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# Barriers to Utilizing Antenatal Care and Skilled Birth Attendant Services: A Study of Rural Women of Reproductive Age in Three Villages in Khanewal District, Pakistan

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## ABSTRACT

# Barriers to Utilizing Antenatal Care and Skilled Birth Attendant Services: A Study of Rural Women of Reproductive Age in Three Villages in Khanewal District, Pakistan

Antenatal care (ANC) and skilled birth attendants (SBAs) play a crucial role in reducing maternal mortality. This study aimed to identify the barriers to the utilization of essential healthcare services like antenatal care and skilled birth attendants to rural women of reproductive age in District Khanewal, Pakistan. Primary data were collected through semi-structured interviews with Lady Health Workers, rural women of reproductive age, and household members. The participants were purposively selected. A total of 15 semi-structured interviews were conducted, with five interviews each for rural women of reproductive age, household members, and Lady Health Workers. The thematic analysis is conducted to identify the barriers. Rural women's barriers to not using ANC and SBA services and preference for traditional birth attendants stem from their trust in them, adherence to traditional practices, lack of ANC knowledge, decision-making capacity, and distance to health facilities, all identified as the barriers to the utilization. It is necessary to implement community-based interventions in rural areas to enhance knowledge and awareness of ANC services. Targeted interventions should be made in rural areas to improve the coverage and accessibility of primary healthcare services. Rather than discouraging the primary health-seeking behavior of rural women, the study suggests engaging traditional birth attendants, providing them with training, and expanding ANC coverage for the time being by utilizing local traditional attendants.

**JEL Classification:**

I12, I19

**Keywords:**

antenatal care, skilled birth attendant, maternal health, barriers, women of reproductive age

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## **1. Introduction**

Pregnancy is a transformative period in a woman's life, and ensuring the well-being of both the mother and the child is a global health priority. Antenatal care (ANC) serves as a crucial pathway for pregnant women to access services vital for a positive pregnancy outcome. In the context of Pakistan, the pursuit of Sustainable Development Goal 3 (SDG #3) to reduce the maternal mortality ratio to less than 70 per 100,000 live births faces persistent challenges. Maternal health stands as an indicator of the overall health status of the nation, with implications for reducing miscarriages, stillbirths, perinatal losses, and maternal morbidity. Central to this is the utilization of antenatal care and skilled birth attendant services—established global practices aimed at preventing maternal mortality, morbidity, and stillbirth.

While there is a notable increase in the percentage of women receiving antenatal care services from skilled health personnel over time, the progress is not uniform. According to the PDHS (2017-18), 87% of women received antenatal care, yet only 52% completed the recommended four visits. Notably, the completion percentage, aligned with the WHO 2012 focused antenatal care model, remains a concern.

This study aimed to address the gap in understanding the barriers faced by rural women of reproductive age in utilizing antenatal care and skilled birth attendant services. We focus on three villages in District Khanewal, Pakistan, using primary data to identify barriers to the utilization of essential health services. The study sought to enhance our understanding of the barriers affecting antenatal care and skilled birth attendant services utilization by rural women in the selected villages.

### **1.1 Research problem**

In the rural sector of Pakistan, the utilization of primary healthcare services such as ANC and SBA at formal health institutions is not encouraging. The maternal mortality ratio (MMR) in Pakistan is 80 per 100,000 live births (MMS, 2019), 26% higher in rural areas compared to urban areas. The situation is further deteriorated in low-resource rural areas. By the end of 2030, Pakistan aims to achieve the first target of SDG#3: reducing the MMR to less than 70 per 100,000 live births. As maternal health is integral to overall health status, research identifying barriers to the utilization of primary healthcare services is crucial to improving maternal health. If this identified problem is not addressed, maternal health cannot be improved, which has multifaceted implications for the overall country health

status in the long run. Additionally, the indicator SDG 3, aimed at reducing maternal mortality to less than 70 per 100,000 live births, may not be achieved.

## **1.2 Research Objective**

The objective of this study is as follows:

1. To identify barriers to the utilization of essential health services like ANC and SBA to rural women in Khanewal District, Pakistan.

## **1.3 Research Question**

1. What are the barriers to the utilization of primary healthcare services like ANC and SBA to rural women in the selected rural villages in District Khanewal, Pakistan?

This research aimed to contribute by identifying the barriers to maternal healthcare utilization in rural settings, providing a foundation for future interventions and policy enhancements.

## **2. Literature Review**

Maternal health, crucial for development, is facilitated through effective measures such as antenatal care (ANC) and skilled birth attendants (SBAs). These components stand as vital indicators of maternal health, globally influencing positive pregnancy outcomes. Existing literature reveals a nuanced interplay of socioeconomic factors, cultural influences, and accessibility that significantly impact ANC utilization. The studies from diverse regions underscore the complexity of maternal health practices.

In rural Gambia, Jasse (2023) emphasizes the influence of socioeconomic factors, accessibility to ANC, and cultural acceptance on early ANC visits, revealing correlations with elevated maternal and child mortalities in districts with low visit rates. Demographic and socioeconomic factors, electricity availability, and mass media exposure emerge as influencers of ANC service behavior in South Africa (Nxiweni et al., 2022). Sub-Saharan Africa studies by Tessema et al. (2021) reveal determinants like residence, healthcare access, contraceptive use, and health facility accessibility for ANC and SBA utilization. Intended pregnancies and health decision-making capacity stand out as significant influencers of ANC and SBA uptake in Guinea (Ahinkorah, Seidu, et al., 2021). Yaya et al. (2021) note in Cameroon that religious affiliation, particularly being Muslim or Christian, positively influences intentions to visit antenatal care.

Asim et al. (2022) in Pakistan establish a correlation between women's empowerment and the quality of ANC, emphasizing the need to prioritize both empowerment and healthcare improvements. Ala et al. (2021) explore pregnant women's motives for ANC visits in

Karachi, revealing prevention of complications and labor pain minimization as primary reasons. Majrooh et al. (2014) assess the coverage and quality of ANC services in Punjab, revealing challenges related to distance, resource insufficiency, and women's decision-making capacity.

Ntoimo et al. (2022) find in rural Nigeria that women prefer traditional birth attendants due to perceived efficiency, cultural practices, friendly behavior, and lower cost. Ayele et al. (2019) identify factors affecting skilled birth attendance in Ethiopia, linking awareness about maternity care and waiting time at facilities to utilization. Manyeh et al. (2017) and Wilunda et al. (2015) determine maternal age, ANC visits, the attitude of service providers, and knowledge of ANC as determinants in rural Ghana and Ethiopia. Terefe & Gelaw (2019) identify predictors of ANC services utilization in southwestern Ethiopia, emphasizing awareness, knowledge, willingness to pay, time of visit, and satisfaction. Perez et al. (2008) stress the importance of involving traditional birth attendants in prevention programs in Zimbabwe.

Sadia et al. (2022) identify factors contributing to home delivery in rural Sindh, emphasizing low education, multiparity, and lack of ANC knowledge. Ahmed et al. (2020) find poor healthcare services, quality, and access contribute to perinatal losses in Tando Mohammed Khan, Sindh. Mcnojia et al. (2020) attribute reluctant behavior toward skilled birth attendants in Thatta, Sindh, to poor attitude, service quality, high cost, and facility distance.

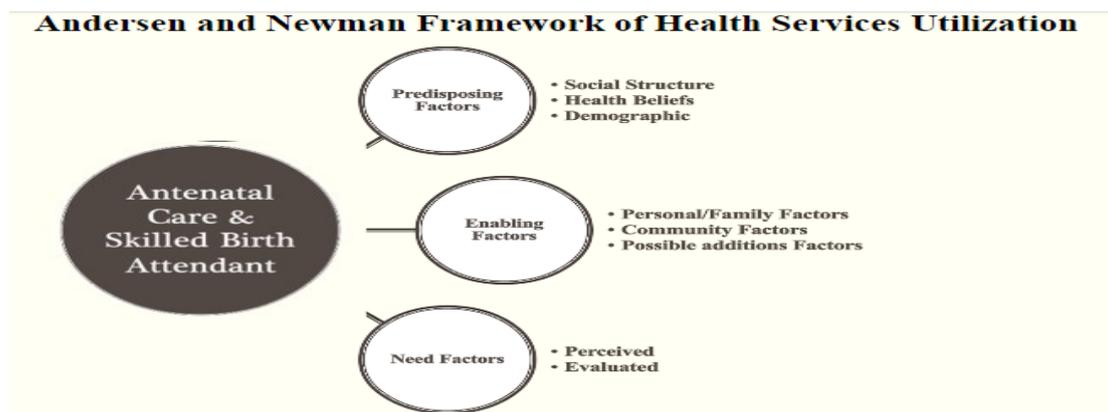
The study extensively covers the literature about the barriers that are affecting the utilization of primary healthcare services. However, the gap is evident in understanding the barriers to the utilization of primary healthcare services in the rural sector of Pakistan. This study aimed to address this gap by focusing on identifying the barriers affecting ANC and skilled birth attendant delivery among rural women of reproductive age in District Khanewal, Pakistan. Utilizing primary data from three villages, the study explored the barriers to the utilization of essential health services, including ANC and skilled birth attendant services at formal health facilities in a rural context.

In conclusion, while existing literature has shed light on various determinants (barriers) influencing ANC and SBA utilization globally, this study contributed to the understanding of specific barriers faced by rural women in District Khanewal, Pakistan, bridging the gap in current knowledge and informing targeted interventions for improved maternal healthcare in the rural sector.

### 3. Theoretical Framework

For theoretical purposes, this research employs the Andersen and Newman Framework of Health Services Utilization to explore the barriers of antenatal care (ANC) services utilization (Andersen and Newman Framework of Health Services Utilization, n.d.). Originally developed in the 1960s, this framework underwent four phases of refinement before reaching its finalized version in the 1990s. This study adopts the most updated fourth-phase framework, modifying it as necessary to suit the requirements of the research.

**Figure 3.1 Andersen and Newman Framework**



Source:(*Andersen and Newman Framework of Health Services Utilization*, n.d.-a)

The relevance of the Andersen and Newman Framework to this study lies in its comprehensive and time-tested approach to understanding the barriers to primary care services utilization. The framework's adaptability and incorporation of predisposing, enabling, and need factors (which could indirectly be the barriers) provided a holistic lens through which to examine the complex dynamics influencing ANC services utilization.

In the context of the research question and objective, the framework aligned seamlessly. The predisposing factor shed light on the demographic and socio-cultural characteristics shaping women's perceptions of ANC services. Enabling factors helped the study to identify barriers to the utilization of health services, particularly in the rural setting of District Khanewal. Need factors guided the research in the identification of perceived and evaluated barriers to ANC services utilization. By employing the Andersen and Newman Framework, the study aimed to explore the barriers that are associated with primary healthcare services in three selected villages in District Khanew, Pakistan.

### 4. Research Methodology

The study aligns with the interpretivism research philosophy. This philosophy is chosen to emphasize the importance of understanding the subjective experiences and perspectives of

rural women, Lady Health Workers, and household members regarding ANC and SBA utilization. Interpretivism allows for a nuanced exploration of the barriers identified in the study. The research employs a mono-qualitative method to comprehensively address the research question. The qualitative aspect involves semi-structured interviews, allowing for an in-depth exploration of the barriers faced by rural women in utilizing antenatal care (ANC) and skilled birth attendant (SBA) services. This study employs a qualitative research design. Thematic analysis is applied during the qualitative phase to identify and explore recurring themes highlighting the barriers related to the utilization of maternal healthcare services. The qualitative analysis is specifically focused on Khanewal. For qualitative insights into barriers faced by rural women, the study concentrates on three villages in Khanewal, a district in Southern Punjab with a predominantly agricultural economy, lower literacy rates, and suboptimal healthcare indicators, as revealed by the 2017 Multiple Indicator Cluster Survey (MICS). The choice of Khanewal aimed to provide a nuanced understanding of the barriers hindering ANC and SBA utilization in a less developed region.

**Table 1: Demographic Information**

<b>Khanewal District</b>			
Population	3 million	ANC received	86%
Literacy Rate	39.9%	Institutional delivery	76%
Rural-to-urban distribution	75% to 25%	SBA at delivery	72%
Health Facilities	1DHQ, 3THQ,9RHCs, 81BHUs,14Dispensaries	ANC by LHWs	64%

Source: *MICS 2018*

The primary data is collected through a semi-structured interview guide with Lady Health Workers at Basic Health Units, reproductive-age rural women, and household members.

For this study, a purposive sampling technique was employed for qualitative data. In this technique, women of reproductive age who had pregnancies in the last three years, household members with recent pregnancy cases, and Lady Health Workers providing services in the respective rural area were randomly selected. This approach ensures a diverse and representative sample that captures a range of experiences related to maternal healthcare. By adopting a purposive sampling technique, the study aimed to minimize bias and generalize findings to a broader population, contributing to a more comprehensive

understanding of the barriers affecting antenatal care and skilled birth attendant services utilization in rural Pakistan. The sample size for the qualitative analysis is 15. A total of 15 semi-structured interviews were conducted, with five interviews each for rural women of reproductive age, household members, and Lady Health Workers. For qualitative data, thematic analysis is employed to identify recurring themes and patterns related to social barriers in ANC and SBA utilization. The qualitative analysis aims to provide a thorough understanding of the social barriers influencing the utilization of antenatal care (ANC) and skilled birth attendant (SBA) services in rural Pakistan.

### **Ethical**

Ethical considerations were integral to this study. Informed consent was obtained from all participants, ensuring their voluntary participation. Confidentiality and privacy were maintained throughout the research process, and participants' rights were protected. This article is extracted from my Master of Philosophy (MPhil) thesis.

## **5. Results and Discussions**

The objective of the study is to identify the barriers to the utilization of essential health services like ANC and SBA to rural women in District Khanewal, Pakistan. Utilizing primary data from three villages, the study identifies the barriers to the utilization of essential health services, including ANC and skilled birth attendant services at formal health facilities in a rural context. The literature extensively covers determinants (which could indirectly be the barriers) influencing the utilization of primary healthcare services. The central themes that emerged from the qualitative analysis of primary data that can affect the utilization of primary healthcare in a rural community are discussed in detail as follows:

### **5.1 Barriers Associated with Formal Health Facility**

Formal health facilities, such as hospitals, clinics, and medical centers, are significant in providing healthcare services to communities. However, rural women of reproductive age face various barriers to the utilization of primary healthcare services. These barriers bring into line with the enabling or need factors (which could indirectly be the barriers) of Andersen and Newman Framework of healthcare utilization.

#### **5.1.1 The behavior of the ANC provider**

Effective communication is essential, but the issue is that the ANC provider's behavior is obscene to the rural woman. The study revealed that antenatal care service providers somehow do not show respect to the rural pregnant women. After getting the services, rural

women and household members show dissatisfaction because of ANC service provider behavior. One participant said:

*“.....I still recall an incident two years ago when I accompanied my sister-in-law to the BHU. Upon our return, she expressed her dissatisfaction, mentioning the crowded environment and the rude behavior of the maternity staff that were in a hurry.....” (HM2)*

The above finding is in tune with the need factors determinant of Andersen's theory which states that perceived and evaluated related barriers can affect the utilization of primary healthcare services. The finding is also observed in Thatta, Sindh by Mcnojia et al. (2020), in rural Nigeria by Ntoimo et al. (2022), and in rural South Africa by Nxiweni et al., (2022). In all these studies, the gender and behavior of ANC service providers were identified as a barrier to service utilization.

### **5.1.2 Lack of Facilities at a Primary Healthcare Institution**

The lack of facilities at a primary healthcare institution, like medication and supplements, are severe issue that can have significant consequences for the health and well-being of pregnant women and their unborn children. Rural women do not have proper access to necessary natal care medication. One participant said:

*“..... I experienced this once. The behavior of the lady health personnel at the BHU was not encouraging, and the prescribed medicines were unavailable that day. Obtaining those medicines from pharmacies proved expensive.....” (RW1)*

This finding falls within the ambit of the needs and enabling factors determinant of Andersen and Newman's theory which states that family, community, perceived and evaluated, and additional factors could be the potential barriers to service utilization. The finding is also observed in Thatta, Sindh by Mcnojia et al. (2020), in rural South Africa by Nxiweni et al., (2022), in rural Gambia by Jassey (2023) and Guinea by Ahinkorah, et al., (2021), who established that lack of facilities (equipment, natal medication) at formal health institutions are the identified as the barrier to utilization.

### **5.1.3 Lack of Transportation**

The lack of transportation for antenatal care is a common challenge in many regions, especially in low-income and rural areas. This problem is seriously affecting the health and

utilization of primary healthcare services for pregnant women and their babies. One participant said:

*".....When my wife had an accident during her third pregnancy, some of my fellows suggested that I should take her to the doctor, but the Government health facility was quite far away, and I could not arrange transportation to get there.....". (HM4)*

This finding brings into line with enabling factors determinants of Andersen and Newmen's theory which states that family/husband, community, and additional factors are the potential barriers to service utilization. The finding is also observed in Thatta, Sindh by Mcnojia et al. (2020), in rural Gambia by Jasey (2023), and in Guinea by Ahinkorah, et al., (2021), who established that lack of transportation is one of the common barriers to utilization. Because families in the rural sector have inadequate resources and public transport facilities are unavailable for them to reach formal healthcare institutions.

#### **5.1.4 Distance to Health Facility**

Distance to a health facility for antenatal is a significant problem, particularly in low-resource or rural areas. This barrier has a severe implications for maternal and child health. Here are some critical problems associated with distance to a health facility for antenatal care, e.g., Delayed or Missed Care, increased risk of complications, high maternal mortality rate, adverse birth outcomes, and Increased healthcare cost. One participant said:

*".....When my wife had an accident during her third pregnancy, some of my fellows suggested that I should take her to the doctor, but the Government health facility was quite far away, and I could not arrange transportation to get there.....". (HM4)*

The above finding is also observed by other researchers in Tando Mohammed Khan, Sindh, by Mcnojia et al. (2020), in Punjab by Majrooh et al. (2014), and in Sub-Saharan Africa studies by Tessema et al. (2021) who established the similar barrier to primary healthcare services utilization.

#### **5.2 Health-Seeking Behavior Influencing Barriers**

There could be several numbers of barriers that can influence the health-seeking behavior of reproductive-age women in rural areas. This theme brings into line with the disposing and enabling factors determinant of Andersen and Newmen Framework which states that

family, community, perceived and evaluated, and additional factors are could be the potential barriers to service utilization.

### **5.2.1 Lack of Supportive Husbands and In-laws**

This can be a tough and emotionally challenging situation to navigate for rural women. The attitude of in-laws and husbands toward the woman is not collaborative during the antenatal period, especially in rural areas. One participant said:

*“.....When I was pregnant, my husband worked in a factory as a laborer and did not live with us. My mother-in-law had a strong influence on my decision-making. She was concerned about the potential costs involved, influenced by the traditional practices, and did not allow me to visit any antenatal care center.....”*. (RW2)

This finding is in tandem with the enabling factors determinant of Andersen and Newmen's theory, which states that family, community, and additional factors could be the potential barriers to service utilization. This finding confirms that family/in-laws' behavior is discouraging the utilization of primary healthcare services.

### **5.2.2 Insufficient Resources**

People in rural areas are too poor to meet the financial burden. In remote or underserved areas, access to healthcare facilities is limited, making it difficult for pregnant women to receive regular antenatal check-ups. The absence of nearby clinics or hospitals exacerbates this issue, forcing women to travel long distances. One participant said:

*".....When my wife had an accident during her third pregnancy, some of my fellows suggested that I take her to the doctor, but the Govt health facility was quite far away, and I could not arrange transportation to get there. Additionally, I was concerned about the potential costs involved.....”*. (HM4)

The above finding is also observed by other researchers in Tando Mohammed Khan, Sindh, by Mcnojia et al. (2020), in Punjab by Majrooh et al. (2014), and in Sub-Saharan Africa studies by Tessema et al. (2021) who established the similar barrier to primary healthcare services utilization. This finding brings into line with enabling factors determinants of Andersen and Newmen's theory which states that family, community, and additional factors could be the potential barriers to service utilization.

### **5.2.3 Lack of Knowledge Related to ANC**

Literacy is a significant problem that exists in our society. People do not have some knowledge about antenatal care services, especially in our rural locations and backward areas. Most of our responders are uneducated due to ignorance regarding antenatal care, which is at its peak and costs a lot for the health of the woman and her baby. This theme is also aligned with existing literature.

### **5.2.4 Religious Practices**

Religious sentiments are another issue that exists in our society. Apart from benefiting from the health sector and consulting their issues with qualified doctors, people like to discuss their issues with clerks and religious scholars. Some of them advise them to go for proper treatment, but other religions that are not well-educated bring them in the wrong direction. One participant said

*“.....My husband follows the teachings of the religious leader of the village. He advised me to wear protective symbols (TAWEEZ, DHAGA) during the period of pregnancy for the well-being of the child and ordered me to stay at home and not allow me to go outside of my home as it is not good for upcoming children.....” (RW3)*

This is an interesting finding that illustrates the Taboo beliefs of rural women and their families that are affecting the utilization of primary healthcare services including antenatal care from skilled health personnel. The above finding is in tune with the need factors determinant of Andersen's theory which states that perceived and evaluated related barriers that can affect the utilization of primary healthcare services. The finding is also observed in Thatta, Sindh by Mcnojia et al. (2020).

## **5.3 Barriers Related to Women's Preferences Towards TBA**

Traditional birth attendants (TBAs) are individuals in many cultures who provide maternal and newborn care during pregnancy, childbirth, and postpartum. They have been a significant part of healthcare systems in many communities, particularly rural and low-resource communities. TBAs are usually women who have received informal training and gained experience assisting with childbirth and related care through traditional or cultural practices.

### **5.3.1 TBAs are Available at any Time**

TBAs in many communities are often available anytime, especially in rural and remote areas where formal healthcare services may not be readily accessible. TBAs typically live within the communities they serve, and they are often on call and available to assist pregnant women during labor and childbirth whenever the need arises. One participant said:

*“.....The trust that TBAs have built over the year is not just with us, it is with our whole community.....” (LHW1)*

Another participant said:

*“.....TBAs are my choice because pregnancy is a confidential thing, and it is easy for me to share with them.....” (RW2)*

This finding falls within the ambit of the needs and enabling factors determinant of Andersen and Newmen's theory which states that family, community, perceived and evaluated, and additional factors are could be the potential barriers to service utilization. This finding illustrates that rural women perceived TBAs best choice for maternity care because TBAs are available at any time at low or no cost. This barrier is the most observed sub-theme among all the participant responses.

### **5.3.2 Traditional Practices**

TBAs are individuals within communities who traditionally provide maternal and newborn care during pregnancy, childbirth, and postpartum. Their practices and roles have varied widely across cultures and regions, but some common traditional practices are associated with Traditional birth attendants assisting with Home Births, Emotional Support, Positioning and Massage, and Herbal Remedies. One participant said:

*“.....When I had a bleeding problem, I discussed it with her. She recommended some herbal medicines and asked me to stop cohabiting these days. She said these are not easy to prepare and costly to make, so she did not have it right now, but she understood the pregnancy complications I had.....” (RW4)*

This finding brings into line with the need factors determinants of Andersen and Newmen's theory which states that evaluated and perceived factors could be the potential barriers to service utilization.

### **5.3.3 Psychological Support**

Psychological support is an essential aspect of the role of TBAs. TBAs often provide emotional and psychological support to expectant mothers during pregnancy, labor, childbirth, and postpartum. Here are ways in which TBAs offer psychological support, e.g., Emotional Reassurance, Building Trust, creating a Familiar Environment, providing a Listening Ear, Cultural Sensitivity, Offering Privacy, Empowerment, Postpartum Support, and Referring for Medical Help. One participant said:

*“.....The trust that TBAs have built over the years is not just with us, but with our entire community. I can convey to them easily the issue I had faced, and often they understand complication.....”*. (RW1)

*“The relationship with TBAs is built on trust, as they are women like us, eliminating gender barriers. They offer crucial emotional support during our most vulnerable times. Even if resources are limited, I can still turn to them, unlike doctors whose services are expensive.....”*. (RW3)

All the themes and sub-themes are confirmed and tested by Andersen and Newmen Framework of primary healthcare utilization in rural villages of district Khanewal. Overall, the brief of the thematic analysis is that the challenges associated with formal healthcare institutions and other factors influencing the behavior of rural women. The central theme that emerged from the analysis of a research study on maternal healthcare services in a rural community is the community's trust deficit to prefer skilled birth attendants.

The study revealed that community and household members in all three villages favoured the seeking health services at home from TBAs. Surprisingly, many participants were unaware of the presence of skilled birth attendants in their area. However, some individuals were willing to consider skilled birth attendants for delivery if they lived nearby or shared a similar caste.

In the rural setting, a significant challenge was noted with public sector health facilities, which provided services for limited hours during the day, leading to a lack of 24/7 availability of maternal care services. This limitation influenced the choices made by pregnant mothers regarding where to seek care. Overall, the study underscores the complex factors influencing maternal healthcare decisions in the rural community, ranging from trust and awareness to accessibility and the perceived benefits of healthcare facilities.

## 6. Conclusion

The study concludes that distance to health facilities, gender/behavior of service providers, lack of transportation, and shortages of supplies significantly influence primary healthcare behavior. The study concludes with a poignant quote from a participant, a mother-in-law, who expressed a preference for home deliveries, citing concerns about the strength of girls and a lack of confidence in the skills of LHWs.

Notably, the findings highlight a preference for traditional birth attendants among rural women, even with favorable socioeconomic characteristics. This preference is attributed to a lack of awareness about antenatal care and trust in traditional birth attendants, who are more accessible in local communities.

The recommendations underscore the need for strategic policies that support maternal healthcare, with a fundamental goal of improving ANC coverage and promoting skilled attendance at delivery. These strategies should focus on empowering women with knowledge about the benefits of antenatal care and seeking assistance from skilled health personnel. While aligning with WHO recommendations, these programs should be designed with cultural sensitivity, respecting local customs and beliefs. Community-based interventions are deemed vital in rural areas to increase knowledge and awareness of ANC services, ultimately improving maternal health outcomes. Suggestions for further research include exploring ways to ensure service availability in rural areas, expanding ANC access, adopting innovative approaches to increase skilled birth attendant coverage, and highlighting successful policy models in regions with high maternal mortality rates.

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