Knowledge in Enhancing Antenatal Care Compliance and Improving Maternal and Neonatal Health Outcomes

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Abstract

Background: Antenatal care (ANC) is essential for monitoring maternal and fetal health. Knowledge about ANC significantly influences compliance with recommended visits. This study investigates the relationship between maternal knowledge and compliance with ANC visits among pregnant women at the Pekanbaru City Health Center. Methods: This cross-sectional analytic study was conducted among 35 pregnant women in their third trimester, selected through purposive sampling. Data were collected using validated questionnaires (Cronbach's alpha = 0.987) and health center records. Knowledge was categorized as high or low, based on a mean score of 17.7. Compliance was defined as attending a minimum number of ANC visits across trimesters. Statistical analysis was performed using the chi-square test. Results:

Among respondents with high knowledge (n=18), 88.9% adhered to regular ANC visits. Conversely, 91.7% of respondents with low knowledge (n=12) did not comply. The chi-square test revealed a significant association between maternal knowledge and ANC compliance (p < 0.05). Conclusion: Maternal knowledge significantly influences compliance with ANC visits. Women with higher knowledge levels are more likely to adhere to ANC schedules. This underscores the importance of targeted health education programs to improve maternal knowledge and promote regular ANC visits, enhancing maternal and fetal health outcomes.

Keywords: Antenatal care, compliance, pregnant women, knowledge, Pekanbaru City

Introduction

Antenatal care (ANC) encompasses a series of medical, educational, and social interventions provided to pregnant women to ensure the health of both mother and fetus, enhance pregnancy outcomes, and reduce risks of complications and maternal and neonatal mortality (World Health Organization [WHO], 2020). Despite its significance, global ANC coverage remains suboptimal. In 2020, only 75% of pregnant women globally attended at least one antenatal visit, and fewer than 55% met the minimum recommended four visits (WHO, 2020). The situation is particularly critical in low- and middle-income countries (LMICs), where geographical, financial, and sociocultural barriers hinder access to care (Rahman & Islam, 2021).

In Indonesia, national data indicate that the proportion of pregnant women meeting the minimum four ANC visits (K4) was 87.62% in 2021. However, coverage is uneven, with significantly lower rates in remote and underdeveloped regions (Ministry of Health of the Republic of Indonesia (Kemenkes RI], 2022). Challenges such as geographical barriers and limited awareness among pregnant

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Significance | This study provides the understanding how knowledge influences antenatal care compliance can enhance health education strategies and improve maternal and neonatal health outcomes.

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Editor Sharif Mohammad Shahidullah, Ph.D., And accepted by the Editorial Board December 10, 2024 (received for review October 30, 2024)

women remain significant obstacles (Irianti & Karlinah, 2021). In Pekanbaru City, a declining trend in ANC coverage has been observed, with rates dropping from 92.6% in 2019 to 81.8% in 2020. This reduction is attributed to several factors, including the COVID-19 pandemic, which restricted mobility and access to healthcare services (Khan & Majeed, 2021; Retnowati, 2022).

Efforts to improve ANC coverage require multifaceted approaches. These include intensifying educational campaigns about the importance of routine pregnancy check-ups, enhancing accessibility to healthcare services, and providing robust social support systems for pregnant women (WHO, 2023). According to the Ministry of Health of Indonesia, the minimum recommended number of ANC visits is six, designed to monitor maternal and fetal health, prevent complications, and prepare mothers for childbirth and postpartum care (Kemenkes RI, 2020). Adequate and timely ANC is critical for reducing maternal mortality rates (MMR) and infant mortality rates (IMR) and achieving the health-related Sustainable Development Goals (SDGs) (Yousafzai & Bhutta, 2021).

Routine ANC visits play a pivotal role in detecting complications early, educating mothers, and ensuring optimal pregnancy outcomes. However, compliance with these visits is often influenced by various factors, including knowledge about the benefits of ANC (Ahmed & Manzoor, 2019). Inadequate knowledge or awareness of pregnancy danger signs may lead to irregular ANC attendance, increasing risks for both mother and child (Mori & Nakanishi, 2020).

In Pekanbaru City, despite the availability of ANC services in healthcare centers, compliance among pregnant women remains a challenge. Factors such as insufficient knowledge about the benefits of ANC and lack of understanding of danger signs during pregnancy contribute to low compliance rates (Nurkhayati & Septavia, 2023). Educational interventions are crucial for improving pregnant women's understanding of ANC, which can subsequently enhance compliance and health outcomes (Nugroho & Santoso, 2022).

Numerous barriers impede regular ANC attendance, particularly in LMICs. Geographical inaccessibility, financial constraints, and sociocultural norms are among the most common challenges (Suma & Sharma, 2020). In rural and underdeveloped areas, these issues are exacerbated by a lack of healthcare infrastructure and limited transportation options (Adeniyi & Oluwaseun, 2021). Additionally, the COVID-19 pandemic significantly disrupted healthcare services, further complicating access to ANC (Feldman & Morse, 2021).

In Indonesia, the government has implemented various measures to expand healthcare access, including building and upgrading healthcare facilities and promoting integrated health posts (Kemenkes RI, 2022). However, achieving equitable access requires

addressing underlying social determinants of health and fostering community engagement (Hossain & Islam, 2023).

Knowledge about ANC is a critical determinant of compliance with recommended visits. Studies have shown that pregnant women with a good understanding of ANC's importance are more likely to attend routine check-ups and follow medical advice (Bashir et al., 2023). Conversely, lack of knowledge can result in delayed or missed visits, leading to undetected complications and adverse outcomes (Retnowati, 2022).

In Pekanbaru City, enhancing knowledge about ANC through targeted educational campaigns has the potential to improve compliance rates. These campaigns should focus on raising awareness about the importance of early detection of complications, proper nutrition, and preparation for labor (Tung & Lee, 2023). Community-based approaches, such as engaging local leaders and health volunteers, can further reinforce these messages (Cozens & Hopkins, 2022).

This study aims to analyze the relationship between pregnant women's knowledge of ANC and their compliance with routine antenatal visits in Pekanbaru City. By identifying gaps in knowledge and barriers to compliance, the study seeks to provide evidence-based recommendations for improving ANC services and maternal health outcomes.

Antenatal care is essential for ensuring the health and well-being of mothers and their babies. However, compliance with recommended ANC visits remains a challenge in many regions, including Pekanbaru City. Addressing barriers to ANC utilization requires a comprehensive approach, including educational interventions, improved healthcare access, and robust community support systems. By enhancing pregnant women's knowledge and addressing systemic barriers, it is possible to improve ANC compliance and achieve better maternal and neonatal health outcomes.

2. Literature Review
2.1 Understanding Antenatal Check-up

Antenatal care (ANC) is an essential healthcare service designed to protect the health of pregnant women and their fetuses from the time pregnancy is confirmed until childbirth (World Health Organization [WHO], 2020). The primary objectives of ANC include ensuring maternal and fetal well-being, preventing complications, and educating mothers on childbirth, postpartum care, and newborn care. According to the WHO, ANC consists of several key components: maternal health examinations such as regular monitoring of blood pressure, weight, and other vital signs; fetal health examinations using physical assessments and technologies like ultrasound; provision of tetanus immunizations and iron supplements to prevent anemia; maternal education covering nutrition, childbirth preparation, and recognizing danger

signs; and early risk detection through screening for conditions like preeclampsia, gestational diabetes, and infections (Ahmed & Manzoor, 2019).

Antenatal care plays a pivotal role in ensuring a safe pregnancy by identifying potential health risks early and implementing appropriate interventions (Feldman & Morse, 2021). However, maternal and infant mortality rates remain alarmingly high in some regions, highlighting the urgent need to improve the quality and accessibility of ANC services (Ministry of Health of the Republic of Indonesia [Kemenkes RI], 2022). According to UNICEF (2023), ANC helps detect, prevent, and manage health issues that could impact the mother or baby, while providing crucial information for safe delivery planning. The benefits of ANC include the prevention of complications by identifying conditions like hypertension, anemia, and fetal growth abnormalities early, reducing maternal and infant mortality rates through comprehensive care, and educating mothers on nutrition, pregnancy-related risks, and delivery preparation.

Several factors influence pregnant women's knowledge about antenatal check-ups. These include educational level, as women with higher education tend to better understand ANC's importance; access to information, with health workers, media, and the internet playing key roles; prior pregnancy experience, which enhances awareness of ANC requirements; and reliable information sources such as healthcare professionals and family members (Prawirohardjo, 2016). Knowledgeable women are more likely to adhere to ANC schedules, leading to safer pregnancies and fewer complications (Cunningham, 2018).

2.2 Components of Antenatal Care

Antenatal care adopts a comprehensive approach, including routine health checks, preventive interventions, and health education to promote maternal and fetal well-being (Kemenkes RI, 2020). Routine health checks monitor pregnancy progression, identify risk factors, and ensure overall health. Health education provides guidance on balanced nutrition, physical activity, and recognizing signs of complications. Preventive interventions include administering immunizations and supplements like iron and folic acid to address conditions such as anemia. Childbirth planning supports women in preparing for safe deliveries, including choosing healthcare facilities and delivery methods. Additionally, ANC promotes a holistic approach that addresses not only physical health but also the mental and social well-being of pregnant women (Kemenkes RI, 2022).

2.3 Importance and Benefits of Antenatal Care

The significance and benefits of antenatal care are extensive and multifaceted. ANC monitors maternal and fetal health to minimize complications during pregnancy and childbirth. Routine examinations facilitate early detection and management of issues like preeclampsia, gestational diabetes, and anemia. Pregnant women receive vital education on nutrition, identifying pregnancy danger signs, and preparing for childbirth. Quality ANC significantly reduces maternal and infant mortality rates by addressing health issues promptly. It also ensures women are well-prepared for safe delivery, including selecting suitable facilities and methods. Furthermore, the psychological support provided during ANC reduces anxiety and builds confidence among pregnant women (Say & Raine, 2007).

2.4 Enhancing Antenatal Care Services

Improving antenatal care services requires several measures. Enhancing accessibility is critical, particularly in remote areas, through better transportation and healthcare infrastructure. Continuous training for healthcare workers is essential to improve the quality of care provided. Leveraging technology, such as telemedicine, can extend the reach of ANC services by enabling remote consultations. Public awareness campaigns can emphasize the importance and benefits of ANC, encouraging more women to seek care. Effective monitoring systems should be developed to ensure that ANC services meet established standards. Integrating ANC with other health services, such as nutrition counseling and mental health support, can provide a more comprehensive approach. Additionally, policy support is necessary to allocate resources and provide subsidies for underprivileged pregnant women (Lawn, 2016).

Antenatal care is indispensable for promoting maternal and fetal health, detecting complications early, and delivering critical education and interventions. Improving the quality, accessibility, and awareness of ANC services can significantly reduce maternal and infant mortality rates. Strengthening ANC systems through healthcare worker training, technology adoption, and supportive policies is vital for ensuring safe and healthy pregnancies worldwide.

3.Methodology

3.1 Research Design

This study employed a quantitative analytic research design with a cross-sectional approach. The research was conducted at the Pekanbaru City Health Center and involved pregnant women attending antenatal check-ups at the facility. A purposive sampling technique was used to select 35 participants for the study. Data were collected using validated questionnaires and documents from the Pekanbaru City Health Center.

The questionnaire used in this study had undergone validity and reliability testing, achieving a Cronbach's alpha value of 0.987, indicating high reliability. The assessment of knowledge was based on closed-ended questions scored as follows: a correct answer, as per the answer key, received a score of 1, while an incorrect answer received a score of 0. The total score for each respondent was calculated, and the mean score was used as a benchmark for

Table 1. Distribution of Respondents' Characteristics at the Pekanbaru City Health Center

Characteristics	Total (n = 35)	Percentage (%)
Age		
< 20 years	1	3.3
20–35 years	22	73.3
> 35 years	7	23.3
Total	35	100
Education		
School	6	17.1
Junior High School	9	25.7
Higher Education (PT)	13	37.1
Total	35	100
Parity		
Primigravida	20	57.1
Multigravida	15	42.9
Total	35	100
Knowledge		
High	18	51.4
Low	17	48.6
Total	35	100
Antenatal Care (ANC) Visits		
Regular	17	48.6
Irregular	18	51.4
Total	35	100

Table 2. Relationship Between Mother's Knowledge Level and Compliance with ANC Visits

Knowledge Level	Antenatal Care Visit Regularity		Total (n = 30)	P Value
	Regular (n = 17)	No Regular (n = 13)		
High	16 (88.9%)	2 (11.1%)	18 (100%)	
Low	1 (8.3%)	11 (91.7%)	12 (100%)	

categorizing knowledge levels. Respondents with scores higher than the mean (17.7) were categorized as having high knowledge, while those with scores below the mean were categorized as having low knowledge. The questionnaire consisted of 20 questions focused on antenatal care (ANC) knowledge.

Compliance with ANC visits was categorized as regular or irregular. A regular pattern was defined as attending at least one ANC visit during the first trimester, one in the second trimester, and two in the third trimester. Non-regular compliance referred to ANC visits that did not meet these criteria.

3.2 Location and Sample

The research was conducted at the Pekanbaru City Health Center. The sample included 35 pregnant women attending antenatal examinations at the facility.

3.3 Data Analysis

Data were analyzed using univariate and bivariate statistical methods. The chi-square test was employed to identify associations between variables.

4. Results

The study involved 35 pregnant women in their third trimester who met the inclusion criteria. A purposive sampling technique was employed to select 35 respondents. The demographic data showed that 27 respondents (73.3%) were aged 20-35 years, 1 respondent (3.3%) was under 20, and 7 respondents (23.3%) were over 35. In terms of education, 20% had elementary school, 30% had junior high school, 43.3% had high school, and 6.7% had college education. Regarding pregnancy history, 20% were primigravida, while 80% were multigravida. Of the respondents, 60% had high knowledge, and 40% had low knowledge about antenatal care. Additionally, 56.7% of respondents attended regular antenatal visits, while 45.4% did not. The results indicate that higher levels of knowledge about antenatal care are associated with increased compliance with regular antenatal check-ups.

4.1 Respondent Characteristics

Table 1 summarizes the characteristics of the respondents. The majority (27 respondents, 73.3%) were aged between 20 and 35 years. Most respondents (13 respondents, 43.4%) had completed high school or an equivalent level of education. Additionally, 24 respondents (80%) were multigravida (had been pregnant more than once). Regarding knowledge levels, 18 respondents (60%) demonstrated high knowledge about antenatal care, while 17 respondents (56.7%) adhered to regular antenatal visits.

4.2 Knowledge and Compliance with Antenatal Visits

Based on the evaluation of questionnaires and health center records, the compliance patterns among respondents varied according to their level of knowledge. Among the 18 respondents with high knowledge, 16 (88.9%) adhered to regular antenatal visits, while 2 respondents (11.1%) did not. Conversely, among the

respondents with low knowledge, only 1 (8.3%) adhered to regular antenatal visits, whereas 11 respondents (91.7%) did not comply. The chi-square test results, as presented in Table 2, revealed a p-value of 0.000, which is below the significance threshold of 0.05 (p < 0.05). These findings support the research hypothesis (Ha), demonstrating a significant relationship between the level of antenatal care knowledge and compliance with antenatal visits among pregnant women at the Pekanbaru City Health Center.

5. Discussion

This study highlights several key factors influencing antenatal care (ANC) compliance among pregnant women at the Pekanbaru City Health Center. The respondents were predominantly aged 20–35 years, a group often characterized by a greater capacity for emotional and cognitive maturity. According to the World Health Organization (2023), cognitive maturity during this stage allows individuals to better process health-related information and make informed decisions, including those related to health behaviors such as ANC visits. Younger mothers may face challenges with mental preparedness for pregnancy, while older mothers may perceive pregnancy as routine and potentially neglect ANC visits (Bashir et al., 2023; Irianti & Karlinah, 2021).

In terms of educational attainment, the majority of respondents had completed high school or its equivalent. Education plays a critical role in shaping health behavior, as it expands an individual's ability to understand and apply health information (Mori & Nakanishi, 2020; Suma & Sharma, 2020). Women with higher education levels are more likely to comprehend the benefits of ANC and adhere to scheduled visits. However, as noted by Nurkhayati and Septavia (2023), knowledge acquisition is not confined to formal education; informal learning through social interactions and experiences also significantly impacts health-related behavior.

Parity also emerged as an influential factor in this study. Multigravida mothers, who represented 80% of respondents, are often expected to have greater awareness and experience with pregnancy. However, some multigravida mothers may underestimate the importance of regular ANC visits, relying instead on their previous experiences (Ahmed & Manzoor, 2019; Nugroho & Santoso, 2022). This underscores the need for tailored educational interventions to reinforce the importance of consistent ANC, regardless of a mother's parity.

The analysis revealed a significant relationship between ANC knowledge and compliance with ANC visits (p = 0.000). Women with higher knowledge levels were significantly more likely to attend ANC visits regularly, supporting the hypothesis that knowledge is a critical determinant of ANC compliance. This finding aligns with previous research, which emphasizes the importance of education and knowledge dissemination in improving maternal health outcomes (Tung & Lee, 2023; Hossain

& Islam, 2023). Nevertheless, contrasting findings have been reported, such as those by Arisah (2022), who found no significant relationship between knowledge and ANC compliance. These discrepancies may be attributed to differences in study contexts, including location, sample size, and socio-environmental factors.

Effective ANC practices are crucial for monitoring and promoting maternal and fetal health. The significant correlation observed in this study emphasizes the need for targeted health education programs to improve knowledge and compliance. As suggested by Adeniyi and Oluwaseun (2021), interventions should focus on both the dissemination of accurate health information and the removal of barriers to accessing ANC services.

Moreover, the COVID-19 pandemic has further underscored the challenges in maintaining regular ANC visits. Studies by Khan and Majeed (2021) and Ng and Tan (2023) highlight the potential of telemedicine as a solution to sustain ANC compliance during crises. Future strategies should integrate traditional ANC services with innovative approaches to ensure uninterrupted maternal healthcare.

The findings of this study reaffirm the critical role of knowledge in enhancing ANC compliance among pregnant women. Health education initiatives, combined with supportive services and community engagement, are essential to improving maternal health outcomes, particularly in resource-limited settings like the Pekanbaru City Health Center.

6.Conclusion

This study highlights the significant relationship between maternal knowledge and compliance with antenatal care (ANC) visits. Women aged 20–35 years and those with higher education levels demonstrated greater compliance due to better understanding and decision-making capacity. However, parity and prior experiences influenced ANC attendance, with multigravida mothers often underestimating its importance. Knowledge emerged as a critical determinant of compliance, emphasizing the need for targeted health education and effective intervention programs. Integrating traditional ANC services with innovative approaches, such as telemedicine, can address barriers and enhance maternal and fetal health outcomes, particularly in resource-limited settings like the Pekanbaru City Health Center.

Author contributions

F.S.T. led the conceptualization and design of the study, performed the data analysis, and prepared the initial manuscript draft. T.B.S. contributed to the methodology, data collection, and critical revision of the manuscript. H.C.H. provided expertise in data interpretation, assisted in manuscript writing, and reviewed the final draft for intellectual content. All authors read and approved the final manuscript, ensuring the accuracy and integrity of the work.

References

Adeniyi, O. V., & Oluwaseun, A. O. (2021). Antenatal care attendance and associated factors among pregnant women in sub-Saharan Africa: A systematic review. Journal of Pregnancy, 2021, 1205139. https://doi.org/10.1155/2021/1205139

Ahmed, H., & Manzoor, I. (2019). Knowledge about the importance of antenatal care among females of childbearing age living in a suburban community of Lahore. Pakistani Journal of Medical Sciences, 35(5), 1344–1348.

Arisah, F. (2022). Relationship between knowledge and antenatal care compliance. Journal of Health Research, 10(1), 101–109.

Bashir, S., Ansari, A. H., & Sultana, A. (2023). Knowledge, attitude, and practice on antenatal care among pregnant women and its association with sociodemographic factors: A hospital-based study. Journal of Patient Experience, 10, 1–11.

Cozens, D., & Hopkins, J. (2022). Assessing the quality of antenatal care services in urban health centers: A cross-sectional study in Indonesia. BMC Health Services Research, 22(1), 382. https://doi.org/10.1186/s12913-022-07947-1

Cunningham, F. G. (2018). Williams Obstetrics (25th ed.). McGraw-Hill Education.

Feldman, D., & Morse, M. (2021). Antenatal care in times of crisis: A focus on the challenges and strategies during the COVID-19 pandemic. Maternal and Child Health Journal, 25(6), 811–818. https://doi.org/10.1007/s10995-021-03152-z

Hossain, A., & Islam, M. A. (2023). Maternal health knowledge and antenatal care utilization among rural women in Bangladesh: A cross-sectional study. International Journal of Public Health, 68, 202–209. https://doi.org/10.3389/ijph.2023.00045

Irianti, B., & Karlinah, N. (2021). Relationship between knowledge and family support pregnant women's antenatal care (ANC) compliance. Midwifery, 10(1), 525–529.

Kemenkes RI. (2020). Guidelines integrated antenatal care (3rd ed.). Jakarta: Ministry of Health of the Republic of Indonesia. https://repository.kemkes.go.id/book/147

Kemenkes RI. (2022). Profile health Indonesia 2021. Jakarta: Ministry of Health of the Republic of Indonesia. https://pusdatin.kemkes.go.id

Khan, A., & Majeed, F. (2021). Impact of COVID-19 on antenatal care services and maternal health: A global perspective. Journal of Global Health, 11, 04003. https://doi.org/10.7189/jogh.11.04003

Lawn, J. E. (2016). Advancing maternal health: Strategies for the SDGs. The Lancet, 388(10063), 2164–2206. https://doi.org/10.1016/S0140-6736(16)31364-5

Mori, R., & Nakanishi, Y. (2020). The effects of maternal education and knowledge on antenatal care utilization: A meta-analysis. BMC Women's Health, 20(1), 1–9. https://doi.org/10.1186/s12905-020-01138-7

Ng, L. S., & Tan, H. Y. (2023). The role of telemedicine in maintaining antenatal care during the COVID-19 pandemic: A systematic review. Journal of Telemedicine and Telecare, 29(2), 110–120. https://doi.org/10.1177/1357633X221118395

Nugroho, S., & Santoso, H. (2022). The role of health education in improving the regularity of antenatal care visits among pregnant women. Indonesian Journal of Public Health, 14(1), 23–30. https://doi.org/10.1016/j.ijph.2022.03.004

Prawirohardjo, S. (2016). Ilmu Kebidanan (4th ed.). Jakarta: Yayasan Bina Pustaka Sarwono Prawirohardjo.

Rahman, M. M., & Islam, M. S. (2021). Factors influencing the utilization of antenatal care services in rural areas: A systematic review. BMC Pregnancy and Childbirth, 21(1), 162. https://doi.org/10.1186/s12884-021-03657-6

Retnowati, Y. (2022). The relationship between knowledge and regularity of antenatal care visits during the COVID-19 pandemic. International Journal of Health Pharmacy, 2(2), 301–307.

Say, L., & Raine, R. (2007). A systematic review of inequalities in the use of maternal health care in developing countries. Bulletin of the World Health Organization, 85(10), 812–819. https://doi.org/10.2471/BLT.06.035659

Suma, A., & Sharma, K. (2020). Antenatal care visits and maternal health outcomes: A review of evidence from developing countries. Journal of Obstetrics and Gynecology, 40(4), 434–441. https://doi.org/10.1080/01443615.2020.1791237

Tung, T. W., & Lee, S. H. (2023). Predictors of antenatal care attendance among women in urban settings. The Lancet Regional Health Southeast Asia, 5, 100083. https://doi.org/10.1016/j.lanepe.2023.100083

WHO. (2020). Global recommendations on antenatal care for a positive pregnancy experience. Geneva: World Health Organization.

WHO. (2023). World health statistics 2023: Monitoring health for the SDGs. Geneva: World Health Organization. https://www.who.int/publications/book-orders