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RESEARCH

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The Relationship between Antenatal Care Quality and Pregnancy Outcomes: Systematic Literature Review

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Abstract

This study investigates the correlation between the quality of prenatal care and pregnancy outcomes through a comprehensive literature review. The systematic literature review aims to elucidate the relationship between prenatal care quality and pregnancy outcomes while identifying key factors influencing care quality. Relevant studies were identified through an extensive search of databases, including Google Scholar, ScienceDirect, and PubMed, using specific keywords related to antenatal care quality, serum levels, and pregnancy outcomes. Articles published within the last ten years were screened based on inclusion criteria, resulting in 12 original studies selected for detailed analysis. The findings reveal a statistically significant correlation between prenatal care quality and pregnancy outcomes. Inadequate prenatal care was associated with a higher risk of preterm birth, low birth weight, and complications during delivery. Socioeconomic factors such as income level, education, and access to healthcare services were identified as critical determinants of prenatal care quality. This study highlights the urgent need to enhance the accessibility, continuity, and quality of prenatal care to reduce maternal and neonatal mortality and morbidity, particularly in resource-limited settings. Policy implications suggest the necessity of targeted interventions to address disparities in prenatal care, including improving healthcare infrastructure, training healthcare providers, and implementing community-based programs. In conclusion, the study underscores the pivotal role of high-quality antenatal care in ensuring favorable pregnancy outcomes. Tackling socioeconomic barriers and enhancing service delivery are crucial to reducing adverse outcomes and promoting maternal and child health. The findings call for policy reforms to strengthen antenatal care services, especially in underserved regions, to achieve better health outcomes for mothers and infants.

Keywords: Antenatal Care Quality, Pregnancy Outcomes, Socio-Economic, Maternal Health, Policy Implications.

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1. INTRODUCTION

Maternal Mortality Rate (MMR), Neonatal Mortality Rate (NMR), Neonatal Mortality Rate (NIR), and Under Five Mortality Rate (U5MR) serve as vital indicators in public health. The World Health Organization (WHO) reported that in 2020, a maternal death occurred approximately every two minutes, with about 800 women succumbing daily to preventable pregnancy and childbirth-related causes (World Health Organization, 2023). Indonesia witnessed a rise in maternal mortality from 4,005 in 2022 to 4,129 in 2023, as per data from the Maternal Perinatal Mortality (MPDN) reporting system of the Ministry of Health (Direktorat Gizi dan Kesehatan Ibu dan Anak, Kementerian Kesehatan Republik Indonesia, 2023). Despite concerted efforts to curb pregnancy-related morbidity and mortality, substantial progress remains elusive (Lupu et al., 2023). The Sustainable Development Goals (SDGs) aim to reduce maternal mortality to below 70 per 100,000 live births and ensure universal access to high-quality sexual and reproductive health care. Reducing the likelihood of maternal death is highly dependent on access to high-quality prenatal, antenatal, and postnatal care (Girum & Wasie, 2017).

The purpose of prenatal care (ANC) is to improve maternal and foetal health by addressing the unique needs of pregnant mothers and teenage girls (Gamberini et al., 2023). Preventing health issues for both mother and child and improving parenting abilities are all goals of prenatal care (ANC). It sets the stage for the promotion of health, evaluation of risk, prevention, and management of illnesses associated with pregnancy (Kare et al., 2021). Assessment of risk, treatment and prevention of pregnancy-related illnesses, health education, and promotion are all part of these services (Tuncalp et al., 2015). Global recommendations endorse frequent healthcare visits during pregnancy to curtail maternal and perinatal mortality risks (Akum et al., 2023; Ali et al., 2020). It is advised that women commence ANC promptly during pregnancy to diminish complications, enhance the likelihood of healthy pregnancies, and streamline fetal and maternal health monitoring (Tuncalp et al., 2015). WHO advocates for a minimum of 4 visits during the first trimester and 8 visits throughout pregnancy, spaced at 12-week intervals (Ali et al., 2020).

Quality primary healthcare provisions entail basic services for pregnant women and newborns, with escalated services for those in need. ANC is pivotal in realizing SDG targets concerning maternal health. The quality components of ANC vary across nations (Singh et al., 2019). WHO guidelines encompass fundamental services such as medical history, physical examination, and assorted laboratory tests, alongside tetanus vaccination, 90 days of iron and folic acid supplements, along with thorough counseling (Singh et al., 2019).

Ensuring quality ANC in resource-constrained regions is paramount. Quality ANC serves as a linchpin in enhancing maternal health and averting maternal mortality (Gamberini et al., 2022; Masaba & Mmusi-Phetoe, 2023). This facilitates early risk identification and tailored treatment for pregnancy-related complications (Brizuela et al., 2019). Enhancing healthcare quality in facilities could prevent 28% of maternal deaths (Chou et al., 2019).

Early care of chronic diseases, prevention and treatment of anemia, and skilled delivery are a some of the many preventative and therapeutic approaches that high-quality ANC can employ to reduce mother and newborn morbidity and mortality (Alibekova et al., 2013). Early ANC initiation and at least 4 visits correlate with improved birth outcomes and reduced infant mortality (Joshi et al., 2014). ANC quality assessment encompasses service initiation timing, visit frequency, and the inclusion of all service delivery components (Berehe & Modibia, 2020). Early prenatal care initiation aligns with favorable pregnancy outcomes. The scientific literature extensively explores the link between ANC service quality and pregnancy outcomes through various observational and cross-sectional studies.

Previous research has demonstrated the significance of high-quality antenatal care (ANC) in improving maternal and newborn health outcomes. Alibekova et al., (2013) highlighted that early care of chronic diseases, anemia prevention, and skilled delivery are key ANC interventions to reduce maternal and neonatal morbidity and mortality. Similarly, Joshi et al.

(2014) found that early ANC initiation and at least four visits were associated with improved birth outcomes and reduced infant mortality. The assessment of ANC quality, as outlined by Berehe and Modibia (2020), includes factors such as timing of service initiation, visit frequency, and service delivery comprehensiveness. Despite these findings, limitations remain, particularly in the variation of study designs, geographic contexts, and inconsistent metrics used across studies, which may hinder generalization and practical application. Newer studies, such as those by Amponsah-Tabi et al., (2022) and Saaka, et al., (2023), emphasize that gaps in ANC service content, accessibility, and communication still significantly impact pregnancy outcomes, especially in resource-limited areas. This systematic review aims to bridge these gaps by aggregating findings to develop a more comprehensive understanding of the role of ANC quality in reducing adverse pregnancy outcomes and to highlight actionable insights for enhancing ANC services across diverse populations. Conducting a systematic literature review offers a robust approach to comprehensively understanding these relationships by aggregating, evaluating, and synthesizing findings from diverse studies. The systematic literature review aims to elucidate the relationship between prenatal care quality and pregnancy outcomes while identifying key factors influencing care quality.

2. RESEARCH METHOD

The systematic literature review (SLR) method is a structured approach to identifying, evaluating, and synthesizing relevant literature on a specific topic. According to Kitchenham et al., (2009), the SLR process involves three main phases: planning, conducting, and reporting. This approach ensures transparency and replicability in reviewing existing studies, thereby providing a comprehensive understanding of the research problem. Prastowo, (2012) emphasizes that a systematic literature review relies on critical and structured readings from diverse sources such as journals, books, documents, and other related literature. This ensures that the findings are well-grounded in existing knowledge. Additionally, Okoli and Schabram (2010) highlight that using frameworks like PICOT allows researchers to refine their search and focus on relevant data, improving the reliability and validity of the results. The PICOT framework, integral to this study, is recognized as a systematic tool for defining research questions and identifying relevant literature. Melnyk and Fineout-Overholt, (2019) describe PICOT as a guide that enables researchers to systematically address clinical questions by specifying five components: Population/Problem, Intervention, Comparison, Outcome, and Timeframe. By applying this framework, the study ensures a focused approach to journal searches, utilizing databases such as Google Scholar, ScienceDirect, and PubMed with keywords like “quality of prenatal care,” “serum levels,” and “pregnancy outcomes.”

Table 1. PICOT Framework Literature Review Format

Criteria	Inclusion	Exclusion
Population	Pregnant women of various gestational ages	Those expecting a child who suffers from a chronic illness (diabetes, high blood pressure, kidney disease, etc.) that could impact the pregnancy's result
Intervention	Studies evaluating the quality of antenatal care	Study that did not evaluate the quality of antenatal care
Comparison	Studies comparing various levels or aspects of the quality of antenatal care	Studies that did not have a comparison group or only compared the quality of antenatal care with non-quality factors
Outcomes	Studies investigating various pregnancy outcomes, such as the incidence of	Studies that only evaluate very specific pregnancy outcomes or are

	premature birth, birth weight of the baby, the incidence of pregnancy complications, and neonatal mortality	not relevant to the quality of antenatal care (eg, sex of the baby)
Time	The journal publisher time range used is 2014-2024	Under 2014

The researchers utilized databases such as Google Scholar, Science Direct, and PubMed, searching with keywords such as "quality of prenatal care," "serum levels," and "pregnancy outcomes." This search yielded approximately 288,000 articles, which were subsequently screened. Focusing on journals published within the last five years, 1,090 articles were initially deemed relevant. Through a rigorous technical and relevance evaluation, 81 journals were identified that aligned with the study's objectives, with 27 further narrowed down and 25 excluded due to incomplete publication or unavailability. Ultimately, five full-text articles were selected for in-depth analysis.

The primary goal of this research method is to address gaps in understanding the impact of antenatal care (ANC) quality on pregnancy outcomes by synthesizing evidence from existing literature. This study aims to solve the issue of variability in ANC services, including differences in care initiation, service comprehensiveness, and visit frequency, which have been linked to inconsistent maternal and neonatal health outcomes. By systematically reviewing high-quality studies, the research seeks to provide a clearer understanding of which aspects of ANC contribute most significantly to positive pregnancy outcomes, especially in resource-limited settings, and to offer insights that could enhance ANC practices and inform health policies.

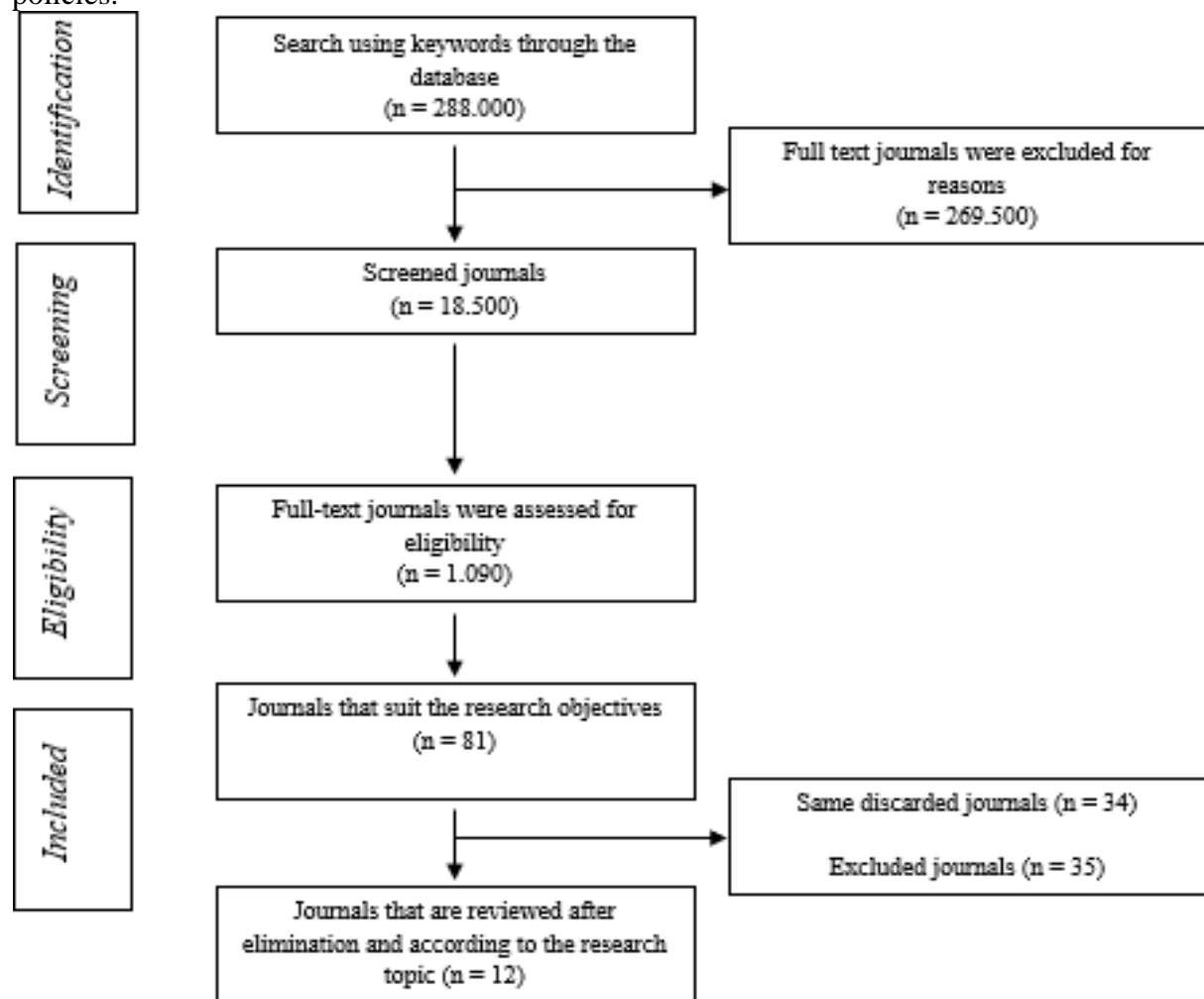


Figure 1. PRISMA Literature Review diagram

3. RESULTS AND DISCUSSION

Table 1. Table of Literature Review

Researcher Name and Year	Journal Name	Title	Objective	Method	Summary of Results
Yeoh et al., 2018	International Journal for Quality in Health Care	Evaluating the quality of antenatal care and pregnancy outcomes using content and utilization assessment	To assess the relationship between adequate prenatal care (ANC) and pregnancy outcomes by considering both content and utilization.	Retrospective cohort study	63% of women used ANC services more frequently than recommended, while 52% received less than 80% of the recommended content. Preterm birth was less common among women who adequately used ANC services, although this trend wasn't statistically significant. Women with inadequate ANC had higher chances of premature birth (aOR=3.69, 95% CI 1.60-8.55).
Temilola & Eborka, 2020	Southern African Journal of Demography	Correlates of Antenatal Care Services Attendance and Experiences of Negative Pregnancy Outcomes among Shomolu Residents in Lagos, Nigeria	To examine the relationship between antenatal clinic attendance, negative pregnancy outcomes, and social factors like religion, education, and partner conversations in Shomolu, Lagos State, Nigeria.	Cross-sectional survey	Husbands' religiosity and education significantly influenced wives' ANC experiences. Muslim and traditionalist women had higher health complications compared to Christians. Regular ANC attendance was linked to reduced complications. Adequate support for ANC access in traditional settings is recommended.
Bantas et al., 2019	Jurnal Epidemiologi Kesehatan Indonesia	The Relationship between Antenatal Care with Childbirth Complication in Indonesians Mothers	To investigate the prevalence of complications during labor and the perception of antenatal care among	Cross-sectional design	49.2% of births had complications, with 91.2% of these cases reporting insufficient prenatal care. Women with inadequate prenatal care were 1.3 times more likely to experience

			pregnant women in Indonesia.		childbirth complications (POR 1.3, 95% CI 1.1-1.4).
Akhila et al., 2022	Journal of Maternal and Child Health	A Study on Role of Antenatal Care in Pregnancy Outcome in Tertiary Health Care Centre, Hyderabad	To determine the relationship between ANC visits and pregnancy outcomes.	Cross-sectional study	Mothers with fewer than four ANC visits had higher rates of miscarriages and low birth weight infants. Frequent ANC visits were negatively correlated with poor birth outcomes, showing statistically significant associations between ANC visits and reduced risks of miscarriage, low birth weight, and stillbirth.
Kare et al., 2021	SAGE Open Medicine	Quality of antenatal care and associated factors among pregnant women attending government hospitals in Sidama Region, Southern Ethiopia	To collect data on the quality of prenatal care and associated factors among pregnant women attending government hospitals in the Sidama Region of Southern Ethiopia.	Facility-based cross-sectional study	41.2% of pregnant women received high-quality prenatal care. Factors positively associated with quality care included urban residency, education level, income above 3000 Ethiopian Birr, and attending at least four ANC visits.
Halle-Ekane et al., 2015	Women Health Open Journal	Quality of Antenatal Care and Outcome of Pregnancy in a Semi-Urban Area in Fako Division, Cameroon	To determine the relationship between pregnancy outcomes and the quality of ANC.	Cross-sectional study	Most participants attended at least one ANC visit, but only 15.5% began early. A small percentage received adequate care. Poor care was associated with adverse outcomes, such as preterm birth, low birth weight, and extended labor.
Amponsah-Tabi et al., 2022	PLoS ONE	An assessment of the quality of antenatal care and pregnancy outcomes in a tertiary hospital in Ghana	To assess whether poor-quality ANC impacts negative pregnancy outcomes among women	Cross-sectional study	Of 950 participants, only 7.6% received high-quality ANC. Low to moderate quality ANC was associated with higher pregnancy-related complications, including anemia and

			delivering at Komfo Anokye Teaching Hospital in Ghana.		low birth weight. Education and early ANC start were positively correlated with receiving high-quality ANC.
Saaka & Sulley, 2023	Annals of Medicine	Independent and joint contributions of inadequate antenatal care timing, contacts, and content to adverse pregnancy outcomes	To determine if adequate use of ANC services could reduce low birth weight and preterm delivery among women in Tamale, Ghana.	Analytical cross-sectional study	Adherence to WHO recommendations reduced the likelihood of preterm delivery by 71% and low birth weight by 56% after adjusting for confounders.
Golshan et al., 2021	Journal of Education and Community Health	Health Literacy, Antenatal Care Adequacy Indicator, and Delivery Outcomes in Pregnant Women in Zahedan, Iran	To explore the relationship between health literacy, adequacy of prenatal care, and delivery outcomes.	Descriptive-analytical research	Higher health literacy was linked to better ANC access, with significant associations between ANC availability and both health education and infant weight outcomes.
Banchani & Tenkorang, 2020	Maternal and Child Health Journal	Determinants of Low Birth Weight in Ghana: Does Quality of Antenatal Care Matter?	To examine the relationship between the quality of prenatal care and birth weight in Ghana.	Log-log model	High-quality ANC was associated with lower prevalence of low birth weight. Consistent ANC (eight or more visits) reduced the risk of low-birth-weight infants.
Nimi et al., 2016	International Journal of Gynecology and Obstetrics	Prenatal care and pregnancy outcomes: A cross-sectional study in Luanda, Angola	To describe ANC among women in large tertiary hospitals in Angola and explore the relationship with perinatal outcomes.	Cross-sectional study	Inadequate ANC (less than four visits) was more common among younger, less educated women. Insufficient ANC was linked to higher odds of low birth weight and preterm birth.

This systematic review synthesizes findings from 12 studies that explore how the quality of antenatal care (ANC) influences pregnancy outcomes, aiming to address the identified gaps in ANC quality and access, particularly in resource-constrained settings. Four main themes emerged from the analysis, shedding light on factors impacting maternal and neonatal health and providing insights to improve ANC delivery.

ANC Utilization and Risk of Adverse Pregnancy Outcomes. The reviewed studies indicate that adequate ANC utilization is essential in reducing the risk of adverse pregnancy outcomes. [Yeoh et al. \(2018\)](#) demonstrated that insufficient ANC utilization correlates with an increased risk of preterm birth. [Akhila et al. \(2022\)](#) reported that low attendance and fewer than four cervical checks elevated the likelihood of negative outcomes, whereas early ANC initiation during the first trimester significantly mitigated risks. These findings underscore the need for consistent, quality ANC access as a preventive strategy.

Socioeconomic and Demographic Factors Influencing ANC Quality. Socioeconomic status and education levels emerged as significant determinants of ANC quality and, subsequently, pregnancy outcomes. [Carey et al., \(2021\)](#) noted that women with higher education, income levels, and urban residence were more likely to access quality ANC and experience favorable outcomes. Conversely, [Nimi et al., \(2016\)](#) found that younger, less educated, and socioeconomically disadvantaged women attended fewer ANC visits, leading to higher rates of complications, including cesarean sections, premature births, and low birth weights. Addressing these socioeconomic disparities is essential to improve ANC access and quality.

Quality of ANC and Specific Pregnancy Risks. The direct relationship between ANC quality and pregnancy risks highlights the role of comprehensive care in preventing complications. [Halle-Ekane et al., \(2015\)](#) linked poor ANC quality with adverse pregnancy outcomes, and [Amponsah-Tabi et al., \(2022\)](#) associated low or moderate-quality ANC with increased cases of anemia, severe preeclampsia, and low birth weight. [Saaka and Sulley, \(2023\)](#) further emphasized that inadequate communication and content during ANC visits were linked to higher instances of preterm birth and low birth weight, indicating that improved ANC service content could mitigate these risks.

Healthcare Access and Geographic Disparities. Healthcare access, especially in rural areas, plays a critical role in determining ANC quality. Women in rural health facilities faced higher risks of unfavorable outcomes compared to those in urban settings. [Banchani and Tenkorang, \(2020\)](#) highlighted that both regularity and quality of ANC visits are vital for reducing low birth weight and improving pregnancy outcomes, especially in underserved regions. These findings highlight the need to address geographic disparities by ensuring ANC service availability and accessibility.

4. CONCLUSION

The systematic review concludes that high-quality ANC is integral to improving pregnancy outcomes and reducing maternal and neonatal mortality. The analysis reaffirms that while socioeconomic and demographic factors impact ANC access and quality, the availability and consistency of ANC services remain crucial. Poor-quality ANC, including inadequate content and frequency, is associated with adverse outcomes such as preterm birth, low birth weight, and increased maternal complications. To bridge the gap between ANC guidelines and practical implementation, particularly in resource-limited areas, it is essential to prioritize policies that enhance ANC service accessibility, continuity, and quality. Meeting these needs could contribute significantly to achieving SDG targets, underscoring the importance of robust, equitable maternal healthcare systems worldwide.

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