

# Factors influencing late antenatal care of Muslim pregnant women: A predictive correlational study in Aceh, Indonesia

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## Abstract

**Background:** Late antenatal care (ANC) has significant implications for maternal and infant morbidity and mortality among Muslim pregnant women in Indonesia. Existing literature has primarily focused on gestational weeks at the first ANC contact, with limited attention to the total number of ANC visits.

**Objective:** This study aimed to explore the factors predicting late antenatal care contact among Muslim pregnant women, including the gestational weeks of the first ANC contact and the total number of ANC visits in Aceh, Indonesia.

**Methods:** A predictive correlational study design was utilized. Eighty postpartum women who received late ANC were purposively sampled and included in the study. Data were collected in May 2023 using ANC knowledge, beliefs, and social support questionnaires. Statistical analyses included descriptive statistics, Spearman's rank correlation, Chi-Square tests, and binary logistic regression with the enter method.

**Results:** Pregnant women residing farther from home to ANC services were more likely to have their first ANC contact after 20 weeks than those with a shorter distance (AOR = 1.06; 95% CI: 1.02-1.10;  $p = 0.007$ ). Additionally, women with a history of multiple abortions were more inclined to have four or more ANC visits compared to those with fewer abortions (AOR = 6.78; 95% CI: 1.64-28.09;  $p = 0.008$ ).

**Conclusion:** Distance from home to healthcare services emerged as a significant barrier to ANC contact, while a history of abortion appeared to motivate pregnant women to seek ANC more frequently. To address these issues effectively, nurses should consider implementing telemedicine services for ANC provision, integrating information on pregnancy complications to better support pregnant women in their care journey.

## Keywords

Indonesia; late antenatal care; pregnant women; postpartum; pregnancy complications; Islam; social support; nursing

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## Background

Late antenatal care (ANC) is defined as a pregnant woman having her first ANC contact after 12 weeks of gestation and having fewer than eight ANC contacts in total (World Health Organization (WHO), 2018). In contrast, the Indonesian government still uses the criterion of fewer than four ANC contacts (Indonesia Ministry of Health, 2021). This late ANC is associated with significantly higher maternal and infant morbidity and mortality in developing countries, with rates up to 36 times higher than in developed countries (Bill & Melinda Gates Foundation, 2022; WHO, 2022).

The global maternal mortality rate (MMR) increased from 157 deaths per 100,000 live births in 2019 to 158.8 per 100,000 live births in 2021 (Bill & Melinda Gates Foundation, 2022; WHO, 2022). Late first ANC contact and fewer than four ANC contacts have been linked to a 15% increase in perinatal deaths and a higher risk of maternal morbidity and mortality due to complications such as vaginal bleeding, hypertension, sepsis, unsafe abortion, and obstructed labor (Sharrow et al.,

2022; WHO, 2022). A study reported that maternal near-miss rates were 59.6 per 1000 person-years for pregnant women with ANC contact, compared to 86.1 per 1000 person-years for those without ANC contact (Kebede et al., 2021). Similarly, previous studies have shown that pregnant women who did not receive ANC had 1.3-3.9 times higher odds of neonatal death compared to those who had at least four ANC contacts (Andriani et al., 2022; Arunda et al., 2017). Thus, adequate ANC contact is essential to reduce the risk of maternal and infant morbidity and mortality.

Maternal healthcare services are essential to alleviating pregnancy complications (Alem et al., 2022). During pregnancy, delivery, and postpartum, pregnant women receive maternal and fetal health risk assessments, vaccinations, and health information (Vant Hoog et al., 2020). Previous studies in developed countries found that approximately 85% of pregnant women had their first ANC contact before 12 weeks of gestation and had 7–16 ANC contacts, leading to fewer maternal complications (Alem et al., 2022; Palamuleni, 2022). However, in developing countries

such as Ethiopia, Sub-Saharan Africa, and Bangladesh, only 63.8-86% of pregnant women had their first ANC contact after 12 weeks of gestation (Sarker et al., 2020). Similarly, in Indonesia, approximately 83.14% of pregnant women had their first ANC contact after 12 weeks of gestation, and around 70% had fewer than four ANC contacts (Denny et al., 2022; Suwanti et al., 2018). Therefore, factors related to the gestational week of the first ANC contact and the number of ANC contacts should be considered in developing countries, especially for Muslim pregnancies in Indonesia.

Bandura's Social Cognitive Theory can guide the understanding of factors influencing a person's behaviors,

particularly mothers' behaviors regarding antenatal care in this study. This theory is dynamic and reciprocal, consisting of personal, environmental, and behavioral factors. Personal factors include physical and cognitive elements, such as personal characteristics, beliefs, knowledge, previous experience, perceived self-efficacy, and perceived barriers. Environmental factors, such as social networks, resources, and social support from family or friends, also play a significant role in predicting health behavior (Bandura, 1986). Thus, factors predicting late ANC in this study are associated with personal and environmental factors based on Bandura's theory, as shown in Figure 1.

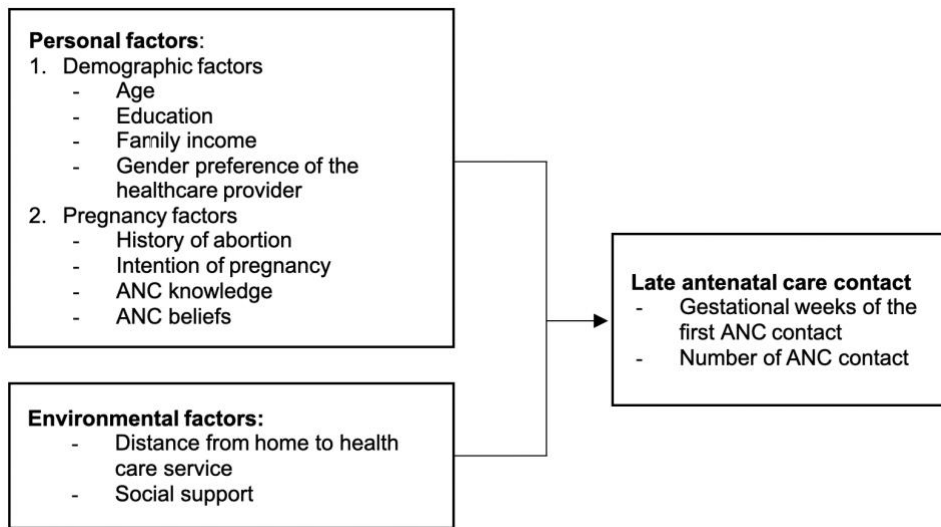


Figure 1 Conceptual framework of factors predicting late antenatal care

Previous studies have revealed that various personal and environmental factors are significantly associated with "late first ANC contact" among pregnant women in developing countries. Personal factors include age (Debelo & Danusa, 2022), education (Ali et al., 2020), income (Ejeta et al., 2017), history of abortion (Schmidt et al., 2021), pregnancy intention (Abame et al., 2019), ANC knowledge and beliefs (Mgata & Maluka, 2019), and gender preference of healthcare provider (Negash Dechasa et al., 2022). Environmental factors include distance to healthcare centers (Belay et al., 2022) and social support (Nuampa et al., 2020).

Further studies have identified factors predicting "late ANC contact," including maternal age (Jihad et al., 2022; Schmidt et al., 2021; Wolde et al., 2019), education (Schmidt et al., 2021), ANC knowledge (Schmidt et al., 2021; Wolde et al., 2019), ANC beliefs (Okunowo & Fasesin, 2019), history of abortion (Jihad et al., 2022), unplanned pregnancy (Tsfaye et al., 2017), and social support (Kachoria et al., 2022). Additionally, one study found that education, age, and pregnancy exposure could jointly predict late first ANC contact by 44 percent (Ziblim et al., 2022).

Limited studies have explored the factors associated with the "number of ANC contacts." Some have found that age, education (Alibhai et al., 2022), family income (Sui et al., 2021), pregnancy intention (Hassen et al., 2021; Islam et al., 2023), ANC knowledge (Kebede et al., 2022), and distance from home to health facility (Dusingizimana et al., 2023) are significantly associated with having fewer than four ANC contacts. Given the limited research on factors predicting the

number of ANC contacts, it is essential to separately analyze the factors affecting the timing of the first ANC contact and the total number of ANC contacts.

Aceh province in Indonesia, with an almost 100% Muslim population and diverse cultures, seeks better healthcare services for maternal and neonatal health. Pregnant women in Aceh often prefer female healthcare providers for cultural reasons (Dechasa et al., 2021). Previous studies in Indonesia reported that approximately 83.14% of pregnant women had their first ANC contact after 12 weeks of gestation (Suwanti et al., 2018), while 51.8% of pregnant women in Aceh had only 1–2 ANC contacts (Kiftia et al., 2022). One study also found that pregnant women often had their first ANC contact in the second trimester to ensure their infants were still alive (Sarker et al., 2020).

There are limited studies on late ANC contacts in Indonesia, and these studies have some limitations, including small sample sizes and limited variables (Agus & Horiuchi, 2012). Factors such as ANC beliefs (Kachoria et al., 2022) and gender preference influence (Islam et al., 2023) are particularly understudied. Most previous studies have focused only on the timing of the first ANC contact, with few studies examining the number of ANC contacts, which is crucial for preventing pregnancy complications. Therefore, our study aimed to investigate the factors predicting late ANC among pregnant women, considering both the gestational week of the first ANC contact and the number of ANC contacts. It was hypothesized that personal factors (age, education, family income, gender preference of the healthcare provider, history

of abortion, pregnancy intention, ANC knowledge, and ANC beliefs) and environmental factors (distance from home to healthcare service and social support) would collectively predict the timing of the first ANC contact and the number of ANC contacts for Muslim pregnant women in Aceh, Indonesia.

## Methods

### Study Design

This study employed a predictive correlational study design. This design was used to understand the strength of the relationship between variables and make predictions about a specific variable of interest (Grove et al., 2017).

### Samples/Participants

The samples for this study were postpartum women who delivered during May 2023 at Tgk. Chik Ditiro Hospital, Tgk. Abdullah Syafii Hospital, dr. Zoebir Mahmud Hospital, and Graha Bunda Hospital, meeting the following inclusion criteria: (1) postpartum women without complications who had their first ANC contact after 12 weeks of gestation and/or had fewer than four ANC contacts; (2) aged 18 years or older; (3) of the Islamic religion; (4) able to communicate in Bahasa or Acehnese; and (5) willing to cooperate in the research by signing an informed consent form.

The sample size was calculated using power analysis with G\*Power software (Faul et al., 2009) for linear multiple regression, with an effect size of 0.26 (Oduro et al., 2023), a power of 0.80,  $\alpha = 0.05$ , and a total of ten predictors. This yielded a required sample size of 80 postpartum women with late ANC, including a 10% attrition rate. All participants were recruited using the convenience sampling approach.

### Instruments

The instruments employed in the study consisted of four questionnaires, all adapted with permission from their respective developers as follows:

**Demographic Questionnaire:** Created by the researcher, this questionnaire includes items on age, education, family income, history of abortion, intention of pregnancy, gender preference of the healthcare provider, distance between healthcare service and home, gestational weeks of the first ANC contact, and number of ANC contacts.

**ANC Knowledge Questionnaire:** Adapted from Agus and Horiuchi (2012), this questionnaire covers information related to ANC contact, antenatal performance, and its benefits. It was expanded from the original ten items to 12 items, with responses marked "1 for true" and "0 for false". The total score ranges from 0 to 12 points, with higher scores indicating higher levels of ANC knowledge. The Content Validity Index (CVI) from three experts was 0.95, and the Kuder-Richardson-20 (KR-20) reliability was 0.80 in this study.

**ANC Beliefs Questionnaire:** Adapted from Agus and Horiuchi (2012), this questionnaire addresses traditional beliefs and norms related to ANC contact and delivery. It was modified from seven to eight items, using a 5-point Likert scale from "1 for strongly disagree" to "5 for strongly agree". Negative questions are scored inversely. The total score ranges from 8 to 40 points, with higher scores indicating more positive ANC beliefs. Content validity was tested by three

experts, yielding a CVI of 0.80, and Cronbach's Alpha coefficient was 0.70 in the current study.

**Social Support Questionnaire:** Based on the MOS Social Support Survey and adapted from Sherbourne and Stewart (1991) and Hijazi et al. (2021), this questionnaire was reduced from 18 items to 15, using a 5-point Likert scale from "1 for none of the time" to "5 for all of the time". Negative questions are scored inversely. The total score ranges from 15 to 75 points, with higher scores indicating greater social support. The CVI of the three experts was 0.95, and Cronbach's Alpha coefficient was 0.70 in the current study.

### Data Collection

Data collection began with training a research assistant, a nursing student proficient in English. The researcher trained her thoroughly on using all the questionnaires until she could understand and administer them correctly. The research assistant then collected data from three pregnant women in their last trimester using all the questionnaires. The test-retest reliability of the research assistant was 0.99, which is acceptable at 0.80 or higher (Cozby & Bates, 2011). After receiving approval from the Institutional Review Board (IRB) and permission from the directors of the hospitals, the researcher and the research assistant introduced themselves and established rapport with the potential participants. They explained all research information and obtained informed consent from the participants. The researcher and the research assistant asked the participants to complete all the questionnaires, including ANC beliefs, social support, ANC knowledge, and demographic information, for approximately 20 minutes. Finally, the researcher checked each questionnaire for completeness.

### Data Analysis

The descriptive and inferential statistics were analyzed using SPSS. A significance level of  $p < 0.05$  was used to determine statistical significance. Descriptive statistics were used to summarize the characteristics of the participants and all dependent variables, including mean, standard deviation (SD), range, frequency ( $n$ ), and percentage (%). Due to some variables not meeting the normal distribution assumption and showing severe positive skewness, Spearman's rank correlation and Chi-Square tests were used to examine variable relationships. Additionally, since some variables did not meet multiple regression assumptions—including multivariate normality, linearity, homoscedasticity, no autocorrelation (independence), and no multicollinearity—binary logistic regression using the enter method was employed to test the hypotheses.

### Ethical Consideration

This study obtained ethical approval from the Institutional Review Board (IRB) at the Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Thailand (COA.MURA2023/275), and from the ethics committee at Syiah Kuala University, Aceh, Indonesia (113895100423), before data collection began. The researchers explained the study's purposes, expected risks, and benefits to the participants before obtaining their voluntary informed consent. Participants were told they could withdraw from the study until data collection was concluded without affecting their healthcare. It was also

explained that all data would be kept confidential and anonymous, and the results would be presented as an overall outcome.

## Results

### Characteristics of the Participants

Eighty postpartum women participated in this study. The average age was 31.20 years (SD = 5.95, range = 20-43 years), and the highest education level averaged 10.26 years (SD = 2.85, range = 6-16 years). The average family income was Rp 1,284,750.00 (SD = 650,703.56, range = Rp 500,000 – 4,000,000), the average distance from home to healthcare service was 21.60 kilometers (SD = 18.21, range = 2-85 kilometers), and the average number of abortions was 0.13 (SD = 0.40, range = 0-2).

The average scores for ANC knowledge, ANC belief, and social support were 7.31 (SD = 1.99, range = 3-12), 23.34 (SD = 3.46, range = 16-32), and 50.59 (SD = 10.79, range = 19-75), respectively. Additionally, most participants preferred a female healthcare provider (82.5%), did not intend the pregnancy (72.5%), and had a history of spontaneous abortion (90%) and induced abortion (100%). The average gestational age at the first ANC contact was 18.59 weeks (SD = 5.23,

range = 13-28 weeks), and the average number of ANC contacts was 2.78 times (SD = 1.07, range = 1-5 times).

### Correlational Analysis of the Variables

As some variables had severe skewness, this study utilized Spearman's correlation for continuous variables and the Chi-Square test for three nominal scale variables to examine correlations among them. The researchers categorized the gestational weeks for the first ANC contact of participants into two groups: <20 weeks and >20 weeks for correlation analysis and hypothesis testing. The findings revealed that the gestational weeks for the first ANC contact among postpartum women had a positively significant correlation with distance from home to healthcare service ( $r = 0.56, p < 0.01$ ), a negatively significant correlation with the number of abortions ( $r = -0.29, p < 0.01$ ), and a significant correlation with a history of spontaneous abortion ( $p < 0.05$ ).

Moreover, the number of ANC contacts demonstrated a negatively significant correlation with distance from home to healthcare service ( $r = -0.37, p < 0.01$ ), a positively significant correlation with the number of abortions ( $r = 0.29, p < 0.01$ ), and a significant correlation with a history of spontaneous abortion ( $p < 0.05$ ), as shown in [Table 1](#) and [Table 2](#).

**Table 1** Relationships between independent variables and late ANC (gestational weeks for the first ANC contact and number of ANC contact) of postpartum women using Spearman's correlation (N = 80)

Variables	1	2	3	4	5	6	7	8	9	10
1. Age	1									
2. Education	0.009	1								
3. Family income (Rp)	-0.008	0.284*	1							
4. Distance from home to health care service (Km)	0.088	0.017	0.690	1						
5. Number of abortions	-0.007	-0.091	0.135	-0.121	1					
6. ANC knowledge	0.050	0.178	-0.075	-0.147	0.018	1				
7. ANC beliefs	0.011	-0.095	-0.093	0.065	-0.168	0.122	1			
8. Social support	0.106	0.146	0.034	0.193	0.082	-0.005	0.083	1		
9. Gestational weeks of the first ANC	0.082	-0.022	0.008	0.559**	-0.288**	-0.188	0.040	0.181	1	
10. Number of ANC contact	-0.021	0.033	0.166	-0.368**	0.291**	0.041	0.228*	-0.018	-0.574**	1

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$

**Table 2** Relationships between independent variables and late ANC (gestation weeks of the first ANC contact and number of ANC contact) of postpartum women using Chi-Square test (N = 80)

Variables	GA of the First ANC Contact		p-value	Number of ANC Contact		p-value
	≤20 Weeks n (%)	>20 weeks n (%)		<4 times n (%)	≥4 times n (%)	
<b>History of spontaneous abortion</b>			0.031*			0.012*
No	45 (56.2)	27 (33.8)		59 (73.8)	13 (16.3)	
Yes	8 (10.0)	0		3 (3.7)	5 (6.2)	
<b>Intention of pregnancy</b>			0.058			0.363
No	35 (43.8)	23 (28.7)		46 (57.5)	12 (15.0)	
Yes	18 (22.5)	4 (5.0)		16 (20.0)	6 (7.5)	
<b>Gender preferences of care provider</b>			0.079			0.169
Female	41 (51.2)	25 (31.3)		53 (66.3)	13 (16.3)	
Male	12 (15.0)	2 (2.5)		9 (11.2)	5 (6.2)	

Note: \*  $p < 0.05$

### Regression Analysis of the Variables

As some variables did not meet the assumptions for multiple regression, binary logistic regression was utilized to test the hypotheses. The results indicated that pregnant women who resided farther from home to ANC services were more likely to have their first ANC contact after 20 weeks compared to those with a shorter distance (AOR = 1.06, 95% CI: 1.02-1.10). This

suggests that the greater the distance, the later the gestational week of the first ANC contact. Additionally, pregnant women who had a history of more abortions were more likely to have more than three ANC contacts compared to those with fewer abortions (AOR = 6.78, 95% CI: 1.64-28.09). This implies that a higher number of abortions corresponds to a greater number of ANC contacts (see [Table 3](#)).

**Table 3** Factors predicting late ANC (gestation weeks of the first ANC contact and number of ANC contact) of postpartum women using binary logistic regression ( $N = 80$ )

Variables	Gestational Weeks of the First ANC Contact				Number of ANC Contact			
	B	Exp (B)	95% CI	p-value	B	Exp (B)	95% CI	p-value
Age	-0.03	0.97	0.88-1.07	0.552	-0.04	0.96	0.85-1.71	0.466
Education	0.12	1.13	0.91-1.40	0.259	0.17	1.18	0.93-1.51	0.177
Family income	0.00	1.00	1.00-1.00	0.515	0.00	1.00	1.00-1.00	0.060
Gender preferences of health care provider	0.81	2.26	0.27-19.22	0.456	-0.03	0.98	0.16-6.12	0.978
Number of abortions	-19.09	0.00	0.00-0.00	0.999	1.91	6.78	1.64-28.01	0.008**
Intention of pregnancy	1.27	3.57	0.80-15.89	0.095	-0.06	0.94	0.24-3.65	0.928
ANC knowledge	-0.00	0.93	0.68-1.26	0.617	-0.15	0.86	0.61-1.22	0.392
ANC beliefs	-0.08	0.93	0.76-1.13	0.441	0.26	1.29	0.99-1.69	0.054
Distance from home to health care service (Km)	0.05	1.06	1.02-1.10	0.007**	-0.04	0.97	0.92-1.01	0.146
Social support	-0.01	0.99	0.94-1.05	0.766	0.01	1.01	0.95-1.07	0.856

Note: \*\*  $p < 0.01$

## Discussion

Our study tested two hypotheses. The first hypothesis revealed that pregnant women residing far from home to ANC services were more likely to have their first ANC contact after 20 weeks compared to those with a shorter distance (AOR=1.06, 95% CI: 1.02-1.10). This finding suggests that for each kilometer increase in distance from home to ANC services, participants were 1.06 times more likely to have a gestational week of the first ANC contact exceeding 20 weeks. This result aligns with Bandura's Social Cognitive Theory, which posits that environmental factors influence behavior (Bandura, 1986), indicating that the farther the distance to healthcare services, the later the gestational week of the first ANC contact.

Possible factors contributing to this phenomenon include not only the considerable distance from healthcare services (Mean = 21.60 Km, SD = 18.21) but also lower family income (Mean = Rp 1,284,750, SD = 650,703.56) compared to the gross national income per capita of Rp1,500,000 in 2022 (Central Agency of Statistics Aceh, 2022), resulting in a lack of transportation funds for ANC visits. Moreover, accessing healthcare settings is challenging in Pidie and East Aceh due to geographical conditions, including coastal areas, lowlands, and highlands, which still have numerous remote areas with limited healthcare access. Additionally, the risk of floods and landslides is a barrier to accessing healthcare services (Yayasan Darah Untuk Aceh, 2021). Previous studies have also reported that pregnant women often have their first ANC contact in the second trimester to ensure the well-being of their infants (Sarker et al., 2020).

Similarly, our study found an average gestational week of the first ANC contact in the second trimester at 18.59 weeks (SD = 5.23). Prior research supports these findings, indicating that distance from home to the hospital can predict delayed first ANC contact among pregnant women (Junngam & Suwannasan, 2022; Steinbrook et al., 2021), with 40% predicted in the first 12 weeks of gestation (Junngam & Suwannasan, 2022).

Surprisingly, the remaining predictor variables could not significantly predict the gestational weeks of the first ANC contact in postpartum women. These results are incongruent with Bandura's Social Cognitive Theory, which posits that

personal and environmental factors influence behavioral factors (Bandura, 1986). Despite participants being adults with an average age of 31.20 years (SD = 5.95), suggesting maturity and an understanding of the importance of early ANC contact, their low level of education (Mean = 10.26 years, SD = 2.85) resulted in lower income (Mean = Rp 1,284,750, SD = 650,703.56), possibly contributing to the delayed gestational weeks of the first ANC contact.

Moreover, while participants had moderate levels of ANC knowledge (Mean = 7.31, SD = 1.99) and ANC belief (Mean = 23.34, SD = 3.46), they may not prioritize contacting ANC services. Additionally, limited family income may pose a significant barrier to accessing healthcare services, necessitating increased access to infrastructure such as social media to enhance ANC knowledge, potentially leading to a misunderstanding of the importance of ANC (Konje et al., 2018). Furthermore, the majority of participants in this study did not plan to have children (72.5%) and had no history of abortion (90%). They also received moderate support from family or friends (Mean = 50.59, SD = 10.79), which could contribute to the delayed ANC contact.

The second hypothesis indicated that pregnant women who had more abortions were more likely to contact ANC services more than three times compared to those with fewer abortions (AOR=6.78, 95% CI: 1.64-28.09). This finding suggests that for each one-point increase in the number of abortions, participants were 6.78 times more likely to have more ANC contacts. This result aligns with Bandura's Social Cognitive Theory, which identifies personal factors influencing such behavior (Bandura, 1986). More abortions serve as a significant motivating factor for participants to seek more ANC services. Additionally, the current study found a positive and significant correlation between the number of abortions and the number of ANC contacts. Furthermore, moderate levels of ANC knowledge and belief among participants may contribute to increasing the number of ANC contacts to mitigate risks and safeguard their children (Frederico et al., 2018), aligning with a study by Hassen et al. (2021).

Unexpectedly, other independent variables could not significantly predict the number of ANC contacts in this study. This may be due to differences in socioeconomic status and geographic challenges, including lower education levels, reduced family income, and difficulties accessing healthcare

services, resulting in fewer ANC contacts (Mean = 2.78 times, SD = 1.07). While participants displayed moderate levels of ANC knowledge, ANC belief, and social support, these factors were less influential than the distance from home in determining ANC contacts, leading to a lower number of ANC contacts (Mamuye Azanaw et al., 2021).

Moreover, unplanned pregnancies may result in less consideration for seeking ANC services (Abame et al., 2019). This study aligns with previous research regarding certain factors such as age (Bagambe et al., 2021), education (Rurangirwa et al., 2017), and distance from home to healthcare facilities (Bagambe et al., 2021; Mamuye Azanaw et al., 2021) which were unable to significantly predict the number of ANC contacts. However, this study contradicts previous findings that identified several variables as significant predictors of the number of ANC contacts. For instance, pregnant women aged over 25 years had fewer ANC contacts (Hassen et al., 2021). Additionally, education (Bagambe et al., 2021; Hassen et al., 2021; Mamuye Azanaw et al., 2021; Sui et al., 2021), family income (Hassen et al., 2021; Islam et al., 2023; Khan et al., 2022; Sui et al., 2021), unplanned pregnancies (Alkhalidi et al., 2023; Bagambe et al., 2021; Hassen et al., 2021), social support, and distance from home to healthcare services (Sui et al., 2021) were identified as predictors of the number of ANC contacts.

### Implications of the Study

Given that this study has identified the number of abortions and distance from home to healthcare services as primary barriers to ANC contact, nurses should consider implementing mobile or telemedicine services for ANC and disseminating ANC-related knowledge, particularly concerning complications of spontaneous abortions, to reproductive women through public relations channels. This recommendation may aid pregnant women in understanding the crucial nature of ANC contact for their own and their children's well-being. Additionally, nurses should explore the impact of telemedicine, in collaboration with traditional midwives trained in ANC services and pregnancy complication awareness, on the number of ANC contacts and pregnancy outcomes among pregnant women who initiate ANC before and after 12 weeks of gestational age.

Finally, the nursing curriculum should incorporate factors associated with late ANC, such as long distances from home to ANC services and pregnancy complications, with a specific focus on abortion prevention. This inclusion will better equip nursing students to counsel pregnant women on the importance of early ANC contact in preventing pregnancy complications and ensuring the health of their children.

### Limitations

This study had several limitations. Firstly, all participants belonged to Islam, with gestational weeks for the first ANC contact exceeding 12 weeks and the number of ANC contacts being less than four times. These parameters deviated from the WHO criteria, which recommend a minimum of eight ANC contacts. As a result, the findings of this study may not be readily generalizable to populations in developed countries or individuals of different religious backgrounds. Additionally, the study could not compare with populations from developed

countries who typically initiate ANC earlier in their pregnancies.

## Conclusion

The predictive correlational study examined factors influencing late antenatal care (ANC) contact, including gestational weeks of the first ANC contact and the number of ANC contacts among Muslim pregnant women. The findings highlighted that the distance from home to healthcare services emerged as a significant barrier to ANC contact, while a history of abortions appeared to motivate pregnant women to increase their ANC engagement. Consequently, nurses are encouraged to offer telemedicine services for ANC, incorporating comprehensive information about ANC and pregnancy complications.

### Declaration of Conflicting Interest

The authors have no conflict of interest to disclose.

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### Authors' Contributions

All authors contributed equally to all stages of the study, including making substantial contributions (conception and design of the research, acquisition of data, or analysis and interpretation of data), drafting and revising the manuscript, giving final approval of the version to be published, and agreeing to be accountable for all aspects of the work.

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### Data Availability

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

### Declaration of Use of AI in Scientific Writing

The study did not use generative AI in the writing process of this article.

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