

Original Article

Factors affecting the utilization of continuum of maternal healthcare services: Evidence from rural areas using Andersen-Newman behavioral model

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ABSTRACT

Objectives: This study examines the factors affecting the utilization of the Continuum of Maternal Healthcare Services (CMHS) in rural Purulia, West Bengal, focusing on full antenatal care (ANC), institutional delivery, and full postnatal care (PNC).

Materials and Methods: A household survey using stratified multistage random sampling was conducted, collecting data on socio-demographic characteristics, healthcare access, and maternal healthcare utilization. Logistic regression analysis assessed associations between predisposing, enabling, and need factors with CMHS utilization.

Results: Findings revealed that while 96% of mothers delivered in healthcare facilities, only 39% received full ANC and 44% full PNC, with an overall CMHS utilization rate of 25.74%. Factors influencing utilization included maternal and husband's education, family structure, economic status, mass media exposure, and decision-making.

Conclusion: The study highlights the crucial role of education, family structure, and socio-economic factors in determining CMHS utilization. Targeted interventions to improve maternal education, strengthen community health worker outreach, and enhance healthcare infrastructure are necessary to increase comprehensive maternal care in rural Purulia.

Keywords: Maternal health, Maternal healthcare services, Andersen-Newman behavioral model, Continuum of maternal healthcare services, Purulia

INTRODUCTION

Access to continuum of maternal healthcare services (CMHS) is crucial for improving maternal health outcomes, particularly in low- and middle-income countries where maternal mortality remains high.^[1,2] Globally, maternal deaths estimated at 287,000, in 2020,^[3] are largely due to preventable complications such as hypertension, hemorrhage, and infections.^[4] Addressing these issues requires quality maternal healthcare at every stage: Antenatal care (ANC), skilled delivery, and postnatal care (PNC).^[2]

In India, government initiatives like the National Rural Health Mission and Janani Suraksha Yojana aim to strengthen maternal healthcare. However, challenges persist in many rural areas of India.^[5] For this study, the Purulia district of West Bengal has been chosen. Fifth round of national family health survey data reveals that only 58% of mothers in rural Purulia received four ANC visits, 28% consumed Iron-folic

acid supplements for 180 days, and 48.58% had one PNC check-up. These statistics are the lowest when compared to other districts of West Bengal. While institutional delivery rates are relatively high (89.53%), the continuity of care remains suboptimal.^[6]

This study uses the Andersen-Newman Behavioral Model to analyze socioeconomic, cultural, and systemic barriers affecting CMHS.^[7] Findings will provide insights into factors influencing CMHS utilization and inform policy interventions to improve maternal healthcare access and outcomes in marginalized rural communities.

MATERIALS AND METHODS

The study was conducted in the rural areas of Purulia district of West Bengal state of India, using primary data collected from July to October 2023. A stratified multistage random sampling design was employed to ensure representativeness.

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Received: 19 November 2024 Accepted: 22 December 2024 Epub ahead of print: 10 January 2025 Published: XXXXXXXX DOI: 10.25259/IJMS_276_2024

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All 20 community development (CD) blocks in rural Purulia were categorized into five maternal healthcare services (MHSs) utilization levels: Very high, high, moderate, low, and very low based on “Block-level Performance Report of Maternal and Child Health (MCH) of Purulia District (2022-2023).” One block from each category was randomly selected, including Balarampur, Purulia-I, Hura, Arsha, and Santuri CD. Blocks. Villages within these blocks were further stratified based on their distance from the nearest Health Sub-Center (≤ 3 km, >3 km), with one village randomly chosen from each distance category. Mothers were randomly selected from ANC registers in these villages, yielding a final sample of 408 respondents. This exceeded the required sample size 384 calculated using Cochran’s formula for a 95% confidence level and 5% margin of error to account for potential non-responses.

The dependent variable was CMHS utilization, which included full ANC, institutional delivery, and full PNC.^[2,8] Independent variables were categorized into predisposing, enabling, and need factors.^[2,9] Binary logistic regression identified key determinants of CMHS utilization. Variance inflation factors (VIFs) confirmed the absence of multicollinearity.

RESULTS

Table 1 reveals that while 96% of births occurred in healthcare facilities, only 39% of mothers received full ANC, and 44% received full PNC, indicating significant gaps in service coverage. CMHS utilization, encompassing ANC, delivery, and PNC, was low at 25.74% due to lower coverage of full ANC and PNC, highlighting the need for continuum care in rural Purulia.

The logistic regression analysis identified significant predisposing, enabling, and need factors influencing CMHS utilization among rural mothers in Purulia. In the adjusted

Table 1: Status of MHS utilization in rural Purulia, 2022–2023.

MHS indicators	Frequency	Utilization (%)
Full ANC		
No	249	61.03
Yes	159	38.97
Institutional delivery		
No (home delivery)	16	3.92
Yes (institutional delivery)	392	96.08
Full PNC		
No	228	55.88
Yes	180	44.12
CMHS		
No	303	74.26
Yes	105	25.74

ANC: Antenatal care, PNC: Postnatal care, CMHS: Continuum of maternal healthcare services, MHS: Maternal healthcare services. Date source: Primary field survey conducted in 2022–2023

models, the mean VIF is 2.01 for predisposing factors, 1.22 for enabling factors, and 1.12 for need factors, indicating no significant multicollinearity issues. Table 2 shows that education emerged as a key determinant. Mothers with secondary or higher education were over 3 times more likely to use CMHS than those without formal education (Adjusted odds ratio [AOR] = 3.74, $P = 0.004$ for higher-educated mothers). Similarly, husbands’ education significantly increased

Table 2: Logistic regression analysis showing predisposing factors associated with CMHS utilization in rural Purulia, 2022–2023.

Independent variables	AOR	CI (95%)		P value
		Lower	Upper	
Education level of mother				
No education [®]				
Primary education	0.90	0.24	3.37	0.877
Secondary education	3.34	1.43	7.31	0.005**
Higher education	3.74	1.52	8.94	0.004**
Education level of husband				
No education [®]				
Primary education	1.45	0.54	3.90	0.467
Secondary education	1.73	0.70	4.31	0.238
Higher education	3.17	1.24	7.75	0.016*
Social group				
General (Other) [®]				
SC	0.51	0.22	1.14	0.102
ST	0.36	0.17	0.70	0.008**
OBC	0.80	0.40	1.61	0.532
Religion				
Hindu [®]				
Muslim	0.59	0.10	0.79	0.018*
Others	0.30	0.02	3.75	0.349
Family type				
Joint family [®]				
Nuclear family	2.03	1.16	3.37	0.014*
Mother’s age at marriage (Years)				
<18	0.16	0.03	0.67	0.022*
18–25	0.56	0.13	2.31	0.420
>25 [®]				
Number of living child				
1 [®]				
2	1.11	0.60	2.03	0.741
3	0.48	0.17	1.30	0.149
>3	0.40	0.15	1.70	0.041*
Consumption of alcohol by husband				
Not at all [®]				
Sometimes/occasionally	0.58	0.32	0.89	0.048*
Regular	0.44	0.16	1.21	0.037*
Intimate partner violence				
Not at all [®]				
Yes	0.41	0.19	0.79	0.023*

** $P < 0.01$, * $P < 0.05$ Competed by Author. [®]: Reference category, AOR: Adjusted odds ratio, CI: Confidence interval, CMHS: Continuum of maternal healthcare services, ANC: Antenatal care, SC: Scheduled caste, ST: Scheduled tribe, OBC: Other backward classes

Table 3: Logistic regression analysis showing enabling factors associated with CMHS utilization in rural Purulia, 2022–2023.

Independent variables	AOR	CI (95%)		P-value
		Lower	Upper	
Wealth index				
Poor [®]				
Non-poor	1.62	0.95	2.25	0.044*
Personal savings of mother				
No [®]				
Yes	0.89	0.45	1.74	0.731
Mass-media exposure of mother				
Non-user [®]				
Frequent user (almost all days in a week)	1.90	0.99	3.05	0.047*
Moderate user (1 or all days in a week)	1.89	1.00	3.15	0.049*
Decision-making in household				
Independent or self	1.39	0.39	5.01	0.611
Husband [®]				
Jointly (Husband and wife)	1.87	1.04	2.95	0.036*
Other family members take decision	1.18	0.54	2.60	0.679
Husband's presence during ANC visits				
No [®]				
Yes	2.27	1.28	3.33	0.005**
Husband's presence during PNC visits				
No [®]				
Yes	1.82	1.07	2.21	0.028*
Distance between ANC service center and household (km)				
0–2 [®]				
2–4	0.56	0.32	0.97	0.041*
4–6	0.45	0.21	0.97	0.043*
>6	0.14	0.02	1.22	0.075
Condition of road to reach ANC service center				
Pucca [®]				
Kachha	0.42	0.22	0.71	0.010**

**P<0.01, *P<0.05 Competed by Author. [®]: reference category, AOR: Adjusted odds ratio, CI: Confidence interval, CMHS: Continuum of maternal healthcare services, ANC: Antenatal care, PNC: Postnatal care

utilization (AOR = 3.17, $P = 0.016$). Mothers in nuclear families were more likely to utilize CMHS (AOR = 2.03, $P = 0.014$), while early marriage before 18 years reduced utilization (AOR = 0.16, $P = 0.022$). Scheduled Tribe mothers (AOR = 0.36, $P = 0.008$), Muslim mothers (AOR = 0.59, $P = 0.018$), intimate partner violence (IPV) (AOR = 0.41, $P = 0.023$), and husbands' alcohol consumption (AOR = 0.44, $P = 0.037$) were significant barriers of CMHS utilization.

Table 3 indicates that wealthier or non-poor households (AOR = 1.62, $P = 0.044$) and mass media exposure (AOR = 1.90, $P = 0.047$) positively influenced CMHS utilization. Joint decision-making (AOR = 1.87, $P = 0.036$) and husbands' presence during ANC (AOR = 2.27, $P = 0.005$)

Table 4: Logistic regression analysis showing need factors associated with CMHS utilization in rural Purulia, 2022–2023.

Independent variables	AOR	CI (95%)		P-value
		Lower	Upper	
Pregnancy complications				
No [®]				
Yes	0.36	0.17	0.48	0.000**
Seeking medical help for pregnancy complications				
No [®]				
Yes	1.46	0.89	2.41	0.136
Trimester of 1 st ANC visit				
1 st Trimester [®]				
2 nd Trimester	0.49	0.25	0.85	0.036*
3 rd Trimester	0.62	0.13	3.08	0.562
Home visit of CHW				
No [®]				
Yes	1.96	1.14	2.99	0.015**

**P<0.01, *P<0.05 Competed by Author. [®]: reference category, AOR: Adjusted odds ratio, CI: Confidence interval, CMHS: Continuum of maternal healthcare services, ANC: Antenatal care, CHW: Community health workers

and PNC visits (AOR = 1.82, $P = 0.028$) also increased uptake.

Table 4 shows that pregnancy complications (AOR = 0.36, $P = 0.000$) and late ANC initiation (AOR = 0.49, $P = 0.036$) significantly decreased the likelihood of CMHS utilization compared to their counterparts. In contrast, community health workers (CHW) home visits (AOR = 1.96, $P = 0.015$) significantly increased the likelihood of CMHS utilization for mothers who received the visits compared to those who did not.

DISCUSSION

The findings highlight the multifaceted factors influencing CMHS utilization and underscore the importance of addressing predisposing, enabling, and need factors to improve CMHS in rural Purulia. Education was a key enabler, with maternal and paternal education strongly associated with higher CMHS utilization. Educated families are better equipped to understand the importance of MHS and navigate available services.^[9] Expanding access to higher education is crucial for improving CMHS uptake.

Economic stability and media exposure were significant enabling factors. Financial security allows households to prioritize healthcare,^[2] while media exposure raises awareness about MHS.^[10] Policies aimed at poverty alleviation and media-driven health education campaigns can be essential in promoting CMHS utilization.

Barriers such as socio-cultural norms, IPV, and substance abuse require targeted interventions. Mothers from

Scheduled Tribes and Muslim communities were less likely to access CMHS due to cultural norms, geographic isolation, and systemic inequities.^[11,12] Culturally sensitive healthcare strategies tailored to these communities are essential. Programs addressing IPV and husbands' alcohol consumption are equally important, as these factors undermine women's autonomy and financial stability, restricting access to healthcare.^[13]

The involvement of husbands in maternal healthcare, particularly during ANC and PNC visits, was associated with higher CMHS utilization.^[14] Promoting male engagement through community-based initiatives can strengthen maternal health services. In addition, strengthening the role of CHWs in early ANC initiation and follow-up visits is vital.^[15] CHWs serve as a bridge between communities and healthcare systems, especially in rural areas.

The cross-sectional design of this study restricts the ability to draw causal inferences, and its findings may not be generalizable to regions outside rural Purulia. In addition, the reliance on self-reported data may introduce biases. Nevertheless, the study successfully highlights critical barriers and enablers of CMHS utilization, providing valuable recommendations for improving access to maternal healthcare. To improve CMHS utilization in rural Purulia, immediate measures should focus on enhancing CHW outreach, improving transportation infrastructure, and increasing awareness through media campaigns. Long-term efforts must address systemic inequalities, expand educational opportunities, and implement culturally tailored healthcare programs. By holistically addressing these challenges, the uptake of CMHS in the region can be significantly improved.

CONCLUSION

This study identifies significant gaps in MHS in rural Purulia. While 96% of mothers delivered in healthcare facilities, only 39% received full ANC, and 44% accessed full PNC. The CMHS was utilized by only 25.74%, indicating fragmented care throughout the maternal healthcare journey. Factors influencing CMHS uptake include maternal education, socio-economic status, husband's support, and many more. Addressing these disparities by bridging educational and economic gaps, improving healthcare accessibility, and overcoming cultural barriers is essential. Future research should focus on enhancing the role of CHWs in promoting CMHS, increasing awareness, and evaluating the effectiveness of tailored interventions. Strengthening these efforts can significantly improve the continuum of care in rural areas.

Acknowledgment

The authors are grateful to ground-level health workers for their cooperation during the survey.

Ethical approval

The research/study approved by the Institutional Review Board at Raiganj University, number GEO/14/B/646/23, dated 15th March, 2023.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Chowdhury S, Kasemi N. Factors affecting the utilization of continuum of maternal healthcare services: Evidence from rural areas using Andersen-Newman behavioral model. *Indian J Med Sci.* doi: 10.25259/IJMS_276_2024