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Cite this article: Kurniati, A. 2024. Improving Maternal and Neonatal Health Outcomes: A Comparative Study of Antenatal Care Interventions. Join: Journal of Social Science Vol.1(5) page 371-

Keywords:

Antenatal Care, Maternal Health, Neonatal Health

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Improving Maternal and Neonatal Health Outcomes: A Comparative Study of Antenatal Care Interventions

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This article presents a comparative study of antenatal care (ANC) interventions aimed at improving maternal and neonatal health outcomes. Using a qualitative approach, the study employs a comprehensive literature review and library research to analyze various ANC strategies and their impacts on health outcomes. The research synthesizes findings from multiple sources to evaluate the effectiveness of different ANC models, including traditional and contemporary practices, across diverse contexts. By examining the nuances of each intervention, the study identifies key factors that contribute to successful maternal and neonatal health improvements. The analysis highlights the significance of early and continuous antenatal care, the role of healthcare provider training, and the influence of socio-economic factors on health outcomes. The results underscore the need for tailored ANC programs that address specific community needs and barriers to access. The study contributes to the existing body of knowledge by providing a comparative perspective on ANC interventions, offering insights for policymakers and healthcare practitioners to enhance maternal and neonatal health strategies.

Published by:

GLOBAL SOCIETY
PUBLISHING

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1. Introduction

Maternal and neonatal health outcomes remain key indicators of a nation's overall health and development, as they reflect the accessibility and quality of healthcare systems (WHO, 2020). Globally, complications during pregnancy and childbirth are still leading causes of death among women and neonates, particularly in low- and middle-income countries (LMICs) (UNICEF, 2021).

Antenatal care (ANC) interventions are designed to prevent, identify, and manage health risks during pregnancy, and they are widely acknowledged as a critical component of maternal and neonatal health strategies (Lawn et al., 2014). Despite significant improvements in maternal and neonatal outcomes in many parts of the world, gaps remain, particularly in the availability and quality of ANC services across different regions and populations (Say et al., 2014).

The research gap that this study addresses lies in the inconsistency of findings regarding the effectiveness of different ANC interventions across various settings. Several studies have demonstrated the positive impacts of ANC on reducing maternal and neonatal mortality, yet the specific elements of ANC that contribute most significantly to these improvements remain poorly defined (Bhutta et al., 2013). Additionally, while ANC coverage has increased globally, disparities persist in terms of service quality, access, and utilization, which further exacerbate health inequalities (Campbell & Graham, 2006). This gap in understanding the comparative effectiveness of ANC interventions across different contexts necessitates a more focused examination of their components and outcomes.

The urgency of this research is highlighted by the ongoing global health targets, such as the Sustainable Development Goals (SDGs), which aim to reduce maternal mortality to less than 70 per 100,000 live births by 2030 (United Nations, 2015). Effective ANC interventions are pivotal in achieving these targets. However, achieving universal access to quality ANC services remains a challenge, particularly in resource-limited settings (Koblinsky et al., 2016).

Moreover, the COVID-19 pandemic has further strained healthcare systems worldwide, threatening to reverse progress in maternal and

neonatal health outcomes (Roberton et al., 2020). Addressing these challenges is critical to ensuring that healthcare systems are resilient and capable of sustaining gains in maternal and neonatal health.

Previous research on ANC interventions has predominantly focused on either clinical outcomes or the implementation of specific healthcare policies (Filippi et al., 2016). However, limited comparative studies have been conducted to evaluate the effectiveness of these interventions across different settings, considering factors such as geographical region, socioeconomic status, and healthcare system structure (Benova et al., 2018). Furthermore, studies that do exist often fail to incorporate a comprehensive analysis of both maternal and neonatal outcomes simultaneously, which limits the ability to draw holistic conclusions about the overall impact of ANC services.

The novelty of this study lies in its comparative approach to analyzing ANC interventions across diverse contexts, focusing not only on clinical outcomes but also on service delivery, access, and quality. By examining multiple interventions and comparing their effectiveness in improving maternal and neonatal health outcomes, this study aims to fill the existing gap in the literature and contribute to the evidence base for optimizing ANC services.

Maternal and Neonatal Health refers to the health of women during pregnancy, childbirth, and the postpartum period, as well as the health of newborns during their first month of life. Ensuring the well-being of both mothers and their babies is critical for reducing mortality and improving long-term health outcomes. Globally, significant progress has been made in reducing maternal and neonatal mortality, but challenges remain, particularly in low- and middle-income countries (LMICs). Factors such as inadequate access to healthcare, lack of trained health professionals, and poor infrastructure contribute to preventable deaths and complications (WHO, 2020).

Maternal health encompasses a range of issues, including maternal mortality, complications during pregnancy, access to prenatal care, and the management of conditions such as preeclampsia, gestational diabetes, and infections. Improving maternal health requires a multi-faceted approach that includes providing quality antenatal care, skilled birth attendants during delivery, and postpartum care. Timely

interventions during pregnancy, such as nutritional support and vaccinations, are essential to prevent complications that could endanger both the mother and the baby (UNICEF, 2021). The social determinants of health, including education, income, and gender inequality, also play a significant role in maternal health outcomes.

Neonatal health focuses on the care and survival of newborns during their first 28 days, which is the most vulnerable period for infants. Complications such as preterm birth, low birth weight, infections, and birth asphyxia are among the leading causes of neonatal mortality. Effective neonatal care includes early and exclusive breastfeeding, thermal care, and infection prevention. In many settings, newborn care is closely linked to maternal health services, emphasizing the importance of integrated healthcare approaches (Lawn et al., 2014). Investments in both maternal and neonatal healthcare systems are vital to reducing mortality rates and ensuring healthy development for future generations.

The primary objective of this study is to compare the effectiveness of various ANC interventions in improving maternal and neonatal health outcomes across different settings. Specifically, it seeks to identify which interventions are most effective in reducing maternal and neonatal morbidity and mortality.

In addition, the study will explore how contextual factors such as healthcare infrastructure, socioeconomic status, and geographic location influence the success of these interventions. The findings of this research will provide valuable insights for policymakers, healthcare providers, and international organizations aiming to improve maternal and neonatal health services.

The benefits of this study are twofold. First, it will inform the development of more targeted ANC interventions that are tailored to specific population needs and healthcare system capacities. Second, it will provide evidence that can be used to refine existing global health policies and initiatives aimed at reducing maternal and neonatal mortality, ultimately contributing to improved health outcomes on a global scale.

2. Research Method

This study employs a qualitative research approach using a literature review as the primary research method. The literature review is selected to systematically analyze and compare various antenatal care (ANC) interventions and their impact on maternal and neonatal health outcomes. This method allows for the synthesis of existing research, providing a comprehensive overview of the effectiveness of different interventions across various settings. By focusing on secondary data, the study can identify patterns, gaps, and best practices in the provision of ANC services (Snyder, 2019).

The data sources for this research are derived from peer-reviewed journals, reports from international health organizations such as the World Health Organization (WHO) and UNICEF, and reputable health databases such as PubMed, Scopus, and Google Scholar. Relevant studies published between 2010 and 2023 were included to ensure the analysis is based on the most up-to-date evidence.

The inclusion criteria for the selected articles are studies that focus on ANC interventions aimed at improving maternal and neonatal health outcomes, as well as comparative studies that evaluate these interventions in different contexts. Grey literature, such as reports and working papers, is also included to supplement peer-reviewed sources when relevant to the topic (Booth, Sutton, & Papaioannou, 2016).

Data collection was conducted through a systematic search process using specific keywords such as "antenatal care interventions," "maternal health," "neonatal health," "maternal mortality," "neonatal outcomes," and "comparative study." The search was refined by filtering articles based on their relevance, quality, and the inclusion of qualitative or quantitative data on ANC interventions. Each selected study was evaluated for its methodological rigor and the robustness of its findings (Aveyard, 2023).

The data analysis method used in this study is thematic analysis. This approach allows for the identification and comparison of key themes and patterns across the selected literature. After collecting and reviewing the articles, the data were coded based on recurring themes such as types of ANC interventions, maternal and neonatal health outcomes, and the influence of contextual factors such as geographic location and healthcare infrastructure. These themes were then compared to assess the relative effectiveness of different ANC interventions. The comparative analysis enables the identification of commonalities and differences in outcomes, as well as potential

factors influencing the success of ANC programs in different regions (Braun & Clarke, 2006). The findings from the thematic analysis were synthesized to provide a clear narrative on how different ANC interventions contribute to improved maternal and neonatal health.

3. Result and Discussion

In this study, the literature data collected through the literature review method is based on a selection of articles relevant to the topic Improving Maternal and Neonatal Health Outcomes: A Comparative Study of Antenatal Care Interventions. After conducting a systematic search using specific keywords in health databases such as PubMed, Scopus, and Google Scholar, several articles discussing various antenatal care (ANC) interventions and their impact on maternal and neonatal health outcomes were found. From these articles, 10 were selected for their high relevance and quality based on inclusion criteria such as focusing on ANC interventions, using valid scientific methods, and being published between 2010 and 2023.

Authors and Year	Article Title	Discussed ANC Interventions	Main Findings
Bhutta et al., 2014	Evidence-based interventions for maternal and child health	Nutritional support, iron supplementation	Nutritional interventions significantly reduced maternal and neonatal mortality
Carroli et al., 2017	WHO systematic review of randomized controlled trials of routine antenatal care	Comprehensive ANC packages	Comprehensive ANC reduced maternal mortality and increased neonatal survival
Koblinsky et al., 2016	Quality maternity care for every woman, everywhere	Skilled birth attendance, emergency obstetric care	High-quality care linked with significant reductions in maternal mortality and morbidity
Benova et al., 2018	Not just a number: examining coverage and content of antenatal care	ANC coverage, service delivery	ANC coverage alone is not sufficient; content quality must be improved for better health outcomes
Lawn et al., 2016	Every Newborn: progress, priorities, and	Early essential newborn care, breastfeeding promotion	Early essential newborn care and breastfeeding led to significant

	potential beyond survival		improvements in neonatal survival
Filippi et al., 2016	Levels and causes of maternal mortality and morbidity	Emergency obstetric care, access to trained providers	Identified lack of emergency obstetric care as a major contributor to high maternal mortality in LMICs
Roberton et al., 2020	Early estimates of the indirect effects of the COVID-19 pandemic	Disruptions in ANC during pandemic	Estimated increase in maternal and neonatal mortality due to disruptions in health services
Say et al., 2014	Global causes of maternal death: a WHO systematic analysis	ANC interventions, cause-specific mortality	Hemorrhage, hypertension, and sepsis were leading causes of death; ANC can reduce incidence
Tuncalp et al., 2017	Quality of care for pregnant women and newborns the WHO vision	ANC service quality, comprehensive service packages	Emphasized the importance of quality care and patient-centered approaches for improving outcomes
Campbell & Graham, 2015	Strategies for reducing maternal mortality: getting on with what works	ANC delivery models, midwife-led care	Midwife-led ANC models linked to reductions in maternal mortality and increased satisfaction

The table above contains 10 articles selected as reference materials for this research. These articles vary in methodology, ranging from randomized controlled trials (RCTs) to systematic reviews and qualitative analyses. Each article focuses on different antenatal care (ANC) interventions, such as nutritional support, emergency obstetric care, and high-quality healthcare services. The main findings from these articles highlight that ANC interventions can significantly improve maternal and neonatal health if implemented with appropriate quality and service delivery.

The review of selected literature highlights several key findings regarding antenatal care (ANC) interventions and their impact on maternal and neonatal health outcomes. A common theme across the studies is the critical role of nutritional support in improving maternal and child health. Bhutta et al. (2014) emphasize that nutritional interventions, particularly iron and folic acid supplementation, significantly reduce maternal and neonatal mortality. This finding underscores the importance of addressing maternal malnutrition during

pregnancy, which has long-term effects on both the mother's health and the baby's development. Nutritional care, therefore, remains a vital component of ANC interventions, especially in low-resource settings where malnutrition is prevalent.

In addition to nutritional support, comprehensive ANC packages have been shown to lead to better maternal and neonatal health outcomes. (Carroli et al., 2001) provide evidence that these integrated care models, which include regular health checkups, monitoring for complications, and counseling, are effective in reducing maternal mortality and improving neonatal survival. The findings suggest that a holistic approach, which encompasses both preventive and curative care, is essential in mitigating the risks associated with pregnancy and childbirth. These comprehensive packages, when provided consistently and with quality, can help ensure early detection of potential complications, thus preventing adverse outcomes.

Quality of care is another crucial factor in determining the success of ANC interventions. (Koblinsky et al., 2016) both point out that while ANC coverage has increased globally, the quality of services provided remains inconsistent. Merely increasing the number of women accessing ANC services does not necessarily translate into better health outcomes unless the care is of high quality. Benova et al. (2018) emphasize the need to focus on the content of care, such as the frequency of visits, thoroughness of health checks, and the provision of essential services. High-quality care, including skilled birth attendance and emergency obstetric services, is directly linked to significant reductions in maternal and neonatal mortality and morbidity.

The importance of skilled birth attendance and emergency obstetric care is highlighted in several studies. Both Koblinsky et al. (2016) and Filippi et al. (2016) identify the lack of skilled health professionals and insufficient access to emergency care as major contributors to maternal deaths, particularly in low- and middle-income countries. Emergency obstetric care, which includes the management of severe complications like hemorrhage, sepsis, and obstructed labor, is critical in preventing maternal deaths. Therefore, the availability of trained healthcare providers and the ability to respond to emergencies during delivery are essential components of successful ANC interventions.

The review also highlights the disruptive impact of the COVID-19 pandemic on ANC services. (Roberton et al., 2020) estimate a significant increase in maternal and neonatal mortality due to disruptions in ANC services during the pandemic. The study shows that the pandemic affected both the availability and accessibility

of essential maternal healthcare services, leading to delays in care and missed opportunities for early interventions. This emphasizes the need for resilient healthcare systems that can continue providing essential services even during global health crises, to prevent setbacks in maternal and neonatal health improvements.

Finally, several studies, such as those by Tuncalp et al. (2017) and (Campbell & Graham, 2006), emphasize the importance of midwife-led care models and patient-centered approaches in ANC. These models, which focus on personalized care and continuous support from trained midwives, have been linked to improved maternal satisfaction and reduced maternal mortality. Midwife-led care provides women with consistent, high-quality care throughout pregnancy, which not only improves health outcomes but also enhances the overall childbirth experience. These findings suggest that healthcare systems should invest in training and deploying skilled midwives, particularly in underserved areas, to improve maternal and neonatal health outcomes.

Discussion

Based on the findings presented in the previous section, antenatal care (ANC) interventions play a vital role in improving maternal and neonatal health outcomes. The studies reviewed underscore the importance of comprehensive ANC packages that include nutritional support, skilled birth attendance, and access to emergency obstetric care. These findings are aligned with the global health agenda set by organizations such as the World Health Organization (WHO) and UNICEF, which emphasize the need for high-quality ANC services to reduce maternal and neonatal mortality. Despite progress, disparities in the quality of care and access to essential services remain prevalent, especially in low- and middle-income countries (LMICs).

Nutritional support, as highlighted by Bhutta et al. (2014), is a fundamental component of ANC interventions. Maternal malnutrition remains a significant issue in many developing regions, contributing to poor pregnancy outcomes such as preterm birth, low birth weight, and neonatal mortality. The findings suggest that interventions aimed at improving maternal nutrition, including iron and folic acid supplementation, can significantly reduce these risks. This aligns with the theoretical framework of maternal health, which suggests that adequate maternal nutrition is directly linked to positive pregnancy outcomes (Black et al., 2013). The current global focus on maternal nutrition is crucial, especially considering the increasing rates of food insecurity due to climate change, economic instability, and the ongoing impacts of the COVID-19 pandemic.

The role of comprehensive ANC packages in reducing maternal mortality, as demonstrated by Carroli et al. (2017), highlights the need for holistic care that goes beyond routine checkups. Comprehensive ANC includes regular health assessments, monitoring for complications, counseling on birth preparedness, and timely referrals for emergency care. This integrated approach has been proven to reduce both maternal and neonatal mortality, particularly when combined with skilled birth attendance. These findings support the WHO's recommendation for a minimum of eight ANC visits during pregnancy to ensure optimal maternal and neonatal health (WHO, 2016). However, in practice, many women in LMICs still do not receive the recommended number of visits, often due to barriers such as distance to healthcare facilities, cost, and cultural factors.

One of the most critical findings in the literature is the importance of quality of care. Koblinsky et al. (2016) and Benova et al. (2018) both emphasize that increasing ANC coverage is insufficient unless the quality of care is improved. This is particularly relevant today, as many countries report high coverage rates but still experience high maternal and neonatal mortality. The quality of ANC services, including the frequency and content of health checks, can vary widely between regions. This issue is compounded by shortages of skilled healthcare providers, inadequate training, and insufficient healthcare infrastructure, particularly in rural and underserved areas. Improving the quality of care should therefore be a priority in health policy, with a focus on ensuring that women receive the necessary interventions during their ANC visits.

Skilled birth attendance and emergency obstetric care, as discussed by Koblinsky et al. (2016) and Filippi et al. (2016), are essential components of reducing maternal deaths. The studies highlight that even with adequate ANC, maternal deaths can still occur during childbirth due to the lack of emergency care. This is particularly true in LMICs, where access to hospitals and trained medical personnel may be limited. The findings are consistent with the three delays model, which suggests that maternal deaths are often caused by delays in seeking care, reaching healthcare facilities, and receiving adequate care once at the facility (Thaddeus & Maine, 1994). Addressing these delays requires investments in healthcare infrastructure, transportation, and training programs for healthcare providers.

The impact of the COVID-19 pandemic on maternal and neonatal health, as reported by Robertson et al. (2020), provides a stark example of how disruptions in healthcare services can have devastating consequences. The pandemic led to widespread disruptions in ANC services, resulting in an estimated increase in maternal and neonatal mortality. These findings underscore the importance of

building resilient healthcare systems that can continue providing essential services during crises. In many countries, the pandemic exposed the vulnerabilities of health systems, particularly in LMICs where resources are limited. Moving forward, health systems must prioritize the continuity of maternal and child health services, even in times of crisis, to avoid setbacks in the progress made over the past decades.

Midwife-led care models, as discussed by Tuncalp et al. (2017) and Campbell & Graham (2015), offer a promising solution to improving both the quality of care and maternal satisfaction. Midwives, particularly in underserved areas, can provide continuous, personalized care throughout pregnancy, delivery, and the postpartum period. These care models have been shown to reduce maternal mortality and improve overall birth outcomes. Midwife-led care also aligns with the WHO's call for more patient-centered approaches, where women are empowered to make informed decisions about their care. In practice, however, midwife-led care is still not widely implemented in many regions, particularly in countries that lack formal midwifery training programs or where the role of midwives is undervalued.

From a theoretical standpoint, the findings align with the concept of the continuum of care, which emphasizes the need for integrated care throughout pregnancy, childbirth, and the postpartum period (Kerber et al., 2011). The continuum of care model suggests that health outcomes can be significantly improved when services are provided in a seamless, coordinated manner. This approach is particularly relevant for maternal and neonatal health, where complications can arise at any stage of the pregnancy or delivery process. The reviewed literature supports this theory, demonstrating that interventions that provide continuous care across these stages result in better outcomes than fragmented services.

In response to these findings, the author argues that while progress has been made in improving ANC services globally, gaps remain in both access and quality. Policymakers must not only increase the availability of services but also focus on ensuring that these services are delivered with high quality and are accessible to all women, particularly those in marginalized or underserved communities. Furthermore, efforts should be made to train more midwives and healthcare providers to meet the growing demand for maternal healthcare services. The inclusion of patient-centered approaches, where women are actively involved in their care, is essential to improving satisfaction and outcomes.

The literature highlights the critical role of comprehensive ANC interventions in reducing maternal and neonatal mortality. However, the current state of maternal healthcare services, particularly in LMICs, shows that there is still much work to be done to ensure that all women have access to high-quality care. The disruptions caused by the COVID-19 pandemic further emphasize the need for resilient healthcare systems. Moving forward, policymakers, healthcare providers, and researchers must continue to advocate for improved maternal healthcare services that are accessible, high-quality, and resilient in the face of future challenges.

4. Conclusion

In conclusion, the literature review on antenatal care (ANC) interventions and their impact on maternal and neonatal health outcomes underscores the critical importance of comprehensive and high-quality care. Nutritional support, skilled birth attendance, emergency obstetric care, and regular monitoring during pregnancy have been consistently linked to reductions in maternal and neonatal mortality. The findings demonstrate that while global ANC coverage has improved, gaps in quality and access, especially in low- and middle-income countries (LMICs), continue to hinder further progress. It is clear that a holistic approach to ANC, which includes both preventive and curative services, is essential to improving outcomes for mothers and newborns.

The disruptions in ANC services caused by the COVID-19 pandemic have further highlighted the vulnerabilities within healthcare systems, particularly in underserved areas. As Robertson et al. (2020) pointed out, the pandemic resulted in significant increases in maternal and neonatal mortality due to reduced access to care. This reveals the urgent need for resilient healthcare systems capable of providing continuous, high-quality care during crises. Strengthening these systems and ensuring the delivery of essential maternal health services, even in emergencies, is crucial for safeguarding the health of mothers and newborns in the future.

Future research should focus on exploring innovative models of care, such as midwife-led care and community-based interventions, which have shown promise in improving both maternal health outcomes and patient satisfaction. In addition, further studies are needed to assess

the long-term impacts of the COVID-19 pandemic on maternal and neonatal health, as well as the effectiveness of strategies implemented to mitigate these impacts. Research should also focus on identifying effective ways to improve the quality of ANC services in LMICs, where healthcare systems are often under-resourced. Policymakers and researchers must collaborate to develop evidence-based strategies that address both the systemic barriers to care and the unique challenges faced by women in different regions.

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