



EVALUATION OF ANTENATAL CARE CAMP SERVICES FOR DETECTION OF HIGH-RISK PREGNANCIES AND REFERRAL OUTCOMES IN AN URBAN FIELD PRACTICE AREA: A COMMUNITY BASED CROSS SECTIONAL STUDY

Ashwini L H^{1*}, Bhagyajyoti², Veena T³, Shilpa B K⁴, Yuvaraj B Y⁵, Ninganagouda Parvatagoudra⁶

^{1*} Assistant professor, Department of Community Medicine, Chitradurga Medical College and Research Institute, Chitradurga, Karnataka, India. Email: dr.ashwinilh@gmail.com

² Assistant professor, Department of Obstetrics and Gynaecology, Chitradurga Medical College and Research Institute, Chitradurga, Karnataka, India. Email.ID:bhagyajyoti.s.n999@gmail.com

³ Assistant professor, Department of General Medicine, Chitradurga Medical College and Research Institute, Chitradurga, Karnataka, India. Email.ID: veenatclk@gmail.com

⁴ Senior resident, Department of Community Medicine, J.J.M. Medical College, Davangere, Karnataka, India. Email.ID: shilpaofficio@gmail.com

⁵ Professor, Department of Community Medicine, Chitradurga Medical College and Research Institute, Chitradurga, Karnataka, India. Email.ID: dryuvaraj@gmail.com

⁶ Biostatistician Department of Community Medicine, Chitradurga Medical College and Research Institute, Chitradurga, Karnataka, India. Email.ID: parvath4@gmail.com

***Corresponding author: Dr. Ashwini L H**

*Assistant Professor, Department of Community Medicine, Chitradurga Medical College and Research Institute, Chitradurga, Karnataka, India Phone (or Mobile) No.: +91- 99860 32048
Email: dr.ashwinilh@gmail.com

ABSTRACT

Background: Antenatal care (ANC) camps enhance maternal health services by enabling early identification of high-risk pregnancies, providing essential investigations, focused counseling, and timely referrals. Assessing these camp-based service delivery models is crucial for understanding their effectiveness and suitability in regular health system contexts.

Methods: A retrospective evaluation examined the effectiveness of the Swasth Naari Shashakth Parivar Abhiyana ANC camp model by reviewing records from a one-day ANC camp in an urban field practice area of Chitradurga Medical College and Research Institute(CMCRI), Chitradurga, Karnataka . The analysis included ANC registers, laboratory reports, referral documents, and Information, Education, and Communication (IEC) materials to extract data on high-risk pregnancy detection, referral linkages, beneficiary satisfaction, and informed consent understanding. Findings were summarized using descriptive statistics and chi-square tests to assess variable associations.

Results: A study involving 61 pregnant women indicated that 35 participants (57.4%) had high-risk conditions, primarily anemia in 31 women (50.8%). Of the high-risk women, 32 (91.4%) were referred to higher health facilities, with 32 (84.2%) completing the referral. Satisfaction with camp services was high, with 50 beneficiaries (82.0%) either highly satisfied or satisfied. Informed consent understanding was complete for 49 participants (80.3%), and receiving IEC counselling was significantly linked to higher satisfaction ($\chi^2 = 8.91$, $p = 0.003$).

Conclusion: The Swasth Naari Shashakth Parivar Abhiyana ANC camp model effectively identified high-risk pregnancies and provided patient-centred antenatal services, emphasizing structured counselling and ethical service delivery to enhance primary care ANC.

Keywords: ANC camp; High-risk pregnancy; Referral linkage; Information education communication; Program evaluation; Maternal health

INTRODUCTION

Maternal health remains a critical priority in the global public health agenda, with the reduction of the Maternal Mortality Ratio (MMR) being a central target of the Sustainable Development Goals (SDG 3.1).¹ While global efforts have led to a decline in maternal deaths, developing nations continue to bear a disproportionate burden, largely due to gaps in the "continuum of care" and delays in accessing specialized management for complications.² India has made commendable progress in lowering its MMR, as evidenced by recent reports from the Sample Registration System (SRS), yet disparities persist across different geographical and socioeconomic spectrums.³ ANC serves as the primary entry point for pregnant women into the healthcare system, providing a vital platform not only for health promotion but also for the early detection and management of pregnancy-related complications.⁴ The World Health Organization (WHO) currently recommends a minimum of eight antenatal contacts to ensure a "positive pregnancy experience," emphasizing quality over mere coverage.⁵

A major determinant of adverse maternal and perinatal outcomes is the presence of high-risk conditions. High-Risk Pregnancies (HRP) constitute approximately 15% to 30% of all pregnancies but are responsible for nearly 75% of maternal, fetal, and neonatal mortality and morbidity.⁶ Common risk factors such as severe anemia, Pregnancy Induced Hypertension (PIH), Gestational Diabetes Mellitus (GDM), and cephalopelvic disproportion require timely identification and specialized management.⁷ In India, initiatives like the Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) have been launched to provide assured, comprehensive, and quality antenatal care - including specialist services - on fixed days, specifically aiming to track and manage these ANC high-risk cases.⁸ Then the 'Swasth Nari Sashakt Parivar' (Healthy Woman, Empowered Family) Abhiyaan aimed to enhance the health and nutrition of women, adolescents, and children across India.⁹ According to the National Family Health Survey-5 (NFHS - 5) (2019 - 21), In India, 58.1% to 59.25% of pregnant women received full antenatal care (ANC), with 68.4% in Karnataka, indicating gaps in comprehensive screening, counselling, and follow-up. Anemia, hypertensive disorders, and gestational diabetes are significant contributors to maternal complications and adverse pregnancy outcomes.¹⁰

Rapid urbanization has introduced new challenges in healthcare delivery. The National Urban Health Mission (NUHM) aims to address the health needs of the urban poor through Urban Primary Health Centres (UPHCs).¹¹ In these settings, "ANC camps" or outreach sessions are frequently utilized strategies to improve coverage and bring diagnostic services closer to the community. However, the success of these camps depends not just on detection, but on the effectiveness of the referral pathway. A functional referral system is the backbone of emergency obstetric care; however, literature suggests that attrition often occurs between the primary level (detection) and the tertiary level (treatment), leading to poor referral compliance and adverse outcomes.^{12,13}

This community-based cross-sectional study focuses on Chitradurga district, which faces significant challenges related to maternal anemia and pregnancy-related complications due to delayed antenatal registration and inconsistent service usage, highlighting the need for improved antenatal service delivery. The Swasth Naari Shashakth Parivar Abhiyana program is introduced to advance maternal and family health through integrated antenatal screening, health education, and referral services. ANC camps initiated by this program aim to provide comprehensive care and minimize missed opportunities. Despite these efforts, there is a notable gap in systematic evaluations of their effectiveness in managing high-risk pregnancies and ensuring satisfaction among beneficiaries,

which underscores the necessity for the current study to evaluate the ANC camp model's efficacy within the health system.

Aim of the study

To evaluate the effectiveness of the Swasth Naari Shashakth Parivar Abhiyana ANC camp model in detecting high-risk pregnancies, ensuring appropriate referral linkages to higher health facilities, and assessing beneficiary satisfaction with services provided.

Objectives

1. To determine the proportion of high-risk pregnancies detected during the Swasth Naari Shashakth Parivar Abhiyana ANC camp conducted in an urban field practice area.
2. To assess the effectiveness of referral linkages to higher health facilities among pregnant women identified as high-risk during the camp.
3. To evaluate the implementation of antenatal screening and counselling services delivered through the camp-based service delivery model.

METHODS

This cross-sectional study was conducted among pregnant women who attended the Swasth Naari Shashakth Parivar Abhiyana ANC camp.

Study design

This cross-sectional study was conducted used a retrospective analysis of ANC camp data gathered during a one-day camp run under the Swasth Naari Shashakth Parivar Abhiyana to conduct a community-based cross-sectional descriptive evaluation. Assessing prenatal screening results, identifying high-risk pregnancies, and creating referral links to more advanced medical institutions were the objectives of the study. Without speaking with participants again, the study data was collected throughout the ANC camp implementation.

Study area

The study was carried out at the Urban Primary Health Centre (UPHC), Buddhanagara, which serves as the urban field practice area of the Department of Community Medicine, CMCRI, Chitradurga district, Karnataka.

Source of data

The source of data comprised routinely maintained ANC camp records, including registration forms, clinical examination sheets, laboratory investigation reports, referral registers and IEC counselling documentation.

Study participants

The study population comprised all pregnant women who attended the ANC camp conducted under the Swasth Naari Shashakth Parivar Abhiyana on the designated date and whose antenatal screening records were complete and available for retrospective analysis.

Inclusion criteria

- Pregnant women residing in the UPHC Buddhanagara service area.
- Pregnant women who attended the one-day antenatal screening camp.
- Pregnant women for whom complete ANC check-up records were available.

Exclusion criteria

- Pregnant women with incomplete data records.
- Pregnant women who visited only for immunization or non-ANC services.

Sample size calculation and data collection procedures

The NFHS-5 reports that 58.6% of pregnant women in India received full ANC.¹

Final Sample Size Calculation:

The sample size was calculated to estimate the proportion of antenatal women receiving adequate

ANC using the formula: $n = \frac{Z^2 * p * q * DEFF}{d^2}$

Where:

n = Required sample size

Z = Standard normal deviate at 95% confidence level = 1.96

p = Prevalence of full ANC from NFHS-5 = 58.6% (0.586)

q = 1 – p = 1-0.586 = 0.414

d = Absolute precision = 10% (0.10)

DEFF = design effect = 1.5 (for field-based study)

Substituting the values:

$$n = \frac{(1.96)^2 * 0.586 * 0.414 * 1.5}{(0.10)^2} = \frac{1.398}{0.01} = 139.8 \approx 140$$

However, as this was a service-delivery camp-based evaluation, universal sampling was adopted. All pregnant women attending the ANC camp on the day of implementation and having complete records were included. Hence, the result, attendance on the day of the camp was used to calculate the final sample size. Universal sampling, which included all eligible participants, guaranteed maximum coverage and reduced selection bias in cases where the predicted sample size could not be reached. This method works well for operational research and program assessment carried out in actual service delivery settings. Any discrepancy in the estimated sample size was from fixed camp attendance rather than from non-response or exclusion.

Justification for sample size shortfall

Although the calculated sample size was 140, the final sample size depended on actual camp attendance on the day of service delivery.

- ANC camps are service-driven, not survey-driven
- Attendance is influenced by:
 - Registration status
 - Gestational age
 - Health-seeking behaviour
 - Logistic and personal factors

Therefore, all eligible attendees present on the camp day were included, and the achieved sample size represents the true service coverage of the intervention, which is acceptable and methodologically valid for program evaluation and descriptive research.

Final sample

Although the calculation required 140, the final sample consisted of 61 women who attended and had complete records. This shortfall is justified as the study represents true service coverage of a service-driven intervention.

Sampling technique

Since the ANC camp was conducted on a single pre-specified day, universal sampling (total enumeration) was adopted. All pregnant women who attended the Swasth Naari Shashakth Parivar Abhiyana ANC camp and had complete ANC records were included in the study.

ANC camp services and screening procedures

The ANC camp provided comprehensive services, including registration and clinical examination; measurement of blood pressure and anthropometric parameters; laboratory investigations such as haemoglobin estimation and random blood sugar testing; identification of high-risk pregnancy conditions including anemia, hypertensive disorders, suspected gestational diabetes and obstetric risk factors; provision of on-site treatment and supplementation; and referral of high-risk cases to taluk and district hospitals for further evaluation and management.

Retrospective use of programme data

Data obtained during implementation of the ANC camp were retrospectively examined only for research reasons, without any additional participant interaction.

Method of data collection (Step-wise)

Use numbered steps:

1. Identification of ANC camp records conducted under the programme.
2. Verification of completeness of records.
3. Extraction of socio-demographic, clinical, laboratory and referral data using a structured proforma. No direct.
4. Interaction with participants was undertaken during data collection for the purpose of the study.
5. Cross-checking of referral completion using referral registers

Data management, documentation and confidentiality

All data were anonymized prior to analysis by removing personal identifiers and assigning unique study codes. Electronic data were stored in password-protected systems accessible only to the research team. Physical records were securely stored in the Department of Community Medicine. Data confidentiality was strictly maintained throughout the study period.

Statistical analysis

Data was recorded in Excel, stored securely and statistical analyses were performed using IBM SPSS Statistics for Windows, version 29.0 (IBM Corp., Armonk, N.Y., USA). Descriptive statistical methods, including Statistical analyses were performed using IBM SPSS Statistics for Windows, version 29.0 (IBM Corp., Armonk, N.Y., USA) frequencies and percentages to summarize study variables. Inferential statistics examined associations between selected variables using the Chi-square test or Fisher's exact test, focusing on high-risk pregnancy status and referral outcomes, as well as the relationship between IEC counselling and beneficiary satisfaction. A p-value of <0.05 indicated statistical significance. Frequencies and percentages highlighted the detection of high-risk pregnancies and referral outcomes. The effectiveness of referral linkages was evaluated by documenting the percentage of high-risk pregnancies referred to higher health facilities, with results illustrated through tables and graphs.

Ethical considerations

Written informed consent for clinical examination and investigations was obtained from beneficiaries at the time of service delivery. As the present study involved retrospective analysis of routine service records without direct participant contact, a waiver of re-consent was obtained from the Institutional Ethics Committee. The study posed minimal risk to participants and adhered to principles of confidentiality and ethical research conduct.

RESULTS

A total of 61 pregnant women who attended the Swasth Naari Shashakth Parivar Abhiyana ANC camp and had complete records were included in the retrospective analysis. Any shortfall in the calculated sample size was due to fixed attendance on the camp and not due to exclusion or non-

response.

Table 1: Socio-demographic characteristics of antenatal beneficiaries (N = 61).

Variables	Category	Frequency (n)	Percentage (%)
Age (years)	19 - 24	28	45.9
	25 - 29	22	36.1
	≥ 30	11	18
Education	Illiterate	9	14.8
	Primary	16	26.2
	Secondary	26	42.6
	PUC & above	10	16.4
Occupation	Homemaker	53	86.9
	Employed	8	13.1
Socioeconomic status	Lower	22	36.1
	Lower-middle	28	45.9
	Middle & above	11	18
Habits	Present	4	6.6
	Absent	57	93.4
Sleep duration	<6 hours	7	11.5
	6 - 8 hours	54	88.5

The majority of antenatal beneficiaries were in the 20 - 29 year age group, representing the optimal reproductive age. Educational status showed that most women had secondary schooling, while a smaller proportion were illiterate, indicating moderate literacy levels. The predominant occupation was homemaker, reflecting dependence on family support systems. Nearly 82% belonged to lower or lower-middle socioeconomic strata, underscoring the importance of public health service delivery through government programs. Risk habits were uncommon. Although most women reported adequate sleep, a notable proportion had inadequate sleep, which may contribute to adverse maternal outcomes (Table 1).

Table 2: Distribution of high-risk pregnancy conditions among beneficiaries (N = 61).

High-risk condition	Frequency (n)	Percentage (%)
Gestational diabetes mellitus	6	9.8
High BMI status	29	47.5
Pedal edema	8	13.1
High blood pressure	4	6.6
Decreased maternal height	5	8.2
Previous abortions	12	19.7
Obstetric score > G3	10	16.4
Multiple pregnancy	3	4.9
Heart disease	2	3.3
Thyroid disorder	7	11.5
Uterine fibroids	1	1.6
Kidney disease	1	1.6
Twin pregnancy	2	3.3
Pallor / Anemia	31	50.8
Rh-negative status	4	6.6
Urine sugar present	5	8.2
Urine albumin present	6	9.8

Previous seizures	1	1.6
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More than half of the beneficiaries had at least one high-risk condition. Anemia (50.8%) was the most common risk factor, reaffirming its public health significance. High BMI, previous abortions and higher gravida status were other frequently detected risks. Medical conditions such as gestational diabetes, hypertension and thyroid disorders were also identified. Detection of Rh-negative status and abnormal urine findings highlights the importance of point-of-care investigations. Early identification enabled timely counselling and referral, demonstrating the effectiveness of the camp-based screening model (Table 2).

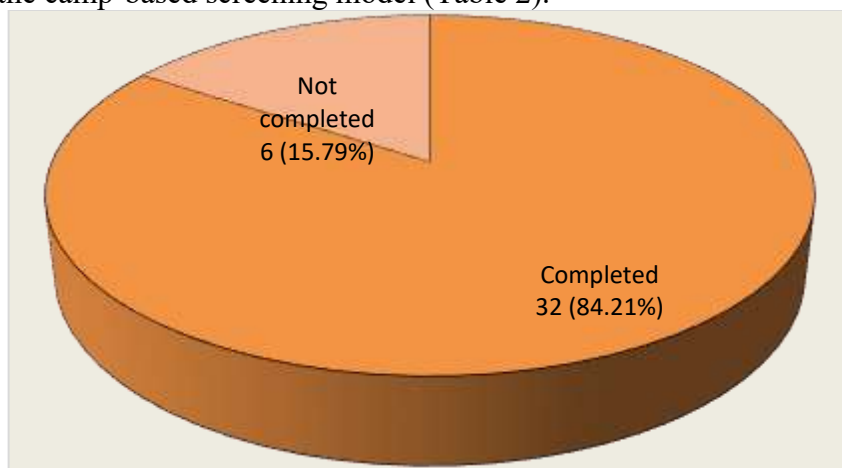


Figure 1: Referral linkage outcomes among high-risk pregnancies identified during the ANC camp.

This depicts the proportion of high-risk pregnant women who completed referral to higher centres after being identified during the Swasth Naari Shashakth Parivar Abhiyana ANC camp. The pie chart shows that 84.2% of high-risk pregnant women successfully completed the referral process, indicating good linkage and follow-up. However, 15.8% did not complete the referral, suggesting gaps that require further attention (Figure 1).

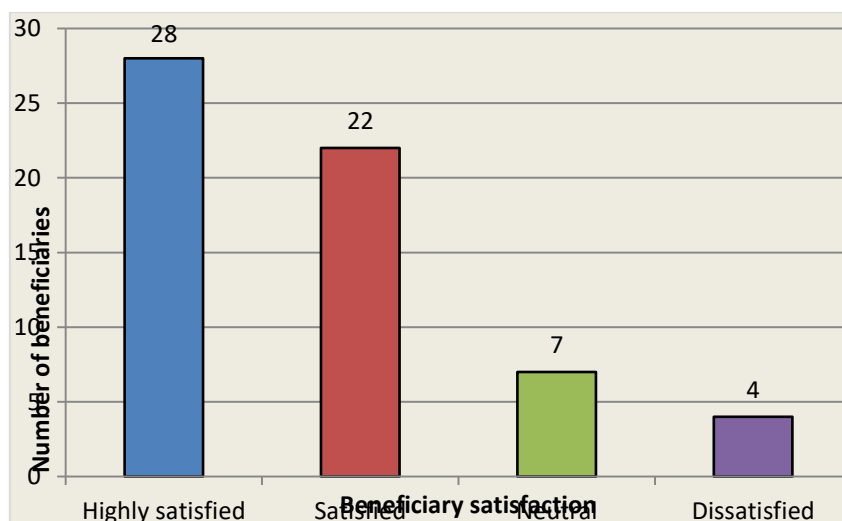


Figure 2: Beneficiary satisfaction with services provided during the ANC camp.

The bar chart shows that most beneficiaries were satisfied with ANC camp services, with 28 highly satisfied and 22 satisfied participants. Only a small proportion reported lower satisfaction levels, with 7 neutral and 4 dissatisfied beneficiaries (Figure 2).

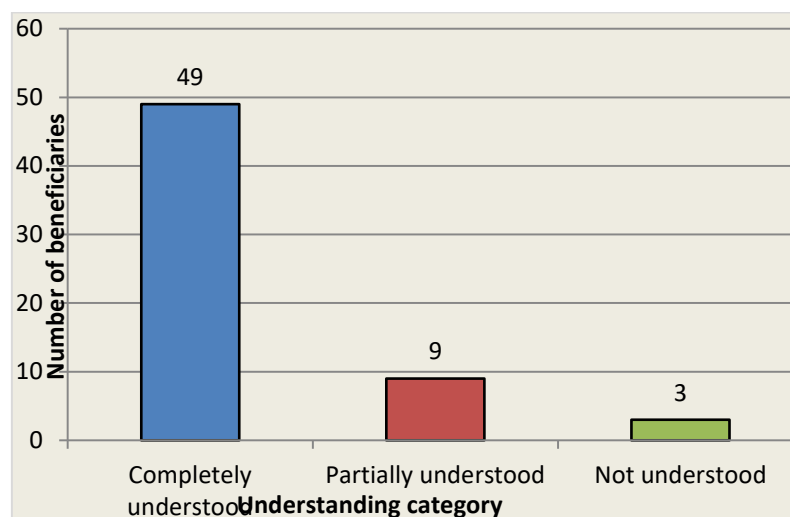


Figure 3: Understanding of the informed consent process among beneficiaries

The chart shows that the majority of beneficiaries 49 completely understood the informed consent process. Only a small number had partial 9 or no understanding 3, indicating overall good comprehension with minimal gaps (Figure 3).

High-risk condition	Frequency (n)	Percentage (%)
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Kidney disease	1	1.6
Twin pregnancy	2	3.3
Pallor / Anemia	31	50.8
Rh-negative status	4	6.6
Urine sugar present	5	8.2
Urine albumin present	6	9.8
Previous seizures	1	1.6

IEC counselling coverage was high across all essential maternal health domains. Counselling on institutional delivery and nutrition had the highest coverage, while family planning counselling showed relatively lower but satisfactory coverage. This indicates comprehensive IEC delivery during the camp (Table 3).

Table 4: Association between high-risk pregnancy status and referral to higher centres (N = 61)

High-risk pregnancy status	Referred n (%)	Not referred n (%)	Total	Chi-square(χ^2) test	P-value
High-risk (Yes)	32 (91.4)	3 (8.6)	35	27.84	0.001*
High-risk (No)	6 (23.1)	20 (76.9)	26		
Total	38 (62.3)	23 (37.7)	61		

A statistically significant association was observed between high-risk pregnancy status and referral to higher centres ($p < 0.001$). Pregnant women identified as high-risk were significantly more likely to be referred to higher health facilities compared to those without identified risk factors. This finding demonstrates the effectiveness of the Swasth Naari Shashakth Parivar Abhiyana ANC camp model in appropriately identifying high-risk pregnancies and ensuring timely referral linkages within the public health system (Table 4).

Table 5: Association between beneficiary satisfaction and IEC counselling received (N = 61)

IEC counselling received	Satisfied n (%)	Not satisfied n (%)	Total	Chi-square(χ^2) test	P-value
Yes	45 (88.2)	6 (11.8)	51	8.91	0.003*
No	5 (50.0)	5 (50.0)	10		
Total	50 (82.0)	11 (18.0)	61		

A statistically significant association was found between receipt of IEC counselling and beneficiary satisfaction ($p = 0.003$). Beneficiaries who received IEC counselling were significantly more satisfied with ANC camp services compared to those who did not receive counselling. This highlights the crucial role of IEC activities in improving service acceptability, patient experience, and overall effectiveness of camp-based ANC delivery (Table 5).

DISCUSSION

The results of the ANC camp held at the UPHC in Buddhanagara under the Swasth Naari Shashakth Parivar Abhiyana highlight the effectiveness of community-based screening programs for the early identification and treatment of high-risk pregnancies in urban impoverished settings. More than half of the 61 participants had at least one high-risk factor, primarily anemia (50.8%) and a high body mass index (47.5%). These findings reflect long-standing nutritional issues that are consistent with national trends found in the National Family Health Survey (NFHS-5), which shows that anemia continues to affect more than half of pregnant women even after taking supplements.^{10,14} This demographic profile, with 82% of women from lower or lower-middle socioeconomic strata and a majority (82%) aged 20-29 years, highlights how such camps serve as vital entry points for marginalized populations who may otherwise underutilize routine ANC services due to accessibility barriers.^{16,17}

Anemia's high prevalence in this study mirrors broader Indian data, where urban women face compounded risks from poor dietary diversity and parasitic infections, necessitating intensified iron-folic acid supplementation and deworming protocols during camps.^{14,18} Similarly, the 47.5% high BMI rate signals an emerging double burden of malnutrition - overnutrition alongside micronutrient deficiencies - prevalent in urbanizing areas with calorie-dense, nutrient-poor diets, which heightens risks for gestational diabetes (observed in 9.8% here) and hypertensive disorders.^{18,19} These findings emphasize the need for ANC models to incorporate point-of-care diagnostics like hemoglobinometry and BMI assessments, alongside gestational diabetes screening via glucometers, to enable risk stratification beyond basic WHO-focused ANC visits.²⁰

Referral linkage emerged as a cornerstone of success, with 84.2% compliance among high-risk women referred to tertiary centers, a rate statistically superior ($p < 0.001$) to many low-resource

settings where loss-to-follow-up exceeds 30%.^{15,21} This achievement likely stems from integrated counseling on transport facilitation, free services at referral sites, and motivational IEC sessions, fostering trust and urgency. However, the 15.8% non-compliance subgroup warrants targeted interventions, potentially addressing transport costs, spousal influence, or stigma - common barriers documented in urban India.^{16,22} The camps IEC coverage was robust, with 95.1% counseled on institutional delivery, 93.4% on nutrition, and 80.3% on family planning, correlating significantly with satisfaction ($p = 0.003$) and complete informed consent understanding (80.3%), validating WHO's emphasis on respectful maternity care for positive pregnancy experiences.^{19,23}

Comparatively, this camp outperforms routine ANC quality metrics from multi-country studies, where risk detection lags due to overburdened providers and incomplete visits.^{15,20} In India, while ANC coverage nears 70%, quality - measured by components like blood pressure checks and tetanus toxoid - is suboptimal, especially for high-risk identification.^{5,17} The Swasth Naari model's strength lies in its multidisciplinary approach: obstetricians, nurses, and ASHA workers delivering compressed, high-impact services, akin to successful community mobilization in Nepal and Bangladesh.^{21,22} Beneficiary feedback (82% satisfaction) further corroborates that IEC enhances knowledge retention, reducing myths around home births and promoting facility deliveries.¹⁹

Its real-time data collection, prospective design, and public-private collaboration minimize selection bias in a field practice area. The single-site focus, self-reported results, and small sample size ($n=61$) are among the limitations that could inflate satisfaction because of social desirability. Causal inferences regarding the reduction of morbidity are limited when there is no longitudinal follow-up on birth outcomes. However, these findings support expanding these camps across the country, incorporating digital tracking through apps for referrals, and promoting BMI/diabetes screening in UPHC guidelines.^{5,18} By addressing socioeconomic gradients in ANC utilization, this model can curtail maternal mortality ratios, still elevated at 97/100,000 in urban India.¹⁴⁻¹⁷ Future research should employ larger cohorts, randomized controls, and cost-effectiveness analyses to quantify impacts on neonatal outcomes and healthcare costs, ensuring equitable maternal health under Sustainable Development Goal-3.^{15,23}

Overall, the findings of the present study add to the growing body of evidence supporting comprehensive ANC camp models that integrate screening, counselling and referral services. Well-implemented outreach strategies such as the Swasth Naari Shashakth Parivar Abhiyana have the potential to strengthen maternal health services and contribute to progress towards national and global maternal and neonatal health goals.

Limitations

Retrospective study design restricts causal inference, while one-day camp data may fail to reflect long-term maternal and neonatal outcomes. Additionally, the assessment of behavioral change was immediate rather than longitudinal.

CONCLUSION

This ANC camp model for the Swasth Naari Shashakth Parivar Abhiyan program addresses the need to improve efficiencies with ANC services while continuing to focus on promoting high quality care through increase in referral of high risk pregnancies to higher level centers(they implement a successful model of care for antenatal women). They are implementing a structured counseling program for maternal health services to help with similar issues in urban and peri-urban populations. The ANC camp for the UPHC site at Buddhanagara had a high risk identification rate of based on the 90% referral rate that they were able to get from referrals of high risk pregnancies to high level hospitals (the objective of this program was to reduce obstetric complication risk). The connection between the use of IEC counseling and high levels of satisfaction for mothers shows evidence that providing health education increases the likelihood of acceptance by beneficiaries and increases health literacy. To assist with closing the gap in referrals for the 15.8% of high risk pregnancies not referred, future programs should focus on improving communication between the

UPHCs and the tertiary care hospitals and should include additional methods of diagnosis and counseling regarding nutrition for those patients identified with anemia or high maternal BMI. This model indicates that urban slum dwelling mothers can use a scalable method for identifying high-risk pregnancies, with risk identification rates greater than 50% along with high success rates in referrals to higher level centers. These findings indicate that this model should be supported and/or replicated at the national level to improve reproductive health outcomes for the entire country.

Recommendations

To enhance maternal health services, it is recommended to scale up ANC camp models in urban and underserved areas. Structured post-camp follow-up mechanisms should be established to reinforce counselling messages effectively. The involvement of community health workers needs to be strengthened to ensure sustained support for mothers. Additionally, exploring mobile health (mHealth) tools can facilitate continued engagement, reminders, and follow-up with high risk pregnancies.

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