational Age at First ANC Visit

The distribution of gestational age at the time of the first ANC visit showed that only 27.3% (n = 115) of participants initiated ANC early, within 12 weeks of gestation. About 22.5% (n = 95) started between 12 and 16 weeks, while the majority (50.2%, n = 212) had their first visit after 16 weeks, indicating a substantial delay in ANC initiation. Overall, 72.0% of women initiated ANC late, emphasizing the need for interventions to promote early attendance (Table 2).

Table 2 Gestational age at first ANC visit among pregnant women at Selam Health Center, Addis Ababa, Ethiopia, 2025 (n = 422)

GA category	Frequency	Percent
<= 12 weeks	115	27.3
12–16 weeks	95	22.5
>16 weeks	212	50.2

5.3 Factors Associated with Early ANC Initiation

Bivariate and multivariable logistic regression analyses were conducted to identify factors associated with early antenatal care initiation among pregnant women at Selam Health Center (Table 3). Variables with P-value ≤ 0.25 in the bivariate analysis (educational status, pregnancy intention, history of previous pregnancy complications, known medical condition, age group, and parity) were entered into the final multivariable logistic regression model.

In the multivariable analysis, four variables remained independently associated with early ANC initiation. Pregnant women with a planned pregnancy were more than 33 times more likely to initiate ANC early compared to those with an unplanned pregnancy (AOR = 33.27; 95% CI: 12.54–88.28). Women who had a history of previous pregnancy complications had about 16 times higher odds of early ANC initiation than those without such a history (AOR = 16.49; 95% CI: 4.70–57.81). Similarly, women with a known medical condition (e.g., HIV, diabetes, or

hypertension) were nearly seven times more likely to initiate ANC early compared to those without a known medical condition (AOR = 6.90; 95% CI: 1.81–26.32).

Age was also significantly associated with early ANC initiation. Women aged 26–30 years had 96% lower odds of early ANC initiation compared to women aged 19–25 years (AOR = 0.04; 95% CI: 0.01–0.16), while those aged 36–40 years had 95% lower odds (AOR = 0.05; 95% CI: 0.01–0.45). Parity, educational status, and other age groups did not show statistically significant associations after adjustment.

These findings suggest that pregnancy planning, prior pregnancy complications, and pre-existing medical conditions strongly motivate women to seek early antenatal care, while older age groups are less likely to initiate ANC early

Table 3 Bivariate and Multivariate Logistic Regression Analysis of Factors Associated with Early ANC Initiation (<12 weeks) among Pregnant Women at Selam Health Center, Addis Ababa, Ethiopia, 2025 (n = 422)

Variable	Category	Early ANC visit n (%)	Late ANC visit n (%)	COR (95% CI)	AOR (95% CI)	p-value
Pregnancy intention	Unplanned	26 (10.2%)	229 (89.8%)	Reference	Reference	
	Planned	92 (56.1%)	72 (43.9%)	12.42 (7.45–20.71)	33.27 (12.54–88.28)	<0.001
History of previous pregnancy complications	No	86 (23.1%)	287 (76.9%)	Reference	Reference	
	Yes	32 (65.3%)	17 (34.7%)	9.68 (5.45–17.20)	16.49 (4.70–57.81)	<0.001
Known medical condition	No	97 (24.9%)	292 (75.1%)	Reference	Reference	
	Yes	18 (62.1%)	11 (37.9%)	4.92 (2.25–10.79)	6.90 (1.81–26.32)	0.005
Age group	19–25	27 (40.3%)	40 (59.7%)	Reference	Reference	
	26–30	47 (26.4%)	131 (73.6%)	0.53 (0.29–0.96)	0.04 (0.01–0.16)	<0.001
	31–35	37 (28.9%)	91 (71.1%)	0.60 (0.32–1.12)	0.21 (0.04–1.02)	0.053
	36–40	3 (7.9%)	35 (92.1%)	0.13 (0.04–0.46)	0.05 (0.01–0.45)	0.007
	41–45	4 (36.4%)	7 (63.6%)	0.85 (0.23–3.18)	0.95 (0.05–18.33)	0.970

Educational status	No formal education	1 (2.1%)	46 (97.9%)	Reference	Reference	
	Primary	5 (9.6%)	47 (90.4%)	4.89 (0.55–43.52)	0.93 (0.06–13.62)	0.955
	Secondary	29 (23.2%)	96 (76.8%)	13.90 (1.84–105.19)	2.07 (0.21–20.23)	0.532
	College/University	83 (43.0%)	110 (57.0%)	34.71 (4.69–256.86)	4.78 (0.50–45.63)	0.175
Parity	0	31 (40.8%)	45 (59.2%)	Reference	Reference	
	1	38 (33.9%)	74 (66.1%)	0.75 (0.41–1.36)	0.95 (0.40–2.26)	0.911
	2	36 (33.0%)	73 (67.0%)	0.72 (0.39–1.31)	0.36 (0.10–1.24)	0.104
	3	11 (14.7%)	64 (85.3%)	0.25 (0.11–0.55)	0.38 (0.08–1.95)	0.247
	4	2 (6.2%)	30 (93.8%)	0.10 (0.02–0.44)	0.43 (0.05–4.10)	0.465

6. Discussion

This study aimed to assess early antenatal care (ANC) initiation and its associated factors among pregnant women attending Selam Health Center ANC OPD. The prevalence of early ANC initiation before 12 weeks of gestation was found to be **27.3%**, indicating that the majority of pregnant women in this setting still initiate ANC later than recommended by the World Health Organization (WHO) (1,2). This finding aligns with previous studies in Ethiopia, such as in

Ambo town (30.5%) (10) and the national 2019 Mini-Demographic and Health Survey (28%) (9), highlighting that timely ANC uptake remains suboptimal. Compared to the WHO recommendation for universal early ANC, the low coverage observed in Selam LHC reflects ongoing challenges in urban Ethiopian settings despite better healthcare access than rural areas (1,8).

Regarding **maternal age**, women aged 26–30 and 35–40 years had significantly lower odds of early ANC initiation compared to younger women (19–25 years). This finding is consistent with previous studies in Addis Ababa, which reported delayed ANC among older women (5). The possible explanation could be that multiparous women in older age groups may perceive themselves as experienced in pregnancy care and therefore delay their first ANC visit, as noted in other studies (4,14). Conversely, younger women may be more cautious or influenced by family or community advice to seek care early.

Pregnancy intention was another important factor. Women with planned pregnancies were significantly more likely to initiate ANC early, which is in line with findings from Ambo town and Gondar city (4,10). Planned pregnancies are often associated with higher preparedness, awareness of pregnancy risks, and motivation to adhere to recommended care schedules.

The presence of **previous pregnancy complications** and **known medical conditions** were positively associated with early ANC initiation. Women with prior adverse pregnancy experiences or medical conditions are more likely to seek care promptly to monitor for potential risks, as supported by evidence from prior Ethiopian studies (5,6). These findings underscore the importance of targeted counseling and risk communication for women with previous complications or chronic illnesses.

Contrary to some expectations, **educational status** and **marital status** were not significantly associated with early ANC in multivariable analysis. Although higher maternal education is generally linked to early ANC uptake (3,6,13), this study suggests that in urban settings like Addis Ababa, other factors such as pregnancy intention and prior pregnancy experience may play a more influential role. This discrepancy could be due to relatively high educational attainment

in the study population (45.7% had college or university education), potentially reducing the variation needed to detect significant associations.

The study also highlights the persistence of late ANC initiation even in a well-resourced urban health center. While overall ANC coverage may be high, early initiation is still hindered by a combination of individual-level factors (age, pregnancy intention, previous pregnancy experience) and community-level barriers identified in the literature, including sociocultural beliefs, perception of timing, and health literacy (4,7,12,15,16). Addressing these multifactorial determinants is critical for improving maternal and neonatal outcomes.

Implications for practice include the need for enhanced health education, community awareness campaigns, and early pregnancy tracking programs to encourage timely ANC initiation. Health workers should prioritize counseling for multiparous women, those with unplanned pregnancies, and women with prior complications to ensure early engagement with ANC services. These interventions align with WHO recommendations for optimizing maternal health and reducing preventable adverse outcomes (1).

7. Strengths and Limitations

7.1 Strengths

- **Representative sample:** The study randomly selected 422 participants from the total population of 922 women attending ANC, enhancing the generalizability of the findings within the health center.
- **Rigorous analytic approach:** Both bivariate and multivariable logistic regression analyses were used, ensuring identification of independent predictors of early ANC initiation.

- **Clear operationalization of outcome:** Early ANC initiation was defined according to WHO recommendations (<12 weeks), providing a standardized outcome measure.

7.2 Limitations

- **Cross-sectional design:** The study cannot establish causal relationships between predictors and early ANC initiation.
- **Self-reported data:** Recall bias or social desirability bias may have affected reporting of gestational age at first visit, pregnancy intention, and medical conditions.
- **Single-center study:** Findings may not be generalizable to rural areas or other health facilities in Ethiopia.
- **The ORs have wide CI:** Small cell sizes in some categories: Certain variables had very few observations in specific cells (e.g., only one woman with no formal education initiated ANC early), leading to wide confidence intervals for some Odds Ratios. This reduces the precision of these specific estimates and should be considered when interpreting the strength of those associations

8. Conclusion

The prevalence of early ANC initiation at Selam Health Center was **low (27.3%)**, indicating that the majority of pregnant women still do not receive timely care. Maternal age, pregnancy intention, previous pregnancy complications, and known medical conditions were significant predictors of early ANC. These findings suggest that both individual awareness and prior risk experiences play critical roles in timely care-seeking.

To improve early ANC uptake, targeted interventions should focus on:

1. **Community awareness and health education** to emphasize the importance of early ANC, especially for multiparous and older women.
2. **Enhanced counseling during preconception and early pregnancy**, particularly for women with unplanned pregnancies.

9. Recommendations

For Health Center Administration and Policymakers:

- **Strengthen family planning services:** Improve counseling on pregnancy planning to encourage early ANC attendance. Based on a planned pregnancy were more than 33 times more likely to initiate ANC early compared to those with an unplanned pregnancy.
- **Targeted education for older and multiparous women:** Design awareness campaigns emphasizing the importance of first-trimester ANC regardless of prior pregnancy experience.

For Pregnant Women:

- **Plan pregnancies:** Seek preconception counseling and early awareness of gestational milestones to facilitate timely ANC.
- **Prioritize first-trimester visits:** Regardless of prior pregnancy experience, early ANC is critical for maternal and fetal health.

For Future Research:

- **Longitudinal studies:** Assess causal relationships between sociodemographic, behavioral, and clinical factors and timing of ANC initiation.
- **Qualitative exploration:** Investigate barriers and facilitators of early ANC from the perspectives of women, families, and healthcare providers.

10 Reference

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Annexes

Annex I: Data Extraction Checklist

Study Title: Prevalence of Early Antenatal Care Visit and Associated Factors Among Pregnant Women Attending the Antenatal Care Clinic at Selam Health Center, Addis Ababa, Ethiopia.

Record ID: [][] (To be assigned by the researcher) Patient Medical Record Number (MRN): _____

Section 1: Sociodemographic Data (To be extracted from the patient's registration card or ANC chart)

101. Age of the woman at first ANC visit (in years): _____

102. Marital Status: 1. Single 2. Married 3. Divorced/Widowed/Separated 4. Not Recorded

103. Educational Status: 1. No Formal Education 2. Primary School 3. Secondary School 4. College/University or Higher 5. Not Recorded

Section 2: Obstetric and Clinical Data (*To be extracted from the patient's ANC follow-up card*)

201. Gravidity (Number of pregnancies, including current): _____

202. Parity (Number of previous live births): _____

203. Gestational Age at First ANC Visit (in weeks, as calculated or recorded): _____

204. **Outcome Variable Calculation:** * Timing of First ANC Visit:

1. **Early Initiation** (≤ 12 weeks)

2. **Late Initiation** (> 12 weeks)

Section 3: Other Relevant Factors (if available in records)

301. History of previous pregnancy complication? 1. Yes 2. No 3. Not Recorded

302. Known medical condition (e.g., HIV, Diabetes, Hypertension)? 1. Yes 2. No 3. Not Recorded

Annex II: Ethical Considerations and Request for Waiver of Consent

Since this study involves a **retrospective review of existing medical records**, direct contact with the patients is not required, and therefore, an individual informed consent process is not feasible or practical. The research poses no more than minimal risk to the subjects, as no interventions will be performed, and all data will be handled with strict confidentiality.

Therefore, a **waiver of individual informed consent** will be requested from the St. Paul's Hospital Millennium Medical College Institutional Review Board (IRB). The request will be based on the following justifications:

Minimal Risk: The research involves no procedures for which written consent is normally required outside of the research context. The risk is limited to a potential breach of confidentiality, which will be mitigated through rigorous data protection measures.

Impracticability: It would be impractical and potentially distressing to re-contact hundreds of women who received care in the past solely for the purpose of obtaining consent for a record review. The logistical and financial burden would make the study unfeasible.

Confidentiality Protection: The privacy and confidentiality of the subjects will be protected. A robust data protection plan will be implemented:

All data will be collected anonymously. The data extraction checklist will use a study-specific ID number, and no personal identifiers (such as names, phone numbers, or detailed addresses) will be recorded.

The link between the study ID and the patient's medical record number will be kept in a separate, password-protected file accessible only to the Principal Investigator.

All data will be stored on a password-protected computer.

The findings will be reported in aggregate form, making it impossible to identify any individual.

This approach ensures that the research can be conducted effectively while upholding the fundamental ethical principles of protecting patient privacy and confidentiality.

Data Abstraction Template

Study Title: Prevalence of Early Antenatal Care Visit and Associated Factors Among Pregnant Women Attending the Antenatal Care Clinic at Selam Health Center, Addis Ababa, Ethiopia.

Instructions for Data Collector: Please fill out one form for each patient record selected. Extract the information directly from the patient's ANC card and/or the facility's registration logbook. If information for a specific field is not available or is illegible, please mark it as "Not Recorded."

Record Identification

- **Form ID:** [____][____][____] (*Assign a unique number to each form, e.g., 001, 002*)
- **Patient Medical Record Number (MRN):** _____
- **Date of Data Abstraction:** ____ / ____ / ____ (DD/MM/YYYY)
- **Data Collector's Name:** _____

Section 1: Sociodemographic Characteristics

Variable	Code	Value/Description	Source in Record
101. Age at First Visit		_____ (in completed years)	ANC Card / Reg. Book
102. Marital Status		1 = Married 2 = Single 3 = Other (Divorced, Widowed) 9 = Not Recorded	ANC Card / Reg. Book

Section 2: Obstetric History and Current Pregnancy Details

Variable	Code	Value/Description	Source in Record
201. Gravidity		_____ (Total number of pregnancies)	ANC Card
202. Parity		_____ (Number of births > 28 weeks)	ANC Card
205. Gestational Age at First Visit		_____ (in completed weeks)	ANC Card

Variable	Code	Value/Description	Justification
301. Timing of First ANC Visit		1 = Early Initiation 2 = Late Initiation 9 = Cannot be determined	Based on Gestational Age in field #205. If $\leq$ 16 weeks, code as '1'. If > 16 weeks, code as '2'.

Section 3: Outcome Variable Calculation (To be completed by the data collector)

Section 4: Data Quality Check

Variable	Code	Action
401. Form Completion Status		1 = Complete 2 = Incomplete (specify missing items below)
402. Remarks/Notes		

Declaration

I, the undersigned student, declare that this research project is my original work in partial fulfillment of the requirement for the **Degree of Doctor in Medicine**, MD. I also declare that it has never been presented in this or any other higher institution and that all resources and materials used in the research work have been duly acknowledged.

Name of the student: Hanna Aschenwald

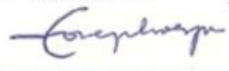
Signature: 

Date: _____

Approval of Advisors

This research work has been submitted for examination with my approval.

Name of School of Public health advisor 1: Yoseph Worku

Signature: 

Date: March 24, 2026

Name of Clinical advisor 2: A. Misael Jans

Signature: 

Date: March 24, 2026