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ASSESSMENT OF HEALTH WORKERS' PERINATAL KNOWLEDGE AND PRACTICES RELATED TO SERVICE DELIVERY IN AN ECOLOGICALLY CHALLENGED RURAL AREA OF WEST BENGAL

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ARTICLE INFO	ABSTRACT
Received 13 th March, 2025 Received in revised form 24 th March, 2025 Accepted 19 th April, 2026 Published online 28 th April, 2026	Background: In the climate-vulnerable Sundarbans, West Bengal, environmental stressors like salinity intrusion exacerbate perinatal risks. This study evaluated a three-year health system strengthening intervention (2022–2025) on the knowledge and practices of Frontline Health Workers in Namkhana (intervention) versus Patharpratima (control) blocks. Methods: A cross-sectional study was conducted following a capacity-building program (2022–2025), 26 Frontline Health Workers (14 intervention, 12 Control) were evaluated after the capacity building programme to corroborate service delivery. Data on High-Risk Pregnancy (HRP) identification and Antenatal Care (ANC) protocols were analysed using Fisher's Exact Test. Results: Intervention health workers demonstrated higher clinical identification of pre-eclampsia (92% vs. 67%) and severe anaemia (92% vs. 85%). Immediate facility-based treatment for high-risk cases was significantly higher in the intervention arm (92.9% vs. 41.7%, $p=0.01$). A significant knowledge gap identified regarding early pregnancy registration in intervention group (42.9% vs. 91.7%, $p=0.015$). Conclusion: The intervention successfully enhanced High Risk Pregnancy management capacity in a disaster-prone region. The disparity in registration knowledge suggests that intensive clinical training must be balanced with routine procedural reinforcements. Future interventions should prioritize on-job mentorship and visual contextual tools to integrate emergency management with routine Antenatal Care for improved maternal outcomes.
Key words:	
Perinatal Health, Frontline Health Workers, , High-Risk Pregnancy, Health System Strengthening, Sundarbans,	
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INTRODUCTION

Perinatal mortality remains a critical public health challenge in developing nations. India has made significant progress in reducing the Neonatal Mortality Rate (NMR), Infant Mortality Rate (IMR) and Under 5 mortality rate (U5MR) with current NMR, IMR, and U5MR 19, 27, and 32¹. Still NMR contributes to 53% of U5MR and regional disparities persist, particularly in ecologically vulnerable areas². The Sundarbans delta in South 24 Parganas, West Bengal, represents one such complex geography where climatic adversities—rising sea levels, salinity intrusion, and frequent cyclones—

directly impact maternal and child health outcomes.³ e.g. exacerbated health risks including miscarriage, anemia, preeclampsia, and infant mortality

Environmental stressors in this region are linked to adverse pregnancy outcomes. Salinity intrusion in drinking water has been associated with an increased incidence of hypertensive disorders of pregnancy, including pre-eclampsia and eclampsia.⁴. In addition to that geographical isolation and transport barriers during extreme weather events frequently disrupt the continuum of care, making the role of frontline health workers (FHWs) such as ASHA, Auxiliary Nurse Midwives (ANMs) and Community Health Officers (CHOs) indispensable.⁵ Effective perinatal care depends heavily on the competence of these FHWs to identify high-risk conditions early and manage referrals.

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However, evidence regarding their knowledge and practices in such disaster-prone settings is limited. Recent studies in 2024 and 2025 have highlighted that while training improves clinical confidence, gaps often remain in routine protocol adherence ^{6,7}

In this context this study was conducted in Namkhana block, a riverine disaster-prone block subject to intense health system strengthening interventions and compared with the neighboring Patharpratima block. of Diamond Harbour health district of West Bengal with following objectives

1. To identify the level of knowledge of frontline health workers and practices related to selected perinatal components in the households and community.
2. To determine the capacity of frontline health workers to deliver quality and timely maternal and child health services
3. To assess frontline health workers' knowledge and practice on timely identification and management of High Risk Pregnancy

MATERIAL AND METHODS

Study design: A prospective cross-sectional study was conducted in Diamond Harbour health district, of West Bengal with 5/14(36%) riverine Blocks.

Study setting & study population: Namkhana Block (37 subcenters) selected as Intervention arm(Namkhana) through purposive sampling. Targeted health system strengthening support was given including comprehensive capacity building of frontline workers through a three-year perinatal health intervention from 2022 to 2025 supported by Terres des hommes (Tdh) in collaboration with Sundarban Social Developmental Centre (SSDC). Under the intervention of the perinatal health project, Auxillary Nurse Midwives (ANM)) and Community Health Officers (CHO) from all 37 Sub-Health Centres underwent capacity building exercise for three days on high-risk pregnancy identification and management, nutritional guidance for anemia, postnatal care (PNC), and pregnancy nutrition by public health experts.

Patha Pratima Block (67 subcentres) was selected as the Control block adjacent to Namkhana Block with similar geospatial characteristics, health infrastructure and socioeconomic characteristics and received standard government health services during the three years period. The Block did not receive any special training on high-risk pregnancy identification and management like intervention block.

Sample size & sampling design: After three years of implementation, a two-stage Stratified random sampling method was employed for endline evaluation of frontline

health workers (FHWs).

In Stage 1, sub-centres in both intervention (Namkhana) and Control (Patharpratima) blocks were stratified by 2024 high-risk pregnancy (HRP) caseloads provided by Terre des Hommes: high (>50 cases), medium (20-49 cases), and low (<20 cases).

In Stage 2 ,Two sub-centres selected through random sampling from each stratum.

Thus, total six sub centers were selected

All twenty six (26) FHWs from the six selected sub-centres (three per block) were included, yielding 14 from the intervention block Namkhana (10 Auxiliary Nurse Midwives and 4 Community Health Officers) and 12 from the Control block Patharpratima (8 Auxiliary Nurse Midwives and 4 Community Health Officers). The design concentrates fieldwork on higher-caseload sites to improve operational efficiency while retaining probabilistic selection

Data collection: Data was collected using pretested semi-structured questionnaires for knowledge assessments of health workers. Scored questions used on Antenatal Care (ANC) protocols, High Risk Pregnancy (HRP) identification criteria (severe anemia, pre-eclampsia etc), and Post Natal Care(PNC) timing for knowledge assessment and for practice assessment: self-reported check list on IFA distribution, home visits, and referral mechanisms were used

Ethical consideration: Ethical clearance was obtained from the Institutional Ethics Committee. Written informed consent was obtained from all participants. Confidentiality of the health workers and beneficiaries was maintained by anonymizing data during analysis.

Data analysis: SPSS software was used for data analysis. Frequencies and percentages were calculated for descriptive analysis. Given the small sample size of health workers (N=26), Fisher's Exact Test was utilized to determine the statistical significance of differences in proportions between intervention and control groups. A p-value of <0.05 was considered statistically significant.

RESULTS

Demographic Profile and Training Status of Health care providers (ANMs & CHOs): The average age of 14 selected health workers in the intervention block (mean age 38 years) was slightly younger compared to the 12 selected health workers in Control block (mean age 41 years).In terms of experience, the intervention block had a more balanced distribution, with 28.6% workers having less than five years, another 28.6% with 5–10 years, and rest 42.8% with over ten years of service. In contrast, the Control block was largely composed of more experienced personnel—75% had over ten years of experience, and rest 25% had less than 5 years of experience, indicating a

senior workforce profile (Table1).

Table1. Profile of Health Workers (N=26):

Characteristic	Intervention Block(n=14)	Control Block(n=12)
Type of Health Worker	ANM: 10 CHO: 4	ANM:8 CHO: 4
Average Age	38 years	41 years
Years of Experience	<5 yrs: 28.6% 5-10 yrs: 28.6% ≥10 yrs: 42.8%	<5 yrs: 25% 5-10 yrs: 0% ≥10 yrs: 75%

Knowledge on Antenatal Care (ANC): Intervention block health workers showed higher knowledge of minimum ANC visits (85.7% vs 75.0%), but significantly lower correct knowledge of pregnancy registration timing (42.9% vs 91.7%, $p=0.015$). Correct knowledge on Calcium start month(92.3 vs 92.9%) and IFA consumption duration (85.7% vs 91.7%) were comparable between intervention and Control groups. (Table 2)

Table 2. Health Workers' Knowledge Regarding ANC Protocols (N=26)

Indicator	Intervention block(n=14)	Control block(n=12)	Fisher's Exact Test (p value)
Correct knowledge of minimum ANC visits	85.7%	75.0%	0.65
Correct knowledge of pregnancy registration timing	42.9%	91.7%	0.015 (Significant)*
Correct start month for Calcium	92.3%	92.9%	1.00
Correct duration for IFA consumption	85.7%	91.7%	1.00

High-Risk Pregnancy (HRP) Identification and Management practices: Health workers demonstrated consistently higher knowledge across all high-risk pregnancy identification criteria in both intervention and Control Blocks, mostly in severe anemia (92% vs 85%), pre-eclampsia (92% vs 67%), Low-lying Placenta/Placenta Previa (77% vs 58%) though differences were not statistically significant($p>0.05$).

Management practices showed significantly higher provision of immediate treatment at the facility in the intervention arm (92.9% vs 41.7%; $p=0.01$). All health workers in the Control block reported referring women with HRP to higher facilities for specialized care, with no instances of home-based care being reported and 14.3%

of health workers in the intervention block mentioned providing home-based management for HRP cases (Table 3).

Table 3. HRP Identification Criteria Knowledge and Management Practices among Health Workers (N=26)

Indicator	Intervention block (n=14)	Control block (n=12)	Fisher's Exact Test (p value)
Severe Anaemia (Hb<7g/dL)	92%	85%	$p=0.58$
Pregnancy Induced Hypertension/ Pre-eclampsia	92%	67%	$p=0.15$
Young/Elderly Gravida	85%	92%	$p=1.00$
Low-lying Placenta/ Placenta Previa	77%	58%	$p=0.41$
Bad Obstetric History	67%	67%	$p=1.00$
Gestational Diabetes Mellitus	62%	67%	$p=1.00$
Twins/Multiple Pregnancy	62%	58%	$p=1.00$
Syphilis/HIV Positive	58%	50%	$p=0.71$
Previous LSCS	58%	42%	$p=0.45$
Malpresentation	54%	42%	$p=0.71$
Hypothyroidism	42%	33%	$p=0.70$
Refer to higher facility	100%	85.7%	$p=0.48$
Home-based treatment	14.3%	0%	$p=0.48$
Providing immediate treatment at the facility	92.9%	41.7%	$p=0.01$ (Significant)

DISCUSSION

This study highlights the mixed impact of health system strengthening in the disaster-prone riverine block. No statistically significant difference was observed between intervention and Control block regarding correct knowledge on minimum ANC visit (85.7% vs 75.0%), Calcium start month (92.3 vs 92.9%) and IFA consumption duration (85.7% vs 91.7%). The finding indicates overall good knowledge among health workers irrespective of intervention. However, the study revealed a significant gap in administrative knowledge, only 42.9% of intervention workers correctly identified the protocol for early pregnancy registration, compared to 91.7% in the control group ($p=0.015$). This mirrors findings from Kangsabanik et al. (2025)⁸ who noted that while clinical skills often improve with training, adherence to administrative and hygiene protocols can

lag without continuous surveillance. It is possible that the intervention training heavily prioritized emergency management (HRP, anemia) over routine administrative procedures.

The higher clinical identification rates of severe anemia (92% vs 85%), pre-eclampsia (92% vs 67%), Low-lying Placenta/Placenta Previa (77% vs 58%) aligns with recent evidence by Al-Tarawneh et al. (2025)⁹, who reported that targeted training significantly improves healthcare providers' knowledge of hypertensive disorders in pregnancy. In the context of the Sundarbans, where salinity intrusion significantly raises the risk of gestational hypertension³, this improved identification capability is clinically vital. Providing immediate treatment at the facility was significantly higher ($p=0.01$) and home-based management trended higher in intervention block. This reflects the positive impact of the specialized training delivered under the perinatal health project, which emphasized home-based management of high-risk pregnancies and facility based follow up as part of an integrated care approach training impact despite limited statistical power from small sample size. Given the high prevalence of anemia in West Bengal (71% in women as per NFHS-5)¹⁰, this improvement suggests that supply chain strengthening combined with provider behavior change is effective.

Limitations of the study

The small number of health workers ($N=26$) limited the statistical power of the study, rendering some clinically meaningful differences (e.g., in pre-eclampsia identification) statistically non-significant. Also, the unique eco-geography of the Sundarbans may limit the application of these findings to non-coastal rural areas. This can be considered as pilot study for planning further future studies involving larger population

CONCLUSION

The intervention in Namkhana has successfully established a workforce that is significantly better trained in managing high-risk pregnancies, a critical adaptation for this climate-vulnerable region. While clinical practices regarding supplementation and institutional delivery is good, a significant gap remains in knowledge regarding early registration protocols which needs immediate refresher training. To bridge the gap between training and practice, on-job mentorship by district and block level supervisors is recommended. Empowering health workers with contextual, visual tools to guide

families in understanding HRP risks and benefits of institutional care and promoting home-based HRP management techniques alongside institutional referrals are required for better maternal outcomes. Future efforts should focus more on improving quality and completion of ANC components, not just coverage of visits.

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