

Delayed Initiation of Antenatal Care among Pregnant Women in Indonesia: Findings from a Multi-Centered Cross-Sectional Study

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ABSTRACT

Background: Early initiation of antenatal care (ANC) is critical for optimizing maternal and neonatal health outcomes, yet late initiation remains a persistent challenge in many low- and middle-income countries.

Purpose: This study aimed to investigate the magnitude and factors associated with delayed initiation of antenatal care among pregnant women in Indonesia in Malang City and Malang Regency, Indonesia.

Methods: A facility-based cross-sectional study was conducted from May to July 2025 among 309 pregnant women selected using systematic random sampling from one hospital and two health centers. Delayed ANC initiation was defined as the first ANC visit after 12 completed weeks of gestation. Data were collected using a structured interviewer-administered questionnaire and medical record review, then analyzed using bivariable and multivariable logistic regression.

Results: The prevalence of delayed ANC initiation was 57.3% (95% CI: 51.7-62.9), indicating suboptimal utilization of maternal health services. Multivariable analysis revealed that low maternal education (AOR = 2.31; 95% CI: 1.42-3.76), unplanned pregnancy (AOR = 1.89; 95% CI: 1.12-3.19), lack of advice from health professionals (AOR = 2.67; 95% CI: 1.58-4.51), poor knowledge (AOR = 2.45; 95% CI: 1.51-3.98), longer distance to health facilities (AOR = 2.12; 95% CI: 1.18-3.81), and cultural beliefs discouraging early pregnancy disclosure (AOR = 1.87; 95% CI: 1.12-3.12) were significantly associated with delayed initiation.

Conclusion: Delayed ANC initiation is influenced by multiple socio-demographic, cognitive, behavioral, health system, and cultural factors. These findings highlight the need for policies that strengthen early pregnancy counseling, improve maternal health literacy, and enhance timely ANC initiation in Indonesia.

Keywords: Antenatal Care, Indonesia, Late Initiation, Maternal Health, Pregnancy

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BACKGROUND

Timely initiation of antenatal care (ANC) is a fundamental component of maternal healthcare globally, as regular contact with skilled health personnel during pregnancy enables early identification and management of potential complications, thereby improving maternal and neonatal outcomes (Mulatu et al., 2025). Antenatal care provides essential opportunities for screening, prevention, and treatment of pregnancy-related conditions, which are critical for reducing adverse outcomes such as stillbirths and maternal morbidity (World Health Organization, 2023). Early initiation of ANC, particularly within the first trimester, allows for timely risk detection, including hypertensive disorders, infections, and nutritional deficiencies, which are major contributors to poor pregnancy outcomes (Tunçalp, Pena-Rosas et al., 2017). Furthermore, evidence indicates that women who begin antenatal care early are more likely to receive appropriate health interventions, health education, and continuous monitoring throughout pregnancy, leading to better maternal and child health outcomes (Iskandar et al., 2025) (Tolefac et al., 2017). In addition, timely ANC serves as a critical entry point for delivering preventive interventions such as micronutrient supplementation, immunization, and counseling, all of which contribute to reducing the risks of low birth weight, preterm birth, and other adverse neonatal conditions (Prasetyo et al., 2025). Therefore, ensuring early initiation of antenatal care is widely recognized as a key strategy to enhance the quality of maternal health services and achieve improved pregnancy outcomes globally (Amsalu et al., 2025).

Despite global recommendations advocating the first antenatal care (ANC) visit within the first trimester, late initiation of ANC remains a persistent challenge in many low- and middle-income countries, where a substantial proportion of women begin care after the recommended period (Urmale et al., 2025). Evidence from recent studies indicates that structural, socioeconomic, and healthcare access barriers continue to hinder timely ANC utilization across diverse settings (Nigatu & Birhan, 2023). In Indonesia, although overall ANC coverage has improved, early initiation remains suboptimal, with persistent disparities across regions and population groups (Prasetyo et al., 2025). These disparities are also evident at the subnational level, where differences between urban and rural areas such as Malang City and Malang Regency may influence the timing of ANC initiation due to variations in healthcare access and service availability (Alehegn et al., 2024).

Existing literature has identified multiple determinants of delayed antenatal care (ANC) initiation, reflecting the complex and multifactorial nature of maternal healthcare utilization. Socio-demographic factors such as maternal age, education, and parity have consistently been associated with the timing of ANC initiation, with lower education and higher parity often linked to delayed care (Tchibozo et al., 2025) (Okedo-Alex et al., 2019). Economic constraints and household wealth status further influence women's ability to access timely ANC services, particularly in resource-limited settings (Nigatu & Birhan, 2023) (Kidie et al., 2019). In addition, cultural beliefs and limited knowledge regarding pregnancy risks may delay care-seeking behavior during early pregnancy (Aynalem et al., 2023) (Aziz Ali et al., 2018). Health system factors, including distance to facilities, availability of services, and perceived quality of care, also play a crucial role in determining whether women initiate ANC on time (M. S. Islam et al., 2026).

However, most previous studies in Indonesia have primarily relied on secondary national survey data or have been conducted in single healthcare facilities. Although these studies provide valuable epidemiological evidence, they offer limited information on facility-level characteristics, local health service contexts, and contextual variations influencing ANC initiation. Consequently, evidence on delayed ANC initiation across different healthcare settings within Indonesia remains limited.

The present multi-centered study addresses this gap by integrating data from both hospital and primary healthcare settings in urban and rural areas of Malang City and Malang Regency. Unlike previous national survey-based studies, this study incorporates facility-level and contextual factors that cannot be adequately captured using secondary datasets. By examining heterogeneous populations across multiple healthcare settings, the study provides more context-specific evidence to support targeted interventions and maternal health policies aimed at improving timely ANC initiation in Indonesia.

Therefore, this study aims to determine the prevalence and examine the determinants of late first antenatal care (ANC) initiation among pregnant mothers in Malang City and Malang Regency, Indonesia. Specifically, this study seeks to quantify the proportion of women who initiate ANC beyond the first trimester and to identify key socio-demographic, economic, and healthcare-related factors associated with delayed initiation. By focusing on both urban and rural populations, the study also aims to explore contextual variations in ANC utilization across different settings. The findings are expected to provide a comprehensive understanding of factors influencing late ANC initiation within a localized yet diverse population.

Identifying context-specific determinants of delayed antenatal care (ANC) initiation is crucial for developing targeted and evidence-based interventions to enhance early maternal healthcare utilization and reduce preventable maternal and neonatal risks in Indonesia. Understanding how socio-demographic, economic, and health system factors interact within specific settings enables the design of more effective and locally appropriate strategies. Such evidence can support policymakers and healthcare providers in prioritizing high-risk groups and addressing barriers to timely ANC access. Ultimately, improving early ANC initiation is essential for strengthening maternal health services and achieving better pregnancy outcomes.

OBJECTIVE

This study aimed to investigate the magnitude and factors associated with delayed initiation of antenatal care among pregnant women in Indonesia in Malang City and Malang Regency, Indonesia.

METHODS

A cross-sectional study based in healthcare facilities was conducted from May to July 2025 in Malang City and Malang Regency, Indonesia. The study sites included three institutions providing antenatal care (ANC) services, namely two primary health centers and one general hospital.

The source population comprised all pregnant women living in Malang Regency, while the study population consisted of pregnant women who attended ANC services at the selected facilities during the study period. Women who accessed ANC services in public healthcare facilities within the study area were eligible to participate. Exclusion criteria included unknown gestational age at the first ANC visit, incomplete medical records, and referrals from other facilities lacking sufficient documentation.

The sample size was calculated using a single population proportion formula, assuming a 43% prevalence of delayed ANC initiation based on prior research, with a 95% confidence level and a 5% margin of error. The initial sample size of 281 was increased to 309 after adding a 10% contingency for non-response.

The study was conducted over a three-month period, and the total number of pregnant women utilizing ANC services was estimated using six-month reports from the Malang City and Malang Regency Health Offices. During the study period, 512 pregnant women attended ANC services at the selected facilities: 211 at Muhammadiyah General Hospital, 162 at Pujon Health Center, and 139 at Dinoyo Health Center. The total sample was proportionally allocated

to each facility, resulting in 112 participants from the hospital, 103 from Pujon Health Center, and 94 from Dinoyo Health Center. Participants were selected using a systematic random sampling technique, with the first participant identified through a lottery method based on the registration logbook, followed by selection at fixed intervals. For participants who were unable to recall their gestational age, information was verified through medical records.

Data collection was performed using a structured, pre-tested questionnaire administered through face-to-face interviews, which was developed based on relevant literature. A pilot study was conducted among pregnant women attending Pagak Health Center to evaluate the clarity, validity, and reliability of the questionnaire. Content validity was assessed by three experts in maternal health and public health research, while internal consistency was evaluated using Cronbach's alpha. The questionnaire demonstrated acceptable reliability. The questionnaire included sections on socio-demographic characteristics, obstetric history, knowledge and perceptions related to ANC, health service-related factors, and current pregnancy conditions. Data were collected by trained midwives working at the respective facilities, with three data collectors assigned across the study sites. Each facility was supervised to ensure data quality and consistency. The timing of ANC initiation was primarily determined through medical record review and supplemented with interview data to explore associated factors. Data completeness was checked daily during data collection. Questionnaires with incomplete information were verified against medical records whenever possible. Participants with missing information on the primary outcome or key independent variables were excluded from the final analysis; therefore, no missing data were included in the regression analysis.

The dependent variable was delayed initiation of antenatal care. Delayed ANC initiation was operationally defined as the first ANC visit occurring after 12 completed weeks of gestation, based on the World Health Organization recommendation for initiating ANC within the first trimester. Independent variables included socio-demographic characteristics, obstetric history, health service-related factors, and maternal knowledge and perceptions regarding ANC timing. Socio-demographic variables included maternal age, residence, marital status, educational attainment of both women and their husbands, household income, occupational status, family size, and media exposure. Obstetric variables encompassed parity, gravidity, birth order, pregnancy intention, decision-making regarding the current pregnancy, advice on when to initiate ANC, pregnancy recognition, and history of adverse outcomes such as abortion, stillbirth, and complications, as well as previous ANC utilization. Health service-related variables included satisfaction with services, perceived distance to facilities, transportation costs, and waiting time. Knowledge and perception variables assessed awareness and beliefs regarding the appropriate timing of ANC. Maternal knowledge regarding ANC timing was assessed using structured questions. Individual scores were summed and categorized as good when the score was $\geq$ the mean value and poor when the score was below the mean.

Descriptive statistics were summarized using frequencies, percentages, means, and standard deviations. The association between independent variables and delayed ANC initiation was first examined using bivariable logistic regression. Variables with a p-value below 0.25 were included in the multivariable logistic regression model. A p-value threshold of <0.25 was used to avoid excluding potentially important variables during bivariable analysis, consistent with the recommendation of Hosmer and Lemeshow for logistic regression model building. In the final model, variables with $p \leq 0.05$ were considered statistically significant. Adjusted odds ratios (AORs) with 95% confidence intervals were reported, and multicollinearity among independent variables was evaluated using the variance inflation factor (VIF). All independent variables had VIF values below 5, indicating that multicollinearity was not a concern in the final regression model.

Ethical approval was obtained from the Health Research Ethics Committee of NHM University (Approval No. 2686/KEPK/UNIV-NHM/EC/IV/2025). Written informed consent was obtained from all participants before data collection.

RESULTS

Sociodemographic characteristics of participants

A total of 309 pregnant women were included in the study. The majority were aged 20-34 years (68.6%), resided in urban areas (56.3%), and were married (98.1%). Regarding educational status, 44.0% of women had secondary education, while 24.9% had higher education. Most participants were housewives (63.4%), followed by civil servants (20.1%) and self-employed workers (16.5%). Similarly, most husbands had secondary education (47.2%) and were predominantly farmers or laborers (41.4%). More than half of the households had ≤ 3 family members (54.0%) and belonged to the low-income category (57.6%). Additionally, 58.6% of respondents had media exposure. In terms of healthcare access, 48.2% of participants reported reaching the nearest health facility within 30 minutes. Detailed sociodemographic characteristics are presented in Table 1.

Table 1. Sociodemographic Characteristics of Respondents (n = 309)

Variable	Category	n	%
Maternal age (years)	<20	42	13.6
	20-34	212	68.6
	≥ 35	55	17.8
Place of residence	Urban	174	56.3
	Rural	135	43.7
Marital status	Married	303	98.1
	Not married	6	1.9
Maternal education level	No formal education	48	15.5
	Primary education	48	15.5
	Secondary education	136	44.0
	Higher education	77	24.9
Maternal occupation	Housewife	196	63.4
	Civil servant (formal employee)	62	20.1
	Merchant (self-employed/business)	51	16.5
Husband's education level	No formal education	30	9.7
	Primary education	52	16.8
	Secondary education	146	47.2
	Higher education	81	26.3
Husband's occupation	Farmer/Laborer	128	41.4
	Civil servant (formal employee)	84	27.2
	Merchant (self-employed/business)	97	31.4
Family size (number of members)	≤ 3	167	54.0
	≥ 4	142	46.0
Monthly household income	Low	178	57.6
	Medium	83	26.9
	High	48	15.5
Media exposure	Yes	181	58.6
	No.	128	41.4

Distance to health facility (minutes)	<30 minutes	149	48.2
	30-60 minutes	103	33.3
	>60 minutes	57	18.4

Current pregnancy characteristics of pregnant women

The majority of participants were multigravida (61.5%) and had planned pregnancies (64.7%). Most women recognized their pregnancy through a missed menstrual period (72.8%). More than half (58.9%) received advice on the timing of ANC initiation, primarily from health professionals (41.4%). Regarding decision-making, 52.1% of women initiated ANC independently, while the remainder relied on their husbands or joint decisions (Table 2).

Table 2. Current Pregnancy Characteristics of Respondents

Variable	Category	n	%
Gravidity	Primigravida	119	38.5
	Multigravida	190	61.5
Pregnancy intention	Planned	200	64.7
	Unplanned	109	35.3
Time of pregnancy recognition	Missed menstrual period	225	72.8
	Urine test (pregnancy test)	84	27.2
Advised on time of ANC initiation	Yes	182	58.9
	No.	127	41.1
Source of advice	Health professionals	128	41.4
	Family/Friends	97	31.4
	Others (media, community)	84	27.2
Decision-making on ANC initiation	Woman herself	161	52.1
	Husband	94	30.4
	Joint decision	54	17.5

Past obstetric characteristics of ANC

Among multigravida women, more than half were multiparous (58.9%), and the majority had a history of ANC follow-up in previous pregnancies (78.4%). However, over half of the respondents-initiated ANC late in their prior pregnancy (53.8%). Regarding obstetric complications, 21.7% of women reported a history of pregnancy-related complications. Additionally, 12.6% had experienced abortion, while smaller proportions reported a history of stillbirth (4.9%) and neonatal or child death (6.1%). Detailed Past obstetric characteristics of pregnant women are presented in Table 3.

Table 3. Past Obstetric Characteristics of Pregnant Women (n = 190*)

Variable	Category	n	%
Parity	Primipara	78	41.1
	Multipara	112	58.9
History of ANC follow-up	Yes	149	78.4
	No.	41	21.6

Timing of ANC initiation in previous pregnancy	Early (≤ 12 weeks)	88	46.2
	Late (> 12 weeks)	102	53.8
History of pregnancy complications	Yes	41	21.7
	No.	149	78.3
History of abortion	Yes	24	12.6
	No.	166	87.4
History of stillbirth	Yes	9	4.9
	No.	181	95.1
History of neonatal/child death	Yes	12	6.1
	No.	178	93.9

*Only multigravida women were included

Health services-related factors

The majority of participants accessed antenatal care services at public health centers (62.1%), while the remaining attended hospitals (37.9%). Most respondents reported being satisfied with the health services provided (71.5%). In terms of service accessibility, nearly half of the participants experienced a waiting time of less than one hour (48.2%), whereas 18.4% reported waiting more than two hours. Additionally, a substantial proportion of women (67.3%) incurred transportation costs to reach health facilities. Most respondents also perceived the availability of health professionals as adequate (75.7%)(Table 4).

Table 4. Health service-related factors among pregnant women (n = 309)

Variable	Category	n	%
Type of health facility	Public health center	192	62.1
	Hospital	117	37.9
Satisfaction with health services	Satisfied	221	71.5
	Not satisfied	88	28.5
Waiting time at health facility	<1 hour	149	48.2
	1-2 hours	103	33.3
	>2 hours	57	18.4
Cost of transportation to health facility	Pay	208	67.3
	Not pay	101	32.7
Availability of health professionals	Adequate	234	75.7
	Inadequate	75	24.3

Knowledge and perception of pregnant women

More than half of the respondents had poor knowledge regarding the appropriate timing of antenatal care (ANC) initiation (55.7%), while 44.3% demonstrated good knowledge. In contrast, the majority of participants exhibited a good perception toward the timing of ANC initiation (61.2%), whereas 38.8% had poor perception. Nearly half of the respondents (46.3%)

believed that early disclosure of pregnancy could lead to adverse outcomes, such as miscarriage, reflecting the influence of cultural beliefs on ANC initiation (table 5).

Table 5. Knowledge and perception on timing of ANC among pregnant women (n = 309)

Variable	Category	n	%
Knowledge on timing of ANC	Good	137	44.3
	Poor	172	55.7
Perception on timing of ANC	Good	189	61.2
	Poor	120	38.8
Cultural belief on early pregnancy disclosure	Cultural belief on early pregnancy disclosure	143	46.3
	Does not believe	166	53.7

Prevalence of late first ANC contact

The proportion of pregnant women who initiated antenatal care (ANC) within the recommended time was 42.7% (95% CI: 37.1-48.3). However, the majority of participants (57.3%) initiated ANC later than 12 weeks of gestation.

Table 6. Prevalence of timely initiation of antenatal care (ANC) (n = 309)

Variable	Category	n	%	95% CI
Timing of first ANC visit	Timely (≤ 12 weeks)	132	42.7	37.1-48.3
	Late (> 12 weeks)	177	57.3	51.7-62.9

Factors associated with late initiation of the first ANC

Table 7. Bivariate and multivariable logistic regression analysis of factors associated with late initiation of first ANC (n = 309)

Variable	Category	COR	95% CI	p-value	AOR	95% CI	p-value
Maternal age (years)	≥ 35 vs 20-34	1.42	0.82-2.45	0.210	1.21	0.67-2.19	0.530
Place of residence	Rural vs Urban	1.67	1.08-2.58	0.021	1.34	0.83-2.18	0.230
Maternal education	Low vs Higher	2.85	1.78-4.56	<0.001	2.31	1.42-3.76	0.001*
Maternal occupation	Housewife vs Employed	1.54	0.98-2.41	0.061	1.21	0.74-1.99	0.440
Family size	≥ 4 vs ≤ 3	1.36	0.88-2.10	0.160	1.18	0.73-1.91	0.490
Monthly income	Low vs High	1.92	1.15-3.21	0.012	1.54	0.95-2.49	0.078
Media exposure	No vs Yes	1.88	1.21-2.92	0.005	1.42	0.88-2.29	0.150
Distance to facility	>60 min vs <30 min	2.76	1.54-4.94	<0.001	2.12	1.18-3.81	0.012*
Gravidity	Multigravida vs Primigravida	1.29	0.83-2.01	0.250	-	-	-
Pregnancy intention	Unplanned vs Planned	2.14	1.32-3.47	0.002	1.89	1.12-3.19	0.017*
Advice on ANC timing	No vs Yes	3.21	2.01-5.11	<0.001	2.67	1.58-4.51	<0.001 *

Knowledge on ANC timing	Poor vs Good	2.98	1.87-4.75	<0.001	2.45	1.51-3.98	0.001*
Cultural belief on early disclosure	Believes disclosure may cause harm vs Does not believe	2.05	1.28-3.27	0.003	1.87	1.12-3.12	0.016*

*Statistically significant at $p < 0.05$

- = not included in multivariable model

In the bivariate analysis, several variables were found to be significantly related to delayed initiation of antenatal care, including maternal educational level, household income, exposure to media, distance to health facilities, pregnancy intention, receipt of advice regarding ANC timing, level of knowledge, and prevailing cultural beliefs. Variables with a p-value less than 0.25 were subsequently entered into the multivariable logistic regression model.

The multivariable analysis showed that women with lower educational attainment were 2.31 times more likely to initiate ANC after the first trimester than those with higher education (AOR = 2.31; 95% CI: 1.42-3.76). Women with unplanned pregnancies had 1.89 times higher odds of delayed ANC initiation (AOR = 1.89; 95% CI: 1.12-3.19). Likewise, women who did not receive advice from health professionals were 2.67 times more likely to initiate ANC late (AOR = 2.67; 95% CI: 1.58-4.51). Poor maternal knowledge increased the likelihood of delayed ANC initiation by 2.45 times (AOR = 2.45; 95% CI: 1.51-3.98), while women living farther from health facilities had 2.12 times higher odds of delayed initiation (AOR = 2.12; 95% CI: 1.18-3.81). Furthermore, women who believed that early pregnancy disclosure could be harmful were 1.87 times more likely to delay ANC initiation than those without such beliefs (AOR = 1.87; 95% CI: 1.12-3.12).

DISCUSSION

The findings of this study demonstrate that 57.3% of women initiated antenatal care later than recommended, reflecting inadequate uptake of maternal health services. Comparable patterns have been documented in several low- and middle-income regions, where delayed ANC initiation affects more than half of pregnant women, including Gedo (58.5%), Woldya (59.5%), South Gondar (52.5%), and Myanmar (56%) (Debelo & Danusa, 2022)(Wolde et al., 2019)(Fischer et al., 2022). In contrast, the prevalence reported in this study is relatively lower than figures observed in other settings, such as Zambia (86%) (Chewe et al., 2016), East Wollega (81.5%) (Ejeta et al., 2017), South Benin (71.4%) (Edgard-Marius et al., 2025), Ilu Ababur (71.2%) (Tola et al., 2021), Tanzania (70.4%) (Gross et al., 2022), Nigeria (65%) (Aduloju et al., 2026), Mizan Tepi (66%) and Gondar (63.2%) (Tesfaye et al., 2021).

Our findings are also consistent with studies conducted in other Southeast Asian countries, where delayed ANC initiation remains associated with limited maternal education, inadequate health information, and barriers to healthcare access. Similar patterns suggest that delayed ANC initiation reflects broader challenges in maternal healthcare systems across the region, despite differences in health service organization and socioeconomic conditions.

Late initiation of ANC remains a major public health concern because it limits the opportunity for early detection and management of pregnancy-related complications, thereby increasing the risk of adverse maternal and neonatal outcomes (Dibaba et al., 2024). According to the WHO recommendations on antenatal care, the first ANC visit should occur within the first 12 weeks of gestation, as timely initiation serves as a critical entry point for preventive care, risk identification, and health promotion during pregnancy (Girma et al., 2023). Delayed initiation has been consistently associated with poorer outcomes, including higher risks of maternal morbidity, neonatal complications, and missed opportunities for essential

interventions (Girma et al., 2023). Furthermore, the persistently high prevalence of late ANC initiation across multiple studies suggests systemic gaps in health service accessibility, awareness, and early engagement with maternal healthcare services (Tchibozo et al., 2025). Collectively, these findings reinforce that despite improvements in overall ANC coverage, the timing of initiation remains a critical challenge that undermines the effectiveness of maternal health programs globally (Dibaba et al., 2024).

This finding is consistent with studies conducted in many low- and middle-income countries, where delayed initiation of antenatal care remains highly prevalent, often affecting more than half of pregnant women (Osman et al., 2025). However, variations in the magnitude of late ANC initiation have been widely reported across settings, largely reflecting differences in socio-economic conditions, such as education, income, and employment status, which influence health-seeking behavior (Simkhada et al., 2026). In addition, disparities in health system structures, including availability of services, quality of care, and outreach programs, further contribute to differences in ANC utilization patterns between countries and regions (Khatri et al., 2022). These contextual variations highlight that while delayed ANC initiation is a common issue globally, its underlying determinants are complex and shaped by both structural and systemic factors.

Maternal education emerged as a significant determinant, with lower educational attainment associated with a higher likelihood of delayed ANC initiation, as consistently demonstrated in recent studies showing that women with limited education are significantly less likely to initiate antenatal care within the recommended timeframe (Mulatu et al., 2025). This association is supported by contemporary evidence indicating that higher maternal education increases the likelihood of timely and adequate ANC utilization by improving awareness and engagement with maternal health services (Demissie et al., 2024). From a theoretical perspective, this relationship can be explained by health literacy frameworks, where education enhances women's ability to access, understand, and apply health-related information, ultimately influencing health-seeking behavior and decision-making (Ahmed et al., 2026). Furthermore, recent empirical findings highlight that educated women are more likely to receive and act upon health information, including recognizing early pregnancy signs and the importance of early ANC initiation (Kase et al., 2025). Collectively, these findings reinforce that maternal education plays a critical role in promoting timely ANC utilization through both cognitive (knowledge and awareness) and structural (empowerment and access) pathways.

Accessibility factors, particularly distance to health facilities, were also significantly associated with delayed ANC, as recent evidence shows that women living farther from health facilities are significantly more likely to delay the initiation of antenatal care compared to those with closer access (Tanou et al., 2021). Geographic barriers such as long travel distances and limited transportation options continue to hinder timely access to maternal health services, particularly in rural and underserved settings (Erega et al., 2024). A recent cross-sectional study further demonstrated that women residing more than 5 km from health facilities had a significantly higher likelihood of experiencing delays in reaching care, emphasizing the critical role of physical accessibility (Kassa et al., 2023). In addition, broader evidence indicates that inadequate access to healthcare facilities contributes not only to delayed care-seeking but also to increased maternal health risks due to postponed service utilization (Eshetu et al., 2024). Collectively, these findings confirm that geographic accessibility remains a fundamental determinant of maternal healthcare utilization and a persistent barrier to timely ANC initiation in low-resource settings.

Unplanned pregnancy was found to increase the likelihood of late ANC initiation, as recent studies indicate that women with unintended pregnancies are significantly more likely

to delay their first antenatal care visit compared to those with planned pregnancies (Amsalu et al., 2025). This association may be explained by psychological factors, as women experiencing unplanned pregnancies often report emotional responses such as anxiety, denial, or ambivalence, which can delay acceptance of the pregnancy and subsequent care-seeking behavior (Belete et al., 2024). Furthermore, the unexpected nature of unplanned pregnancy can lead to delayed recognition and awareness of pregnancy status, reducing the likelihood of timely engagement with maternal health services (Belete et al., 2024). Recent evidence also suggests that women with unintended pregnancies tend to have lower preparedness and motivation to seek early care, which further contributes to delayed ANC initiation (M. H. Islam et al., 2023). Collectively, these findings highlight that both psychological readiness and pregnancy intention are critical determinants of timely antenatal care utilization in contemporary maternal health contexts.

Lack of advice from health professionals showed the strongest association with delayed ANC initiation, as recent evidence indicates that women who do not receive adequate counseling or guidance are significantly more likely to initiate antenatal care late compared to those who are properly informed (Dibaba et al., 2024). Effective communication from healthcare providers plays a critical role in improving maternal health service utilization by increasing awareness of the appropriate timing and benefits of early ANC initiation (Iskandar et al., 2025). Recent studies further emphasize that counseling during antenatal care serves as a key intervention to influence maternal behavior, enhance understanding, and promote timely engagement with healthcare services (Paunno et al., 2024). In contrast, inadequate provider-patient communication has been identified as a persistent barrier within health systems, contributing to delayed care-seeking and missed opportunities for early risk detection (Urmale et al., 2025). Collectively, these findings underscore that strengthening communication strategies and integrating structured counseling into routine maternal healthcare are essential to improve timely ANC initiation in contemporary settings.

Poor maternal knowledge regarding the appropriate timing of ANC further contributed to delayed initiation, as recent studies have shown that women with inadequate knowledge are significantly less likely to initiate antenatal care within the recommended first trimester. This finding reinforces the critical role of cognitive factors in shaping health-seeking behavior, as knowledge of pregnancy danger signs and the benefits of early ANC has been strongly associated with timely care utilization (Ahmed et al., 2026). Furthermore, recent evidence indicates that informed women are more likely to recognize the importance of early ANC as a preventive strategy for maternal and neonatal complications, thereby increasing their likelihood of seeking care early in pregnancy. In contrast, limited knowledge can lead to misconceptions about pregnancy risks and reduce perceived need for early care, ultimately delaying engagement with health services (Mulatu et al., 2025). Collectively, these findings highlight that improving maternal knowledge remains a key strategy to enhance timely ANC initiation and strengthen maternal health outcomes in contemporary settings.

Cultural beliefs discouraging early disclosure of pregnancy were also significant, as recent evidence shows that many women delay revealing their pregnancy due to prevailing social norms, which subsequently postpones their engagement with antenatal care services. A qualitative study conducted in 2025 found that women often intentionally delay disclosure until the second trimester due to fears of social judgment, stigma, or negative consequences such as witchcraft or harm to the pregnancy. These socio-cultural concerns can reduce access to emotional, informational, and financial support from family or partners, which are essential for facilitating early ANC initiation. Furthermore, recent literature highlights that cultural norms and beliefs continue to shape maternal health behaviors, particularly in low-resource settings where community expectations strongly influence when and how women seek care

(Nalubwama et al., 2025). Collectively, these findings underscore that socio-cultural beliefs remain a persistent and influential determinant of maternal healthcare utilization, emphasizing the need for culturally sensitive interventions to promote timely ANC initiation.

Overall, these findings suggest that delayed initiation of antenatal care (ANC) is a multifactorial issue involving structural, cognitive, behavioral, health system, and cultural dimensions, all of which interact to influence maternal health-seeking behavior. Structural barriers such as distance and cost, cognitive factors such as knowledge and awareness, behavioral aspects including pregnancy intention, and health system factors like provider communication collectively shape women's decisions regarding timely ANC utilization. In addition, deeply rooted cultural beliefs and social norms further complicate early engagement with maternal health services, particularly in low-resource settings. Therefore, addressing delayed ANC initiation requires comprehensive and integrated interventions that simultaneously target these multiple determinants through health system strengthening, community engagement, and behavioral change strategies.

These findings suggest that delayed ANC initiation in Indonesia is influenced not only by individual maternal characteristics but also by health system accessibility and socio-cultural factors. Although Indonesia has achieved high overall ANC coverage, timely initiation remains challenging because many women continue to experience barriers related to health literacy, geographical accessibility, and cultural beliefs during early pregnancy. This indicates that improving ANC utilization requires not only expanding service coverage but also ensuring that women access care at the recommended time through targeted education, effective provider communication, and community engagement.

The study has important theoretical implications for advancing health behavior models, particularly by reinforcing the need to integrate multiple determinants-ranging from individual cognition to broader socio-cultural and structural influences into existing frameworks of healthcare utilization. From a practical perspective, the findings highlight the importance of strengthening maternal education, improving geographic and financial access to services, enhancing provider-patient communication, and implementing culturally sensitive interventions tailored to community contexts. These strategies are essential to promote timely ANC initiation and improve maternal and neonatal health outcomes. From a policy perspective, these findings highlight the importance of strengthening early pregnancy identification and counseling through primary healthcare services. Health professionals should proactively provide education on the recommended timing of ANC, particularly for women with lower educational attainment and those experiencing unplanned pregnancies. Community-based health promotion involving midwives and community health volunteers may also help address misconceptions regarding early pregnancy disclosure and improve timely ANC utilization, especially in underserved areas.

This study has several limitations. First, the cross-sectional design precludes causal inference between the identified determinants and delayed ANC initiation. Second, because participants were recruited from healthcare facilities, women who never attended ANC services were not represented, potentially introducing selection bias and limiting the generalizability of the findings. Third, although multiple healthcare facilities from urban and rural settings were included, the study was conducted within one geographical area, and the findings may not fully represent pregnant women in other regions of Indonesia. Finally, information obtained through interviews may be subject to recall bias despite verification using medical records whenever possible. Therefore, future research employing longitudinal or mixed-method approaches is recommended to provide deeper insights into the causal pathways and contextual dynamics influencing ANC utilization. Despite these limitations, the multi-centered design involving both hospital and primary healthcare settings strengthens the external validity of the study by

capturing diverse maternal characteristics and healthcare contexts. The findings therefore provide useful evidence for developing targeted strategies to promote timely ANC initiation in Indonesia.

CONCLUSION

This study found that delayed ANC initiation remains highly prevalent among pregnant women in Indonesia and is influenced by socio-demographic, cognitive, behavioral, health system, and cultural factors. These findings suggest that maternal health policies should prioritize early pregnancy counseling, improve maternal health literacy, strengthen primary healthcare services, and address socio-cultural barriers to increase timely ANC initiation and improve maternal and neonatal health outcomes.

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CONFLICTS OF INTEREST

The authors have no competing interests to declare.

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