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Original Research Article

An Assessment of Knowledge-Awareness of Birth Preparedness and Complication Readiness and its Relationship with Educational Status: A Cross-Sectional Study among Pregnant Women in Urban Slums of Meerut City, Uttar Pradesh, India

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Abstract: Every pregnancy is a joyful journey for all the mothers and their families who dream of a safe pregnancy and a healthy baby. However, in every pregnancy, the pregnant woman faces the risk of some unpredictable complications that could end in the death or injury of the pregnant woman or the baby. Birth Preparedness and Complication Readiness (BPCR) is a critical strategy for reducing maternal mortality and morbidity by minimizing delays in obstetric care. The objective of the study was to assess the awareness and knowledge of Birth Preparedness and Complication Readiness (BPCR) and to examine the association between pregnant women's educational status and maternal health practices in the urban slums of Meerut city, Uttar Pradesh. A community-based cross-sectional study was conducted among 50 pregnant women in the urban slums of Meerut city from the month of November 2025 to January 2026. Data was collected using a structured questionnaire. The data was computed using descriptive statistics. The associations between the educational qualification and maternal health practices were assessed using the chi-square test. The effect size was also estimated using Cramer's V. The percentage of participants who were illiterate, having primary education, and junior education were 30%, 64%, and 6%, respectively. Results showed that the educational qualification was significantly associated with the preference of institutional delivery and other maternal health practices (χ^2=14.29, df= 2, p=0.00079). Cramer's V=0.53 which shows a large effect size. The study also shows significant associations between the educational status and antenatal care, iron and folic acid consumption, and tetanus toxoid vaccination.

Keywords: Birth Preparedness, Complication Readiness, Maternal Health, Urban Slums, Institutional Delivery, and Antenatal Care (ANC).

INTRODUCTION

Maternal Mortality remains a major global public health concern, particularly in low-resource settings. (World Health Organization, 2023; Say *et al*., 2014). Birth preparedness and complication readiness (BPCR) is a strategy that encourages pregnant women, their families, and their communities to effectively plan for childbirth and to prepare for emergencies if they occur. Maternal and infant mortality remains a global public health concern, particularly in low-resource settings (World Health Organization, 2023; Say *et al*., 2014). India has made effective progress in reducing maternal mortality; however, disparities persist in the urban slum populations. The urban slum population remains disproportionately vulnerable due to socioeconomic disadvantages and limited access to healthcare (Agarwal *et al*., 2007).

Problem Statement

Maternal health in the urban slums is a critical public health issue. Women often face unique challenges due to poverty, inadequate infrastructure, poor living conditions, and limited access to healthcare. These women have poor maternal health education and inadequate support systems during pregnancy and childbirth. This results in the underutilization of the essential maternal health services and high maternal and neonatal mortalities.

In order to address these challenges, there is an urgent need to increase awareness about the concept of birth preparedness and complication readiness in the urban slum areas. This will include improving access to antenatal care, disseminating accurate and needful information, and empowering women and their families to make informed decisions that enhance maternal and child health outcomes.

Scope of the Study

The study focuses on pregnant females who are residing in the urban slum areas of Meerut City who have enlisted themselves with the ASHA (Accredited Social Health Activist) and Anganwadi workers.

Rationale of the Study

Maternal health is essential to ensure the health and well-being of both the mother and the child; hence, addressing and improving the quality of maternal health services is important. According to the latest special bulletin on maternal mortality in India (2020-22) released by the Sample Registration System (SRS) and the Registrar General of India, the MMR is 88 per 100,000 live births, which indicates a decline from 97 reported in 2018-2020. Despite improvements in India's maternal mortality ratio (MMR), disparities persist in states such as Uttar Pradesh (Registrar General of India, 2024). States like Madhya Pradesh (159), Uttar Pradesh (141), and Chhattisgarh (141) are the top contributors to MMR, and Kerala (19) is at the lowest.

According to the latest Census (2011) data, Meerut district in Uttar Pradesh has the highest urban slum population, 544,859 slum dwellers in its urban areas, primarily Meerut city. Maternal health is important in the urban slums because pregnant women in these areas are at a high risk, and they often have limited access to health facilities due to social, economic, and environmental factors that affect the women living in these areas. The urban slums are often characterized by overcrowding, poor sanitation, inadequate access to clean water, and limited healthcare services.

Hence, to address these challenges, there is an urgent need to increase the awareness and knowledge about birth preparedness and complication readiness (BPCR) in urban slums.

Main Objective of the Study

To assess the awareness and knowledge of Birth Preparedness and Complication Readiness (BPCR) and examine the association between the educational status of the pregnant women and maternal health practices being followed in the urban slums of Meerut city, Uttar Pradesh.

LITERATURE REVIEW

Birth Preparedness and Complication Readiness (BPCR) is a vital strategy that reduces maternal and neonatal mortality and morbidity worldwide. It emphasizes the importance of birth planning and anticipating potential obstetric complications. This approach empowers women, families, communities, and healthcare providers to take proactive steps to address the obstetric challenges and emergencies and manage them on time. It is a proven strategy that addresses the challenges of maternal and neonatal mortality and morbidity. Its success requires a multi-sectoral approach involving the families, communities, healthcare providers, and policymakers.

BPCR is a comprehensive approach that encompasses several key components:

- Knowledge of Danger Signs: Educating women and families about the obstetric danger signs (e.g., severe bleeding, convulsions, prolonged labor, etc.), which help to identify the emergencies early.
- Antenatal Care (ANC): Regular ANC visits allow for the health assessments of the pregnant women, risk identification, and BPCR education.
- Plan for Skilled Birth Attendant: Ensuring delivery with the help of a trained healthcare provider minimizes the risks during childbirth.
- Financial Preparedness: Allocating the resources to cover the healthcare costs reduces delays in seeking care and out-of-pocket expenditures.
- Transportation Plan: Identifying a reliable transport option ensures timely access to the facilities during emergencies.
- Community and the Health System Engagement: Strengthening the community support and healthcare infrastructure fosters a conducive environment for BPCR.

Despite its potential, BPCR faces several challenges:

- Knowledge Gaps: Low levels of awareness and education among pregnant women, families, and communities.
- Financial Barriers: High costs of transportation, healthcare services, and other associated expenses.
- Infrastructure: Inadequate and unequipped healthcare facilities and a lack of skilled healthcare providers in remote areas.
- Sociocultural Constraints: Traditional Beliefs and gender norms may hinder timely decision-making.

Three Delays Model (TDM) Frameworks Adapted for the Basis of the Study

Thaddeus and Maine (1994) have provided a safe motherhood community with an explanatory model of maternal mortality that identifies the delays in seeking, reaching, and obtaining care at the facility as the key factors leading to the maternal and neonatal death. This explanatory model, also known as the **Three Delays Model** (TDM), categorizes delays into three types:

1. Delay in Decision-making.
2. Delay in reaching the healthcare facilities.
3. Delay in receiving appropriate care at the facility (see Figure 1 below)

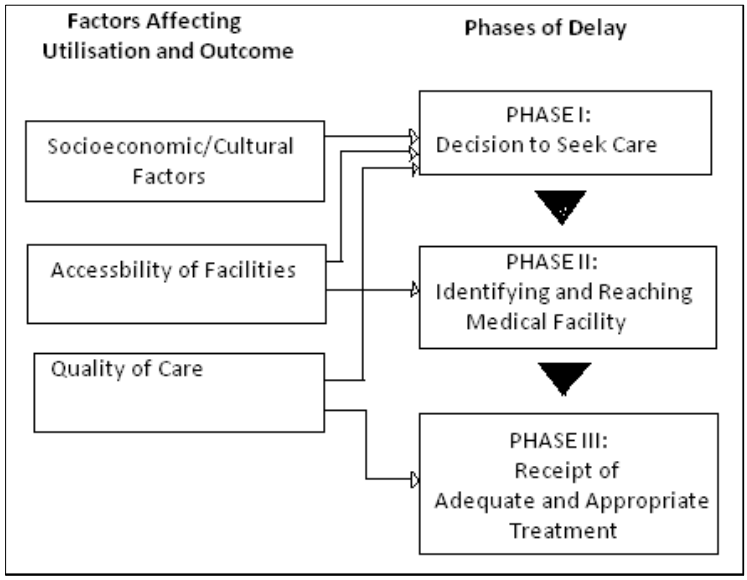

Figure 1: The Three Delays Model

Source: Manual on "Monitoring Birth Preparedness and Complication Readiness tools and indicators for maternal and newborn health" published by Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO). (Thaddeus and Maine, 1994)

Birth Preparedness and Complication Readiness (BPCR) promotes institutional delivery, financial preparedness, transport arrangements, and awareness of danger signs (Jhpiego, 2004; Hailu *et al*., 2011). It also promotes timely use of the skilled maternal and neonatal care, especially during childbirth, based on the theory that preparing for childbirth and being ready for complications reduces the delays in obtaining care. It includes institutional delivery planning, financial preparations, transport arrangements, identification of the blood donors, and awareness of the common obstetric danger signs.

Components of BPCR

Components of the birth preparedness and complication readiness plan include-

1. Identifying a place of delivery.
2. Saving money.
3. Preparing essential items for childbirth.
4. Identifying a skilled provider.
5. Identifying a mode of transportation.
6. Arranging blood donors.
7. Arranging a way for communication.
8. Designating a decision maker.

The BPCR core components were first presented in the Maternal and Neonatal Health Program by Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) in the year 2004 in their toolkit.

Systematic Literature Review (SLR)

Systematic Literature Review (SLR) – It is a rigorous, independent research method that aims to identify, synthesize, and evaluate all the relevant existing research on a specific and well-defined question. It uses a strict, pre-defined protocol to ensure transparency, reduce biases, and make the process replicable. The goal of SLR is to provide a comprehensive, evidence-based answer, identify gaps in current knowledge, and inform decision-making and policy.

Electronic searches were performed in Scopus, PubMed, Google Scholar, and Web of Science for the articles published between January 2011 and July 2025 in the English language. Inclusion criteria were the studies that reported BPCR knowledge and/or practice among pregnant women. The data extraction captured sample size, study design, BPCR component coverage, BPCR measurement instrument, and principal outcomes.

Key Steps in Conducting a Systematic Literature Review (SLR):

1. **Identifying a Research Question**: Begin by formulating a clear and specific research question.
2. **Developing a Protocol**: Creating a detailed plan which outlines the review's methods, scope, inclusion and exclusion criteria, and search strategy.
3. **Conducting Systematic Searches**: Performing a thorough, unbiased search of the relevant literature (e.g., articles, books, conference proceedings) using predefined search terms.
4. **Screening and Selecting Studies**: Filtering the search results, which are based on the eligibility criteria pre-defined in the protocol, and selecting the studies that are most relevant to the research question.
5. **Critically Appraising the Studies**: Evaluating the quality and strength of the evidence in the selected studies to assess their reliability.
6. **Extracting and Synthesizing the Data**: Systematically extracting the key data from the studies included and synthesizing the findings to identify patterns, themes, and their conclusions. .

Why Use a Systematic Review?

- **It Reduces Bias**- predefined methodology and strict protocol help to minimize the reviewer bias in study selection.
- **Enhances Transparency and Replicability**: The documented and transparent process allows other researchers to replicate the review.
- **Provides Evidence-Based Conclusions**: By evaluating all the relevant literature, it offers strong, reliable, and comprehensive conclusions.
- **Identifies Knowledge Gaps:** Clearly highlights the areas where further research is needed.
- **Informs Policy and Practice**: The high-quality systematic reviews provide valuable evidence to support policy development and evidence-based decision-making.

PRISMA Framework for Systematic Literature Review (SLR)

PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) is an evidence-based set of guidelines that ensures transparent and complete reporting of systematic reviews and meta-analyses. It is a 27-item checklist that provides a standardized framework for the authors to communicate their methods and findings clearly.

What PRISMA Includes

- PRISMA Checklist: A 27 item checklist having the minimum information is required to report a systematic review, covering the sections like title, abstract, introduction, methods, results, and discussion.
- PRISMA Flow Diagram: A four-phase diagram that visually depicts the progression of studies through the review process, showing the number of records identified, screened, and included in the final analysis.

Table 1: Identification of Research Gaps after SLR

S. No	Author Name	Country	Study Design	Sample Size	Findings	Research Gaps
1	Balcha, W. F., Awoke, A.M., Tagele Assefa, Geremew Elias, Giza Tigist, Aragaw Betehlem, Daniel Nigist (2024). Practice of Birth Preparedness and Complication Readiness: A health facility based cross sectional study.	Ethiopia	Cross-sectional	397	The study shows that having formal education, starting antenatal care contact in the first trimester of pregnancy, having knowledge of danger signs of labor and delivery, and birth preparedness and complication readiness were significantly associated with the practice	The role of family decision-making dynamics and the importance of financial and transportation arrangements to improve the BPCR indicators are not included

					of preparedness and complication readiness	
2	Parija, P. P., *et al*., (2023). How much do we follow birth preparedness? A Community based snapshot study from Rural Delhi, India	India	Cross-sectional	165	The study shows the importance of the involvement of family support to improve BPCR.	The study does not determine how fear, stigma, or denial about illness symptoms affects the decision to seek care.
3	Banerjee, M.I., Arora Vinod, Banerjee Suchandra, Madhwani K.P., Singh J.K., Sahasrabuddhe Aarti (2023). A study on BCPR in the field practice of RHTC in Central India	India	Cross sectional	420	The study shows Lack of awareness about possible complications during the time of pregnancy, delivery or post-natal period of pregnant women	The study does not include the importance of traditional, cultural practices, family support, and decision-making dynamics to improve the BPCR indicators
4	Chandrakar Tripti, Verma Nirmal, Gupta Shubhra A., Dhurandar Diwakar(2022). Evaluation of Birth Preparedness and Complication Readiness Index Among women of central India. A community based survey of slums	India	Cross sectional	230	Evaluation of the BPCR index was done, which was found to be low	The study does not do a subgroup analysis among pregnant women and recently delivered women.
5	Obionu, I. M., *et al*., (2022). Preparation for birth and complication readiness: Rural urban disparities among pregnant women in communities in Enugu State, Nigeria	Nigeria	Cross sectional	366	Community analyses show gaps in BPCR and facility referrals	The study did not examine transport network mapping or referral timelines, understanding of how beneficiaries define and perceive "adequate care,"
6	Orwa, J., *et al*., (2020). Birth preparedness and complication readiness among women of reproductive age in in Kenya and Tanzania. A community based cross sectional survey	Kenya/ Tanzania	Cross-sectional	1176	Mixed levels of BPCR; linked with facility delivery	The study aggregated heterogeneous settings without exploring local health system differences
7	Patel, G., Patel, H., Modi, A., Mukherjee, A., & Kosambiya, J. (2022). BPCR among pregnant women attending an urban health system in Surat	India	Cross sectional	310	Urban ANC attendees had better BPCR than community averages	Urban ANC attendees may be from different socioeconomic groups and educational backgrounds; this selection bias is not addressed. Understanding how varying levels of health knowledge influence patients' recognition of symptoms and timely care-seeking behavior. Also the study does not include barriers for those who do not attend the ANCs.
8	Sharma, N., Kumar, N., Singh, S., Malik, J., & Jangra, A. (2019). Status and determinants of BPCR in Haryana, India.	India	Cross sectional	200	Socio-economic status and education are strong determinants	The study lacked health system-level and community-level variables like distance to facility and transport facilities.
9	Bintabara, D., *et al*., (2017). Knowledge of obstetric danger signs among recently delivered women. *BMC Pregnancy Childbirth*	Tanzania	Cross-sectional	428	Low knowledge of danger signs despite ANC services	Did not assess the quality or content of ANC Counseling to assess the knowledge gaps, nor the training competence of providers. Lacked follow-up to assess whether counseling leads to behavior change

10	Akshaya, K. Shivalli S.(2017). Birth preparedness and complication readiness among beneficiaries of selected rural PHCs of Dakshina Kannada District	India	Cross sectional	217	Good practice where community programs are implemented	The study does not include the role of family decision-making dynamics and the importance of financial and transportation arrangements to improve the BCPR indicators
11	Ghosh, A., *et al*., (2017). Status of BPCR among recently delivered women in a Kolkata slum.	India	Cross sectional	93	Slum studies show poor preparedness and low recognition of danger signs	The study does not work on the barriers between awareness and practice, like household power dynamics, transportation, and financial management. Limited understanding of how beneficiaries define and perceive "adequate care," influencing their willingness to persist in seeking it
12	Moinuddin, M. *et al*., (2017). Birth preparedness and complication readiness among pregnant women in hard to reach areas in Bangladesh	Bangladesh	Cross-sectional	2897	Greater emphasis on BPCR interventions tailored for hard-to-reach areas is needed to improve skilled birth attendance, care seeking for complications and essential newborn care and facilitate reductions in maternal and neonatal mortality in low performing districts in Bangladesh	The study did not measure all recommended components of BPCR and was limited to only four components and did not include identifying potential blood donor.
13	Mukhopadhyay, D. K., *et al*., (2016). BPCR among women of Bankura District, West Bengal.	India	Cross sectional	355	The findings of the present study suggest the health system should use the missed opportunity during visits to health institutions to create awareness among the pregnant women and her family on how to plan for the pregnancy and identify danger signs during pregnancy, childbirth, and postpartum and the appropriate referral pathways	Cross sectional associations do not confirm whether financial planning causes better outcomes. Gaps exist in analyzing how beneficiaries weigh healthcare costs against daily survival needs.
14	Acharya, A.S., *et al*., (2015) Making pregnancy safer-BPCR study among antenatal women attendees of PHC Delhi	India	Cross sectional	417	The study shows education of women beyond middle school was the most important factor associated with awareness regarding various components of BPCR. Repeated IEC awareness programs may be initiated at the PHC towards community participation so that BPCR status improves for these women.	The study did not examine transport network mapping or referral timelines
15	Solnes Miltenburg, A., *et al*., (2015). Impact of BPCR interventions on birth with a skilled attendant: A Systematic review.	Multiple	Systematic review	NA	BPCR interventions increase skilled birth attendance in some contexts	A wide range of studies were included which limit the focused results as the demographic, socioeconomic, cultural variables differ
16	Mazumdar, R., *et al.*, (2014). Status of BPCR in a rural community, A study from West Bengal	India	Cross sectional	240	Rural West Bengal shows low BPCR;	The study gives evaluation of messaging channels like healthcare workers, media usage.

17	Markos, D., & Bogale, D. (2014). Birth Preparedness and Complication Readiness among women of childbearing age group in Goba Woreda, Oromia Region, Ethiopia.	Ethiopia	Cross-sectional	580	Low BPCR, education and ANC visits linked to better preparedness	Single site community survey which limits the generalization. Did not evaluate the household decision making dynamics and the facility quality perceptions which limit the facility usage.
18	Mbalinda, S. N., Nakimuli, A., Kakaire, O., Osinde, M. O., & Kaye, D. K. (2014). Does knowledge of danger signs of pregnancy predict birth preparedness?	Uganda	Cross-sectional	810	Though awareness about danger signs was low, knowledge of danger signs was associated with knowledge of birth preparedness. More emphasis should be given to emergency/ complication readiness during antenatal care sessions.	The study only focused about pregnant women having admitted for obstetric complications. It excluding the ones who might have complications but did not attend the hospital.
19	Soubeiga, D., *et al*., (2014). Birth Preparedness and Complication Readiness interventions to reduce maternal and neonatal mortality in developing countries. Systematic review.	Multiple	Systematic review	NA	BPCR interventions improve knowledge and some behaviors	Heterogeneity among studies included, limited pooled conclusions. Understanding how varying levels of health knowledge influence patients' recognition of symptoms and timely care-seeking behavior
20	Hailu, M., Gebremariam, A., Alemseged, F., & Deribe, K. (2011). Birth Preparedness and Complication Readiness among Pregnant Women in Southern Ethiopia.	Ethiopia	Cross-sectional	743	BPCR practice is low, and ANC attendance is associated with preparedness	The study sample is taken from a limited geographic area (southern Ethiopia) so findings may not be generalized within the country

Source: Researchers literature review analysis

Table 2: The Table below includes Independent Variables and Dependent variables identified from the research objectives and relevant literature review.

Research Objectives	Independent Variables	Dependent Variables
1. To explore the influence of family decision-making dynamics and traditional practices on birth preparedness and complication readiness among pregnant women.	Family decision-making dynamics, Traditional practices	Birth preparedness, Complication readiness
2. To determine the percentage of households that have made financial and transport arrangements for childbirth and emergencies.	None, Descriptive study -The objective is to measure the current state of arrangements, not to assess their influence on them.	None, Descriptive study -The objective is to measure the current state of arrangements, not to assess their influence on them.
3. To measure the percentage of pregnant women who can correctly identify at least three obstetric danger signs during pregnancy.	None, Descriptive study -The objective is to measure a characteristic, not to assess an influence on it.	None, Descriptive study -The objective is to measure a characteristic, not to assess an influence on it.
4. To assess the percentage of pregnant women who are aware of at least three components of birth preparedness and complication readiness	None, Descriptive study -The objective is to measure a characteristic, not to assess an influence on it.	None, Descriptive study -The objective is to measure a characteristic, not to assess an influence on it.
5. To assess the beneficiary perception of quality of care at the government Healthcare facilities.	Quality of care (as delivered/experienced by the beneficiaries)	Beneficiary perception (of the quality of care)

Source: Researchers literature review analysis

The research objectives mentioned in Table 2 have emerged from research gaps obtained and mentioned in Table 1.

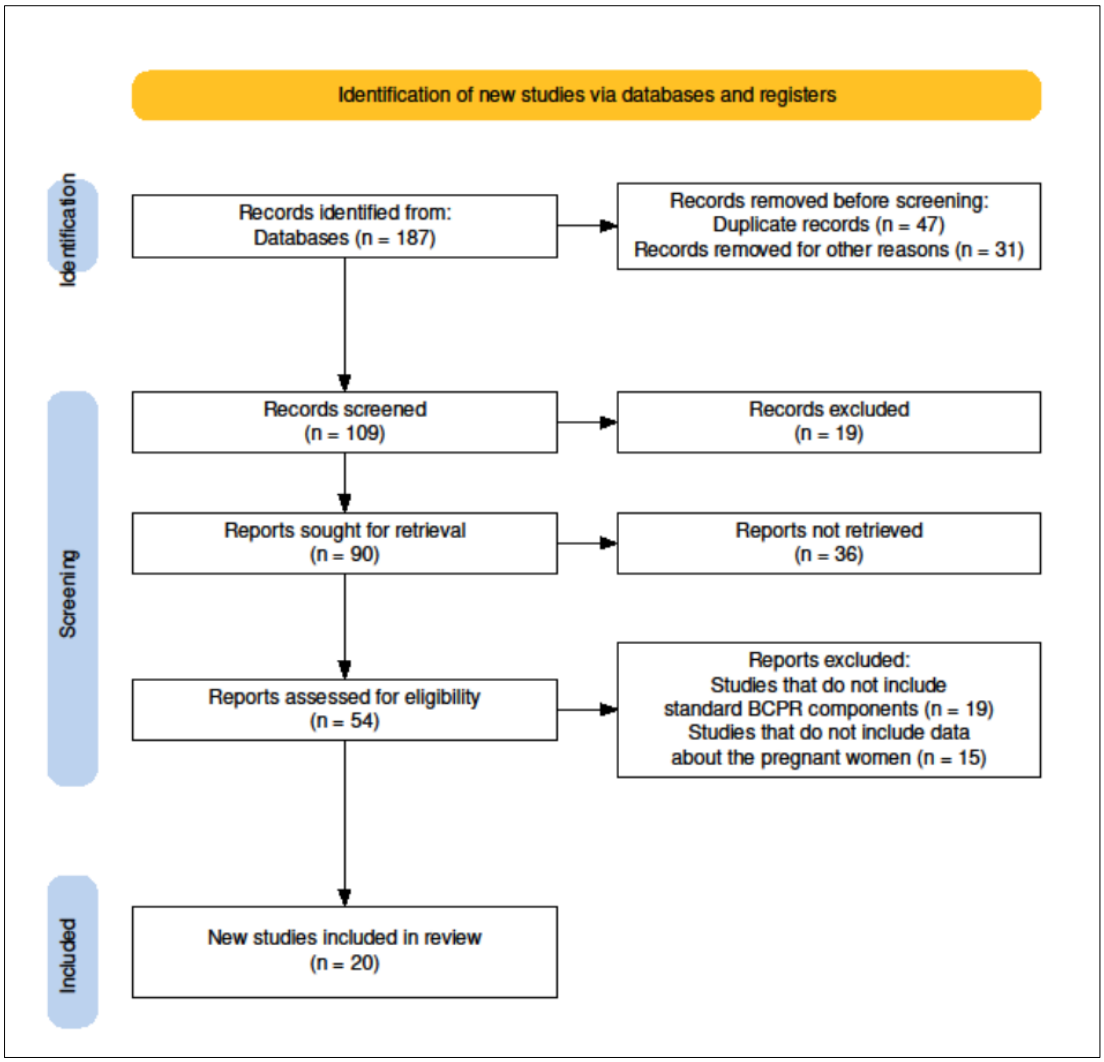

Figure 2: PRISMA Flow diagram

METHODOLOGY

Objective

The objective was to assess the knowledge and awareness of Birth Preparedness and Complication Readiness (BPCR) and examine the association between the educational status of the pregnant women and maternal health practices being followed in the urban slums of Meerut city, Uttar Pradesh.

Hypothesis:

1) H_{01}Null Hypothesis:

There is no association between the educational status of the pregnant women and maternal health practices (place of delivery-home/ institutional-hospital) being followed in the urban slums of Meerut city, Uttar Pradesh.

H_{a1}Alternate Hypothesis:

There is a significant association between the educational status of the pregnant women and maternal health practices (place of delivery-home/ institutional-hospital) being followed in the urban slums of Meerut city, Uttar Pradesh.

2) H_{02}Null Hypothesis:

There is no association between the educational status of the pregnant women and maternal health practices (antenatal care –ANC attendance) being followed in the urban slums of Meerut city, Uttar Pradesh.

H_{a2}Alternate Hypothesis:

There is a significant association between the educational status of the pregnant women and maternal health practices (antenatal care –ANC attendance) being followed in the urban slums of Meerut city, Uttar Pradesh.

3) H_{03}Null Hypothesis:

There is no association between the educational status of the pregnant women and maternal health practices (Iron-Folic acid consumption) being followed in the urban slums of Meerut city, Uttar Pradesh.

H_{a3}Alternate Hypothesis:

There is a significant association between the educational status of the pregnant women and maternal health practices (Iron-Folic acid consumption) being followed in the urban slums of Meerut city, Uttar Pradesh.

4) H_{04}Null Hypothesis:

There is no association between the educational status of the pregnant women and maternal health practices (Tetanus vaccination) being followed in the urban slums of Meerut city, Uttar Pradesh.

H_{a4}Alternate Hypothesis:

There is a significant association between the educational status of the pregnant women and maternal health practices (Tetanus vaccination) being followed in the urban slums of Meerut city, Uttar Pradesh.

Study Design:

A community-based cross-sectional study was conducted to assess the awareness and knowledge of Birth Preparedness and Complication Readiness (BPCR) among pregnant women in the urban slum areas of Meerut city, Uttar Pradesh.

Study Setting:

The study was carried out from November 2025 till January 2026 in selected urban slum areas of Meerut city, Uttar Pradesh. Pregnant women were interviewed from these areas using a detailed questionnaire. These urban slum areas are characterized by overcrowding, inadequate sanitation, low literacy rates, low socioeconomic status, and limited healthcare accessibility. Maternal healthcare services in these areas are primarily delivered through the government health facilities, Accredited Social Health Activists (ASHAs), and Auxiliary Nurse Midwives (ANMs).

Study Population:

The study population included the pregnant women residing in the selected urban slum areas during the study period and those who were willing to participate and provide informed consent.

Sample Size: 50 Pregnant Women (age range between 19 and 35 years)

Study Tool

Data was collected using a pre-structured questionnaire designed to assess socio-demographic characteristics, awareness of BPCR, antenatal practices being followed, delivery preferences, etc. The questionnaire included both categorical variables and Likert- scale responses.

Sampling Technique

A non-probability convenience sampling technique was used. The selected urban slums were visited with the assistance of local health care workers (ASHA/ANMs), and eligible pregnant women were identified and recruited.

Data Collection Procedure

The data was collected through face-to-face interviews. The purpose of the study was explained, and written informed consent was obtained before participation. Confidentiality and anonymity were ensured by assigning identification codes instead of personal identifiers. The respondents were classified into the following categories based on their educational qualifications.

- Illiterate- The women who said in the interview that they have never been to any educational institute, nor can they read or write.
- Primary education level- The women who are educated up to class 5
- Junior education level- The women who are educated up to class 8
- High School level - The women who are educated up to class 10
- Intermediate level- The women who are educated up to class 12

Data Analysis

The data was entered in MS Excel. The data was checked for completeness and consistency before analysis. Descriptive statistics were computed. The data was computed using descriptive statistics. The associations between the educational qualification and maternal health practices were assessed using the chi-square test. The effect size was also

estimated using Cramer's V, where expected cell counts were <5; results were interpreted cautiously due to the potential violation of Chi-square assumptions. Significance level: $p < 0.05$.

RESULTS

Table 3: Education Distribution (n=50)

Educational Level of Pregnant women	N	%
Illiterate	15	30
Primary (up to class 5)	32	64
Junior (up to class 8)	3	6

Source: Researchers' analysis

Table 4: Education and Preference for Institutional/ Hospital Delivery (n=50)

Educational Level of Pregnant women	Home Delivery n (%)	Institutional Delivery n (%)
Illiterate	15 (100)	0 (0)
Primary (up to class 5)	20 (62.5)	12 (37.5)
Junior (up to class 8)	0 (0)	3 (100)

Source: Researchers' analysis

Calculations

Expected Frequencies (E)-

Illiterate

- Home Deliveries $E=\frac{15\times35}{50}=10.5$
- Hospital Deliveries $E=\frac{15\times15}{50}=4.5$

Primary

- Home Deliveries $E=\frac{32\times35}{50}=22.4$
- Hospital Deliveries $E=\frac{32\times15}{50}=9.6$

Junior

- Home Deliveries $E=\frac{3\times35}{50}=2.1$
- Hospital Deliveries $E=\frac{3\times15}{50}=0.9$

Chi-Square Formula-

- $\chi^2=\frac{(O-E)^2}{E}=0.9$

Illiterate home deliveries = $\frac{(15-10.5)^2}{10.5}=1.93$

Illiterate hospital deliveries = $\frac{(0-4.5)^2}{4.5}=4.50$

Primary home deliveries = $\frac{(20-22.4)^2}{22.4}=0.26$

Primary hospital deliveries = $\frac{(12-9.6)^2}{9.6}=0.60$

Junior home deliveries = $\frac{(0-2.1)^2}{2.1}=2.10$

Junior hospital deliveries = $\frac{(3-0.9)^2}{0.9}=4.90$

Total Chi Square Value $\chi^2=1.93+4.50+0.26+0.60+2.10+4.90$

$\chi^2=14.29$

Degree of Freedom (df) = (r-1) (c-1); where 'r' is no. of rows and 'c' no. of columns in the matrix (3 x 2).

= (3-1) (2-1)

df = 2

Table value of Chi-Square-

df =2

Standard significance level $\alpha=0.05$

From Chi Square Distribution table

Significance level α Critical Value (df=2)

- 0.05 5.991
- 0.01 9.210
- 0.001 13.816

Interpretation

Since the calculated value, 14.29> the table value, either of 5.991/9.210/ 13.816 (at all values of alpha).

Hypothesis 1,H_{01})

So the Null hypothesis is rejected, and we accept alternate hypothesis that there is a significant association between the educational status of the pregnant women and maternal health practices (place of delivery) being followed in the urban slums of Meerut city, Uttar Pradesh

The result is statistically significant even at the 0.001 level.

p = 0.00079

Cramer's V measures the strength of association between two categorical variables after a Chi-square test. It does not test statistical significance, which is done by Chi-square and p-value. Cramer's V only measures effect size (strength). The Cramer's effect size is calculated by the formula-

$V=\sqrt{\frac{\chi^2}{n(k-1)}}$

Where,

χ^2 is Chi-Square

n is the sample size

k= smaller number of: (no. of rows) or (no. of columns)

$V=\sqrt{\frac{14.29}{50(1)}}$

Cramer's V = 0.53

Criteria for interpretation of Cramer's Value-

Cramer's Value		Interpretation
0.00-0.10	-	Negligible association
0.10-0.30	-	Weak association
0.30-0.50	-	Moderate association
>0.50	-	Strong association

Hence,

Cramer's Value V=0.53, which shows a strong association between educational qualification and place of delivery.

Table 5: Education and ANC attendance (n=50)

Educational Level of Pregnant women	ANC Yes n (%)	No n (%)
Illiterate	0 (0)	15 (100)
Primary (up to class 5)	12 (37.5)	20 (62.5)
Junior (up to class 8)	3 (100)	0 (0)

Source: Researchers' analysis

Calculations

The expected frequencies and individual Chi Square had been earlier separately calculated for each educational qualification as previously shown, and now in the case of antenatal care (ANC) attendance above.

$\chi^2=\frac{(O-E)^2}{E}$

Total Chi-Square Value, χ^2=14.29

Degree of Freedom (df) = (r-1) (c-1)

= (3-1) (2-1)

df = 2

Table value of Chi-Square-

df =2

Standard significance level α=0.05

From Chi Square Distribution table

Significance level α Critical Value (df=2)

- 0.05 5.991
- 0.01 9.210
- 0.001 13.816

Interpretation
Since the calculated value 14.29> the table value, either of 5.991/9.210/ 13.816 (at all values of alpha)
The result is statistically significant even at the 0.001 level.
p = 0.00079

Hypothesis 2, H_{02})
So the null hypothesis is rejected, and alternate hypothesis is accepted; there is a significant association between educational status and antenatal care (ANC) attendance.

The Cramer's effect size is calculated by the earlier used formula in Hypothesis 1 by substituting the formula.
Cramer's V = 0.53
Hence,
Cramer's Value V=0.53, which shows a strong association between educational qualification and Antenatal Care (ANC) attendance
Significant association observed ($p < 0.05$).

Table 6: Education and Iron-Folic Acid Consumption

Educational Level of Pregnant women	IFA Yes n (%)	No n (%)
Illiterate	0 (0)	15 (100)
Primary (up to class 5)	10 (31.3)	22 (68.7)
Junior (up to class 8)	3 (100)	0 (0)

Source: Researchers' analysis

Calculations
The expected frequencies and individual Chi-Square tests had been earlier calculated separately for each educational qualification, as previously shown; now, as shown in the case of Iron folic acid consumption.
Chi-Square Formula-
$\chi^2 = \frac{(O-E)^2}{E}$

Total Value of Chi- Square, $\chi^2=14.27$
Degree of Freedom (df) = (r-1) (c-1)
= (3-1) (2-1)
df = 2
Table value of Chi-Square-
df =2
Standard significance level α=0.05
From Chi Square Distribution table

Significance level α Critical Value (df=2)

- 0.05 5.991
- 0.01 9.210
- 0.001 13.816

Interpretation-
Since the calculated value 14.27> the table value, either of 5.991/9.210/ 13.816 (at all values of alpha)

Hypothesis 3, H_{03})
So the null hypothesis is rejected, and alternate hypothesis is accepted; there is a significant association between educational status and Iron Folic acid consumption.

The result is statistically significant even at the 0.001 levels.
p = 0.00080
The Cramer's effect size is calculated by the earlier used formula in Hypothesis 1 by substituting the formula.

Cramer's V = 0.53
Criteria for interpretation of Cramer's Value-

Cramer's		Value Interpretation
0.00-0.10	-	Negligible association
0.10-0.30	-	Weak association
0.30-0.50	-	Moderate association
>0.50	-	Strong association

Hence,

Cramer's Value V=0.53, which shows a strong association between educational qualification and iron and folic acid consumption during pregnancy.
Significant association observed ($p < 0.05$).

Table 7: Education and Tetanus Vaccination

Educational Level of Pregnant women	TT Yes n (%)	No n (%)
Illiterate	0 (0)	15 (100)
Primary (up to class 5)	12 (37.5)	20 (62.5)
Junior (up to class 8)	3 (100)	0 (0)

Source: Researchers' analysis

Calculations

The expected frequencies and individual Chi-Square had been earlier separately calculated for each educational qualification as previously shown; now in the case of Tetanus Vaccination above.

The Chi-Square
Chi-Square Formula-
$\chi^2 = \frac{(O-E)^2}{E}$

Total Value of, χ^2=14.29
Degree of Freedom (df) = (r-1) (c-1)
= (3-1) (2-1)
df = 2
Table value of Chi Square-
df =2
Standard significance level α=0.05
From Chi Square Distribution table

Significance level α	Critical Value (df=2)
• 0.05	5.991
• 0.01	9.210
• 0.001	13.816

Interpretation
Since the calculated value 14.29> the table value, either of 5.991/9.210/ 13.816 (at all values of alpha)

Hypothesis 4, H_{04})

So the null hypothesis is rejected, and alternate hypothesis is accepted; there is a significant association between educational status and Tetanus Vaccination.

The result is statistically significant even at 0.001 levels.
p = 0.00079

The Cramer's effect size is calculated by the earlier used formula in Hypothesis 1 by substituting the formula-
Cramer's V = 0.53
Criteria for interpretation of Cramer's Value-

Cramer's	Value Interpretation

0.00-0.10 - Negligible association
0.10-0.30 - Weak association
0.30-0.50 - Moderate association
>0.50 - Strong association

Hence,

Cramer's Value V=0.53 which shows strong association between educational qualification and administration of tetanus vaccination during pregnancy.

Significant association observed ($p < 0.05$).

DISCUSSION

The study examined the knowledge and awareness of Birth Preparedness and Complication Readiness among pregnant women residing in the urban slums of Meerut City, Uttar Pradesh, and explored the association between the educational status and maternal health practices. It demonstrates that the maternal education of the pregnant women is a strong determinant of BPCR-related practices in urban slums. Maternal education enhances health literacy, care seeking behavior, and autonomy (Patel *et al*., 2022).

The study findings indicate that there is limited awareness of BPCR among a substantial proportion of respondents. Although some of the women expressed a preference of institutional deliveries, antenatal care utilization, iron folic acid consumption and tetanus vaccination, overall the preparedness indicators remained suboptimal. This reflects the persistent inequities in maternal health knowledge among the urban slum population, despite the national maternal health programs under the National Health Mission (NHM).

Urban Slums represent a paradox in public health: geographical proximity to healthcare facilities does not necessarily translate into access or utilization. Structural barriers such as low literacy, overcrowding, economic constraints, and perceived poor quality of government services continue to hinder the effective BPCR implementation (Agarwal *et al*., 2007; Ghosh *et al*., 2017). The Illiterate women exhibited 100% preference for home delivery, 0% ANC attendance, 0%IFA consumption and 0% TT vaccination.

These findings align with the public health evidence that maternal education improves healthcare utilization and reduces the maternal risk.

Strengths

- Analytical design
- Public health relevance
- Effect size reporting
- Focus on vulnerable slum population

Limitations

- Cross-sectional design
- Small sample size
- Self-reported data

CONCLUSION

The study assessed the knowledge and awareness of BCPR practices among the pregnant women residing in the urban slum areas of Meerut city, Uttar Pradesh. It also examined the association between the educational status of the pregnant women and maternal health practices being followed.

The findings reveal that there are substantial gaps in BPCR practices within this vulnerable population. Educational status of the pregnant women significantly influences the BPCR awareness, practices and maternal healthcare utilization in the urban slums of Meerut City. These findings analyze the pivotal role of the maternal education in promoting the birth preparedness reducing the preventable maternal health risks. Strengthening the female literacy and targeted healthcare education and interventions are essential for improving the maternal health outcomes.

Recommendations

Although the study is limited by the small sample size and the cross- sectional design, it provides important localized evidence which demonstrates that maternal health education is the key driver to improve the BPCR practices in urban slum settings.

Future research with large sample sizes and multivariate analysis are recommended to further explore the independent predictors of BPCR.

Ethical Considerations

Informed consent was obtained from all participants. Confidentiality of data was maintained. Participation was voluntary. No incentives were provided for the participation.

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