Utilization of Home-Based Newborn Care Services in District Meerut, Uttar Pradesh: A Community-Based Cross-Sectional Study

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Abstract:

Background: The neonatal period contributes substantially to infant and under-five mortality, particularly in low- and middle-income countries. Despite implementation of the Home-Based Newborn Care (HBNC) program under the National Health Mission, variations in service coverage and quality persist. Objective of the study was to assessed the utilization and quality of HBNC services in Meerut district, Uttar Pradesh. **Material & Methods:** A community-based cross-sectional study was conducted among 360 mothers of infants aged 6-14 weeks across 12 blocks of Meerut district using a two-stage cluster sampling technique. Data regarding HBNC visits, feeding practices, immunization, and maternal awareness of neonatal danger signs were collected through face-to-face interviews and analyzed using Jamovi Version 2.6.44. **Results:** Complete scheduled HBNC visits were received by 87.5% of newborns. Institutional delivery was reported in 93.6% cases, while 83.9% infants were age-appropriately immunized. Weight monitoring was performed in 87.8% newborns and temperature monitoring in 68.1%. Kangaroo Mother Care was practiced by 53.6% mothers. Early initiation of breastfeeding was reported in 35.3% cases, whereas exclusive breastfeeding prevalence was 71.9%. Substance application to the umbilical cord was observed in 43.9% newborns. Maternal awareness regarding neonatal danger signs such as convulsions (3.3%) and lethargy (4.4%) was low. **Conclusion:** The study reported coverage under the HBNC program; however, important gaps were identified in comprehensive newborn assessment, early initiation of breastfeeding, and maternal awareness of neonatal danger signs. Strengthening supportive supervision, refresher training, and behaviour change interventions may improve the overall effectiveness of the program.

Keywords: Home-Based Newborn Care; HBNC; neonatal health; ASHA; Newborn care practices; rural health.

Key Message: Important gaps persisted in temperature monitoring, postnatal counselling, early initiation of breastfeeding, and maternal awareness of neonatal danger signs among beneficiaries of Home-Based Newborn Care services in Meerut. Strengthening the quality and comprehensiveness of HBNC services is essential for improving neonatal and maternal health outcomes.

Introduction

The neonatal period remains the most vulnerable phase of life and contributes substantially to infant and under-five mortality worldwide. India continues to bear a significant share of the global neonatal burden, with prematurity, low birth weight, birth asphyxia, and infections being major causes of neonatal deaths.[1,2] Timely postnatal care and early identification of neonatal danger signs are essential for improving newborn survival.

To address gaps in postnatal care, the Government of India launched the Home-Based Newborn Care (HBNC) program under the National Health Mission. The program involves scheduled home visits by Accredited Social Health Activists (ASHAs) to promote essential newborn care practices, breastfeeding, thermal care, immunization, and timely referral of sick newborns.[3] Evidence suggests that effective implementation of HBNC can improve neonatal outcomes; however, variability in service coverage and quality has been reported across different regions of India.[4,5]

Considering the limited district-level evidence from western Uttar Pradesh, the present study was undertaken to assess the utilization of HBNC services and evaluate key newborn and postnatal care practices among beneficiaries in rural Meerut district.

Aim

To assess the utilization and quality dimensions of Home-Based Newborn Care (HBNC) services among beneficiaries in District Meerut, Uttar Pradesh.

Objectives

1. To assess the coverage of Home-Based Newborn Care services among mothers of infants aged 6-14 weeks in Meerut district.

2. To assess maternal awareness regarding neonatal danger signs.
3. To assess postnatal care practices and counselling services provided to mothers during HBNC visits.

Materials And Methods

Study Type: A community-based cross-sectional study was conducted among beneficiaries of Home-Based Newborn Care (HBNC) services.

Study Population: The study population included mothers of infants aged 6-14 weeks who had received HBNC services through Accredited Social Health Activists (ASHAs).

Study Area: The study was conducted in 12 blocks of Meerut district, Uttar Pradesh.

Study Duration: The study was conducted during 2023-2024.

Sample Size Calculation: The sample size calculation has been expanded in the revised manuscript. The formula used was $n = Z^2pq/d^2$, where Z = 1.96 at 95% confidence level, p = 64.5% (anticipated proportion of home-based newborn care visits from the study by Pathak et al.), q = 1 - p, and d = 5% absolute precision. The calculated minimum sample size was 360. The reference study used for estimating prevalence has also been cited appropriately. Since equal cluster sizes were selected, design effect was not incorporated, and this has been acknowledged in the limitations.

A two-stage cluster sampling technique was employed for participant selection. In the first stage, all 12 rural blocks of Meerut district were included as clusters. A complete list of Accredited Social Health Activists (ASHAs) working under the respective Community Health Centres (CHCs) of each block was obtained from the concerned CHCs and served as the sampling frame. From each block, six ASHAs were selected by simple random sampling using the lottery method. Probability Proportional to Size (PPS) sampling was not employed, as an equal number of ASHAs were selected from each block.

In the second stage, a list of eligible mothers (mothers of infants aged 6-14 weeks) under each selected ASHA was prepared using the Home-Based Newborn Care (HBNC) due list, ASHA registers, and Mother and Child Protection (MCP) registers maintained by the respective Auxiliary Nurse Midwife (ANM). From each selected ASHA area, five eligible mothers were selected by simple random sampling using the lottery method. Thus, a total of 30 mothers were selected from each block (6 ASHAs × 5 mothers), resulting in a final sample of 360 mothers.

Participant Flow: Eligible mothers identified - Approached - Consented - Analysed.

Data Collection Tools and strategy: Data were collected through face-to-face interviews using a pre-tested semi-structured questionnaire based on HBNC operational guidelines. Information regarding antenatal care, institutional delivery, HBNC visits, newborn care practices, postnatal counselling, immunization, and maternal awareness of danger signs was collected. MCP cards were reviewed for verification of birth weight and immunization details.

Inclusion Criteria: Mothers of infants aged 6-14 weeks who consented to participate were included in the study.

Exclusion Criteria: Mothers who were unavailable after repeated visits or refused consent were excluded from the study.

Consent: Written informed consent was obtained from all participants before data collection.

Data Analysis - Statistical Tests: Data were entered in Microsoft Excel and analyzed using Jamovi Version 2.6.44. Descriptive statistics were presented in the form of frequencies and percentages.

Ethical Issues: Ethical approval was obtained from the Institutional Ethics Committee, Lala Lajpat Rai Memorial Medical College, Meerut (IEC No. SC-1/2026/667 dated 22/01/2026)

Results

The Present study was conducted among a total of 360 mother who had received HBNC services.

It was found that complete scheduled HBNC visits were received by 315 (87.5%) newborns (fig.1). Maternal awareness regarding HBNC services was reported by 290 (80.6%) beneficiaries. Regarding antenatal and delivery-related healthcare services, antenatal care registration was reported among 287 (79.7%) mothers. However, only 190 (52.8%) completed four or more antenatal visits. Institutional delivery was reported in 337 (93.6%) cases, of which 188 (52.2%) occurred in government facilities and 149 (41.4%) in private facilities (Table 1).

Fig. 1 Coverage of Complete Scheduled HBNC Visits (N = 360 newborns)

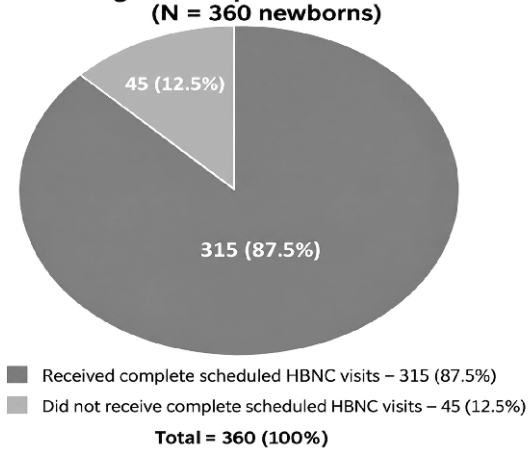


Table 1: Antenatal and delivery service utilization (n=360)

Variable	Frequency	Percentage (%)
ANC registered	287	79.7
≥4 ANC visits	190	52.8
Institutional delivery	337	93.6
Government facility	188	52.2
Private facility	149	41.4

Assessment of components performed during HBNC visits showed variation. Weight measurement was carried out for 316 (87.8%) newborns, whereas temperature monitoring was performed in 245 (68.1%) cases. Handwashing before newborn examination was reported in 299 (83.1%) visits. While kangaroo Mother Care (KMC) was practiced by 193 (53.6%) mothers (Table 2).

Component	Frequency	Percentage (%)
Weight measurement	316	87.8
Temperature monitoring	245	68.1
Handwashing before exam	299	83.1
Kangaroo Mother Care	193	53.6

Table 2: Newborn assessment components during HBNC visits (n=360).

Essential newborn care practices demonstrated varied adherence. Majority of mothers i.e 84.4% reported cord cleaning in newborns; however, 158 (43.9%) families applied substances to the umbilical cord. Eye application practices were reported in 136 (37.8%) newborns.

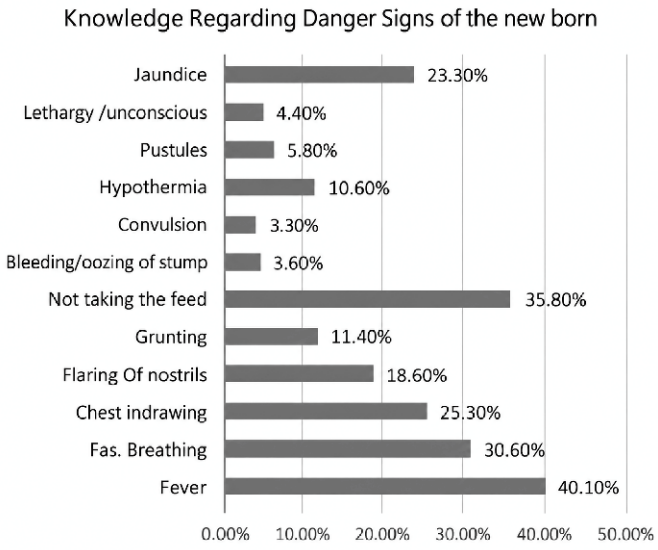
Regarding feeding practices, early initiation of breastfeeding within one hour of birth was reported in 127 (35.3%) cases. Pre-lacteal feeding was given to 103 (28.6%) newborns. Colostrum feeding was practiced by 322 (89.4%) mothers, and exclusive breastfeeding was reported in 259 (71.9%) infants (Table 3).

Table 3: Essential newborn care practices among beneficiaries (n = 360)

Practice	Frequency	Percentage (%)
Cord and eye care practices (n=360)		
Cord cleaning done	304	84.4
Substance applied to cord	158	43.9
Any eye application	136	37.8
Newborn Feeding Practices		
Early initiation (<1 hour)	127	35.3
Pre-lacteal feeding	103	28.6
Colostrum feeding	322	89.4
Exclusive breastfeeding	259	71.9

Immunization status assessment revealed that 302 (83.9%) infants were age-appropriately immunized as per schedule, while the remaining infants were either partially immunized or had missed one or more scheduled doses at the time of assessment.

Fig. 2: Maternal awareness of selected newborn danger signs (n=360).



Maternal awareness of selected newborn danger signs was variable. Fever was recognized by 145 (40.3%) mothers, and fast breathing by 110 (30.6%). Awareness of convulsions was reported by 12 (3.3%) mothers, lethargy by 16 (4.4%), and hypothermia by 38 (10.6%) (Fig. 2).

Table 4: Postnatal care services received by mothers (n = 360)

PNC Component	Yes n (%)	No n (%)
Temperature monitoring done	245 (68.1)	115 (31.9)
Advice on meals per day	216 (60.0)	144 (40.0)
Advice on heavy bleeding	91 (25.3)	269 (74.7)
Advice on foul-smelling discharge with fever	49 (13.6)	311 (86.4)
Advice on fits/convulsions	12 (3.3)	348 (96.7)
Advice on low milk production	97 (26.9)	263 (73.1)
Advice on breast/nipple problems	88 (24.4)	272 (75.6)
Other advice (UTI/lower limb pain)	18 (5.0)	342 (95.0)

Postnatal care services received by mothers showed considerable variation across different counselling and assessment components. Temperature monitoring during the postnatal period was reported by 68.1% mothers. Counselling regarding adequate dietary intake was provided to 60% mothers, whereas advice on major maternal danger signs such as heavy bleeding, foul-smelling discharge with fever, and convulsions was comparatively low (Table 4). Counselling related to breastfeeding difficulties, including low milk production and breast or nipple problems, was also inadequate in a substantial proportion of mothers.

Discussion

The present study assessed the utilization and quality dimensions of Home-Based Newborn Care (HBNC) services in rural Meerut and demonstrated satisfactory program coverage with identifiable gaps in selected components of newborn and postnatal care. While institutional delivery linkage and scheduled HBNC visits were encouraging, deficiencies persisted in comprehensive newborn assessment, early initiation of breastfeeding, maternal awareness of neonatal danger signs, and postnatal counselling. These findings suggest that although the structural framework of HBNC is functioning adequately in the study area, strengthening qualitative aspects of service delivery remains necessary.

Coverage of HBNC visits in the present study was comparatively higher than that reported in several previous studies. Pathak et al.[6] reported incomplete HBNC visit coverage in rural Lucknow, whereas Garg et al.[7] observed variability in screening and visit completion across districts of Chhattisgarh. Higher coverage in the present study may reflect better ASHA outreach and stronger linkage between institutional delivery and community-based follow-up. Rasaily et al.[5] demonstrated that effective implementation of HBNC interventions can contribute significantly to reductions in neonatal and infant mortality.

The proportion of institutional deliveries observed in the present study was high, indicating improved utilization of maternal health services under the National Health Mission. However, completion of four or more antenatal visits remained comparatively lower. Similar findings have been reported by Garg et al.[7] and Pathak et al.[6], where institutional delivery improved substantially while continuity of antenatal care remained suboptimal. Adequate antenatal care plays an important role in preparing mothers for newborn care practices and timely health-seeking behaviour.

Assessment components performed during HBNC visits showed variability. Weight monitoring was conducted for a majority of newborns; however, temperature monitoring was comparatively lower. Similar gaps in comprehensive newborn examination have been documented by Pathak et al.[6] and Garg et al.[7] Inadequate temperature monitoring may compromise early identification of hypothermia, which remains an important contributor to neonatal morbidity in resource-limited settings. Devi et al.[8] reported comparable variability in thermal care practices in rural Uttarakhand, suggesting that counselling quality and family support influence adoption of Kangaroo Mother Care and related practices.

Feeding practices observed in the present study demonstrated mixed adherence to recommended newborn care practices. Early initiation of breastfeeding was low despite relatively higher exclusive breastfeeding prevalence. Similar inconsistencies have been reported by Islam et al.[9] and Sharma et al.[10] in northern Indian settings. Delayed initiation of breastfeeding is often associated with institutional delivery practices and inadequate counselling immediately after birth, whereas continuation of exclusive breastfeeding may improve with repeated community-level counselling during HBNC visits. Pre-lacteal feeding practices observed in the present study also indicate persistence of traditional beliefs influencing newborn feeding behaviour.

A considerable proportion of families continued applying substances to the umbilical cord and using eye applications despite receiving HBNC services. Comparable findings have been reported by Arumugam et al.[11], who documented persistence of culturally rooted newborn care practices in community settings. These findings suggest that information delivery alone may not be sufficient to modify entrenched behaviours, and sustained behaviour change communication involving family members may be necessary.

Maternal awareness regarding neonatal danger signs was limited, particularly for convulsions, lethargy, and hypothermia. Similar observations have been reported by Islam et al.[9] and Sharma et al.[10], where inadequate caregiver knowledge contributed to delayed care-seeking. Since ASHAs often serve as the first point of contact for neonatal illness in rural communities, strengthening counselling during antenatal and postnatal visits is essential to improve early recognition and timely referral.

The present study also highlighted important gaps in postnatal counselling provided to mothers. Although temperature monitoring during the postnatal period was relatively satisfactory, counselling regarding maternal danger signs such as heavy bleeding, foul-smelling discharge with fever, and convulsions was limited. Counselling related to breastfeeding difficulties, low milk production, and breast or nipple problems was also inadequate. Choudhary et al.[12] similarly reported variability in ASHA knowledge and performance regarding home-based newborn care and postnatal counselling. These observations indicate that while contact coverage may be adequate, the comprehensiveness and quality of counselling require strengthening through periodic refresher training and supportive supervision.

Immunization coverage among infants in the present study was relatively high, reflecting effective integration between HBNC visits and routine child health services. Comparable findings have been reported by Awasthi et al.[13], where frontline worker engagement improved uptake of preventive healthcare services in community settings.

Overall, the findings indicate that HBNC implementation in rural Meerut has achieved satisfactory quantitative coverage; however, gaps remain in newborn assessment, breastfeeding practices, postnatal counselling, and maternal awareness of danger signs. Strengthening supportive supervision, periodic capacity building of ASHAs, and improved coordination between facility-based and community-based newborn care services may further enhance the effectiveness of HBNC implementation and contribute to improved neonatal health outcomes.

Conclusion

The present study reported utilization of Home-Based Newborn Care services in Meerut, with 87.5% of newborns receiving complete HBNC visits and 93.6% institutional deliveries. Immunization coverage was also relatively high (83.9%). However, considerable differences were noted in the quality of newborn care and postnatal healthcare practices. While weight monitoring was performed in majority newborns (87.8%), temperature monitoring was comparatively lower (68.1%). Maternal awareness regarding critical neonatal danger signs such as convulsions (3.3%) and lethargy (4.4%) was limited. Persistence of traditional practices such as cord application (43.9%) further indicates gaps in behavioural adoption. Counselling regarding postnatal care services was inconsistent, with advice on adequate meals provided to 60% of mothers, while counselling regarding heavy bleeding (25.3%), foul-smelling discharge with fever (13.6%), and convulsions (3.3%) remained limited. The findings highlight that although HBNC coverage in the study area was encouraging, qualitative inconsistencies remain across newborn assessment, maternal counselling, and postnatal care practices.

Overall, while coverage of HBNC visits, institutional delivery, and immunization was high, considerable variation was observed across components of newborn assessment, feeding practices, postnatal counselling services, and maternal awareness regarding neonatal and maternal danger signs.

Recommendations

Regular refresher training and supportive supervision of ASHAs should be strengthened to improve the quality and comprehensiveness of Home-Based Newborn Care services. Greater emphasis is needed on temperature monitoring, counselling regarding early initiation of breastfeeding, recognition of neonatal and maternal danger signs, and management of breastfeeding-related problems. Behaviour change communication strategies should focus on reducing harmful traditional newborn care practices through active involvement of family members and community participation. Improved coordination between facility-based maternal care services and community-level HBNC follow-up may further enhance neonatal and postnatal health outcomes in rural areas.

Limitation

This study has certain limitations. As information regarding Home-Based Newborn Care services and counselling practices was collected from mothers of infants aged 6-14 weeks, some variables were dependent on maternal recall and may therefore be subject to recall bias. Socially desirable responses and interviewer bias cannot be completely excluded despite the use of a pre-tested questionnaire and standardized data collection procedures. Since the study employed a cross-sectional design, causal inferences cannot be established. Furthermore, the study was conducted in a single district, which may limit the generalizability of the findings. Additionally, a design effect was not incorporated during sample size estimation, which may have affected the precision of the estimates.

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Declaration of Generative AI and AI assisted technologies in the writing process: None

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