

A Descriptive Cross-Sectional Study to Assess Supply Chain Barriers Affecting the Quality of Antenatal Care (ANC) Services in Maharajganj, Uttar Pradesh

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Abstract—Background: Antenatal care (ANC) during the first 1,000 days is critical for preventing maternal, neonatal, and child morbidity and mortality. Despite improvements in coverage, the quality and content of ANC services remain poor in many districts of Uttar Pradesh. Maharajganj district performs significantly below the state average in completion of four or more ANC visits (25.2%) and consumption of iron-folic acid tablets for ≥ 100 days (21.9%). This study aimed to assess supply-side barriers affecting the quality of ANC services at Village Health and Nutrition Day (VHND) sessions at the sub-centre level.

Objective:

To assess the impact of supply-side gaps on the provision of quality antenatal care services at VHND sessions in Maharajganj district, Uttar Pradesh.

Methods:

A descriptive cross-sectional study was conducted among 200 Auxiliary Nurse Midwives (ANMs) (approximately 33% of the total 601 ANMs) posted at sub-centres in Maharajganj district. Data on availability and functionality of ANC equipment, consumables, registers, knowledge and skills of ANMs, and operational challenges were collected using a self-structured, content-validated questionnaire from February to April 2026. Official permission was obtained from the District Magistrate.

Results:

Basic equipment, such as hub cutters (94%), stethoscopes (78%), and adult weighing machines (75%), was available in most sub-centres. However, critical items like Doppler/fetosopes (38%) and height measuring scales (44%) were scarce. Only 36.7% ANMs had glucometer strips, and 52.8% had Hb meter strips. Functional glucometers were available at only 42% sub-centres (83 out of 200), and 116 sub-centres reported a complete absence. 39.7% ANMs reported non-functional Hb meters. Training gaps existed for digital Hb meters and glucometers (18-19%). High workload, irregular

supply of consumables, and lack of equipment maintenance were major operational challenges.

Conclusion:

Significant supply-side barriers exist at the sub-centre level that compromise quality ANC services during VHND sessions. Immediate district-level interventions focusing on equipment procurement, maintenance, and targeted training are urgently needed to improve maternal health outcomes.

Index Terms—Antenatal Care, Supply Side Management, Village Health and Nutrition Day, Maternal Health, Uttar Pradesh.

I. INTRODUCTION

Background

Antenatal care (ANC) during the first 1,000 days of life is a critical window for preventing maternal, neonatal, and child morbidity and mortality and for ensuring optimal birth outcomes. Quality ANC not only promotes maternal health but also enables early detection and management of complications [1,2].

Despite considerable improvement in coverage, the quality of antenatal care remains suboptimal in many parts of India. According to National Family Health Survey (NFHS-5, 2019-21), only 44% of pregnant women consumed iron-folic acid tablets for at least 100 days and 67% of women had an abdominal check-up during ANC visits [3].

The situation is much worse in Maharajganj district of Uttar Pradesh. The district performs significantly below the state average with only 25.2% pregnant women receiving four or more ANC visits and 21.9% consuming IFA tablets for 100 days or more [3]. These

indicators clearly show poor quality of antenatal care services at the sub-centre level.

In the context of WHO health systems framework, procurement and supply chain management are critical components for effective service delivery [4]. However, supply-side barriers at the sub-centre level have received limited attention in the Indian context [5]. The present study was therefore conducted to assess the supply-side barriers affecting the provision of quality antenatal care services at Village Health and Nutrition Day (VHND) sessions in Maharajganj district, Uttar Pradesh.

II. OBJECTIVE

Overall Objective - To assess the impact of supply-side gaps on the provision of quality antenatal care (ANC) services at Village Health and Nutrition Day (VHND) sessions in Maharajganj district, Uttar Pradesh.

Specific Objective

1. To assess the availability and functional status of key ANC equipment
2. To evaluate the knowledge and skills of Auxiliary Nurse Midwives (ANMs)
3. To identify operational and day-to-day challenges faced by ANMs
4. To examine the impact of equipment and supply gaps on screening of pregnant women
5. To suggest feasible, context-specific solutions to address supply-side barriers

III. METHOD

A descriptive cross-sectional study was conducted among 200 Auxiliary Nurse Midwives (ANMs) which is approximately 30% of total ANMs i.e. 601, posted at sub-centres and responsible for providing ANC services at VHND sites in Maharajganj district, Uttar Pradesh; data on supply availability, equipment functionality, ANMs' knowledge and skills, and day-to-day operational challenges were collected using a self-structured questionnaire.

Data collection for the study was conducted from February 2026 to April 2026. During this period, the researcher visited multiple Village Health and Nutrition Day (VHND) sessions and shared observations with district officials and the District

Collector to present ground realities and assess the interest and commitment of district authorities in addressing challenges and improving maternal health indicators in the district.

Official permission to conduct the research was obtained from the District Health Officials, Maharajganj. A structured questionnaire was developed in the form of hard copy form and was content validated by the Additional Chief Medical Officer (ACMO), the District Programme Manager (DPM), and the Maternal Health Consultant. Reliability was assessed through a pilot test among 15 ANMs, and the valuable suggestions and findings from this pilot were incorporated before finalizing the tool. The finalized tool was then disseminated and filled through the ANM meeting, AAA meeting and VHND platform subsequently data collected all ANMs.

IV. RESULT

Descriptive statistics, such as frequencies and percentages, were calculated to summarize the findings related to equipment availability, functionality, ANMs' knowledge, skills, and practical challenges; however, advanced statistical tests such as chi-square, t-test, correlation, or regression analyses were not applied, as the study aimed only to describe the existing gaps rather than test associations.

Key Findings on availability of Equipment, Consumables, Registers, and Training:

- **Consumables:** Only 36.7% of ANMs have glucometer strips, and 52.8% have Hb meter strips.
- **Equipment:** Basic tools are widely available, including hub cutters (94%), stethoscopes (78%), and adult weighing machines (75%); however, doppler/Fetoscope available are available to only 38% and height measuring scale to 44 % of ANMs.
- **Registers:** RCH and AAA meeting registers are well maintained with over 82% availability, but nearly 29 % of ANMs lack HRP registers.
- **Skills and Training:** While 99% of ANMs are trained on BP machines, 18-19% still require training on digital Hb meters and glucometers.

Consumables & Registers (%)

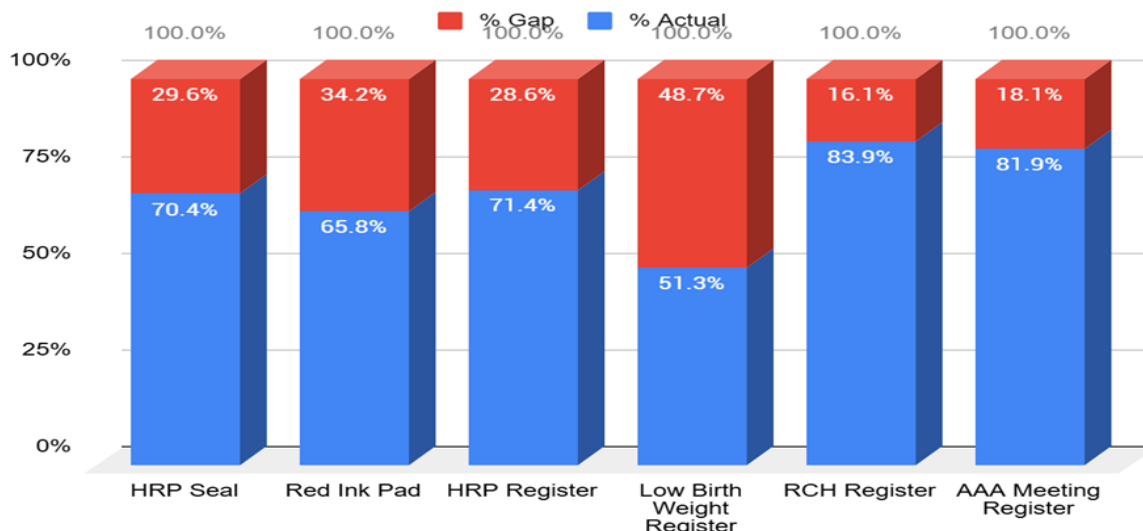


Figure 1: Availability of consumables and registers among ANMs (n=200)

Critical Gaps in Equipment Functionality and ANC Services:

- Glucometers: Only 83 (42%) sub-centres have functional glucometers; a staggering 116 sub-centres reported no glucometer availability, severely limiting gestational diabetes screening for pregnant women (PW).
- Hb Meters: 79 (39.7 %) ANMs reported non-functional Hb meters, and 116 lack the device entirely or its not functional.
- VHND Sessions: Out of 1284 planned sessions per month, urine tests are possible in only 954 (74%), and abdominal examinations in just 742 (58%).
- Service Impact: Nearly 40% of planned sessions cannot provide the full range of essential ANC services.

ANC Diagnostics (%)

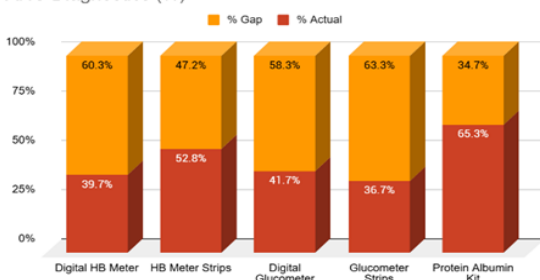


Figure 2: Availability and functionality of diagnostic tools at sub-centres (n=200)

VHND Sessions Breakdown

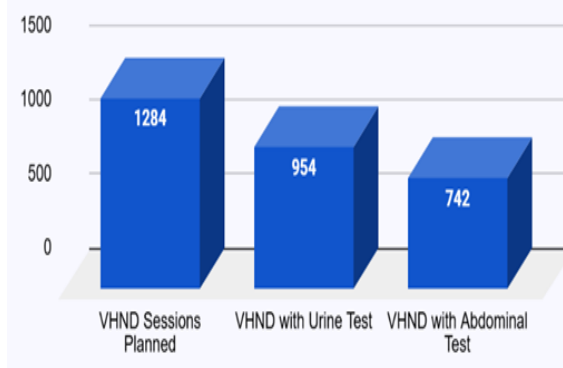


Figure 3: Number of planned VHND sessions where urine testing and abdominal examination could be performed

Training Status and Gaps Among ANMs:

- BP Machine Training: Over 98% of ANMs are trained, yet refresher training is still needed.
- Digital Hb Meter Training: 82% of ANMs are trained, but refresher training remains necessary.
- Priority Advanced Training Needs:
 - Newborn care and resuscitation: 59.8 % ANMs (top priority)
 - Management of pregnancy complications: 59 % ANMs
 - Malnutrition identification: 42 % ANMs

Training Needs Identified (%)

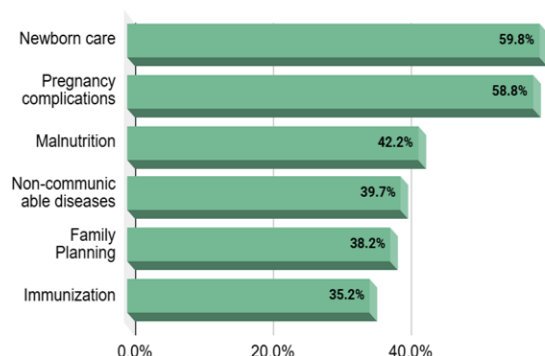


Figure 4: Priority training needs as identified by ANMs (n=200)

Key Qualitative Challenges Reported by ANMs:

- High Workload: Managing populations exceeding 6,000 in plain areas while handling extra responsibilities like PHC delivery point oversight, causing significant physical and mental strain.
- Equipment Issues: Lack of periodic calibration and maintenance.
- Supply Chain Gaps: Inconsistent indentation and availability of consumables.

Key Recommendations:

- Launch a district-wide drive for equipment calibration, repair, and maintenance.
- Procure new diagnostic kits to ensure comprehensive High-Risk Pregnancy (HRP) screening.
- Distribute HRP tracking registers to all ANMs.
- Conduct skill-building training for ANMs on identified clinical priority areas.
- Implement equal work distribution among ANMs and develop strategies for managing high-density blocks.
- Strengthen logistic management, particularly for VHND session days.

V. CONCLUSION

Quality antenatal care services are directly linked to the early identification, management, and referral of high-risk pregnancies, which are essential for reducing maternal and neonatal mortality and improving birth outcomes. This study clearly reveals gaps in the provision of quality ANC services at the VHND level, with the findings indicating strong supply-side barriers

such as inadequate availability of essential equipment, consumables, and registers, shortage of trained human resources relative to workload.

The study has certain limitations. Since the data were self-reported, it may be subject to reporting bias and external influences, including instances where responses were filled in by someone on behalf of the participants. The cross-sectional design captured information at only one point in time and therefore does not allow assessment of changes over time. In addition, the study was conducted in only one district, so the findings cannot be generalized to the state level. The study also lacked qualitative insights, as Focus Group Discussions with ANMs were not conducted.

REFERENCES

- [1] World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: WHO; 2016. <https://www.who.int/publications/i/item/9789241549912>
- [2] Dowswell T, Carroli G, Duley L, et al. Alternative versus standard packages of antenatal care for low-risk pregnancy. Cochrane Database Syst Rev. 2015;(7):CD000934. <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD000934.pub3/full>
- [3] International Institute for Population Sciences (IIPS). National Family Health Survey (NFHS-5) 2019-21. Mumbai: IIPS; 2022. <https://dhsprogram.com/pubs/pdf/FR375/FR375.pdf>
- [4] World Health Organization. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Geneva: WHO; 2010. <https://apps.who.int/iris/handle/10665/44288>