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Original Article

Provider and Administrator Perspectives on Barriers, Facilitators and Frontline Adaptations in Antenatal Care Delivery in Rural Primary Health Centres in Gujarat, India: A Qualitative Descriptive Study

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Abstract

Introduction: Higher antenatal care (ANC) coverage does not guarantee timely, complete and continuous care. We explored how frontline providers and district administrators perceive and manage health-system constraints on ANC delivery in lower-performing rural Primary Health Centres (PHCs) in Gujarat, India. **Methods:** We conducted a qualitative descriptive study in Bhavnagar district from January 2021 to February 2023. PHCs were purposively selected, prioritising lower-performing facilities. We conducted 34 interviews in total, comprising 32 in-depth interviews with 10 medical officers, 12 female health workers, and 10 accredited social health activists, along with two key-informant interviews with district officials. Interviews were audio-recorded, transcribed and translated. Two investigators independently coded transcripts and developed themes inductively; themes were then mapped to Consolidated Framework for Implementation Research (CFIR) domains and WHO health-system building blocks. **Results:** Six themes emerged: service readiness; workforce capacity; information and diagnostics; community engagement; governance and supervision; and frontline adaptability. Participants described a recurring sequence in which structural constraints produced operational consequences (repeated visits, delayed decisions, congestion, referral difficulty); frontline workers responded through ASHA follow-up, due lists, flexible scheduling, outreach and local problem-solving; and these responses reduced but did not close the underlying gaps. **Conclusion:** Constraints were experienced as interacting rather than isolated problems. Frontline adaptive practices buffered some operational effects but could not substitute for structural capacity. Findings are context-specific, rest on provider and administrator perspectives, and are hypothesis-generating.

Key Words: Implementation Science, Maternal Health Services, Prenatal Care, Primary Health Care, Qualitative Research

Introduction

Antenatal care (ANC) is a platform for prevention, early detection of complications, health promotion and continuity of maternal care; quality depends on evidence-based practice, on women's experience of care, and on functioning personnel, information, referral and resource systems.[1,2]

Coverage of ANC contact has expanded in India, but contact does not guarantee that every recommended component is delivered at the right time: in the fifth National Family Health Survey (2019–21), most women reported four or more visits, yet only about one in five received ANC of adequate quality.[3,4] A 91-country analysis found antenatal quality, judged by blood pressure and urine/blood testing, incomplete and unequally distributed by wealth,[5] and facility-based assessment in Bihar found only 30.4% of women received every service in a defined ANC package.[6] Converting service availability into reliable, respectful care is therefore an increasing priority.[7]

Primary Health Centres (PHCs) link rural communities to the health system and coordinate referral. ANC quality at this level is shaped by interacting conditions like staffing, diagnostics, supplies, documentation, supervision, transport and community engagement and by frontline workers' capacity to adapt service delivery to local constraints.

Implementation science offers tools for studying such interactions. The Consolidated Framework for Implementation Research (CFIR) organises contextual determinants of implementation,[8] with a 2022 update revising its domains and constructs,[9] while the WHO

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health-system building blocks describe system capacity through service delivery, workforce, information, products and technologies, financing and governance.[10,11] The two frameworks operate at complementary levels and can be used together, although CFIR was developed to study the implementation of a bounded innovation rather than routine service delivery, an adaptation written in the discussion.

We aimed to explore health-system barriers, facilitators and frontline adaptive strategies affecting ANC delivery in selected lower-performing rural PHCs in Bhavnagar district, Gujarat, India, with four objectives: (i) to describe the barriers and facilitators that providers and administrators perceive; (ii) to explore how these affect the operational delivery and continuity of ANC; (iii) to identify the frontline adaptive practices that mitigate them; and (iv) to interpret the resulting themes through implementation-science and health-system frameworks. Analysis was kept inductive before CFIR and the WHO building blocks were applied as interpretive lenses.

Methods

Study design:

We used a qualitative descriptive design with semi-structured in-depth interviews, chosen because the questions concerned experiences, perceived mechanisms and adaptive practices rather than prevalence or causal effect, and because it stays close to participants' own accounts without committing to a specific theoretical tradition.[12,13] Reporting followed the Consolidated Criteria for Reporting Qualitative Research (COREQ)[14] and the Standards for Reporting Qualitative Research (SRQR);[15] the completed COREQ and SRQR checklists are provided as a supplementary file.

Setting and participants:

The study was conducted in rural PHCs of Bhavnagar district, Gujarat, India, between January 2021 and February 2023, a period that overlapped the COVID-19 pandemic. A list of PHCs was obtained from the district health office, and facilities were purposively selected using prior ANC performance information from National Quality Assurance Standards (NQAS)–related assessments, prioritising lower-performing facilities.[16] NQAS is an internationally benchmarked quality-assessment framework for public health facilities. Checkpoints across eight areas of concern (including service provision, patient rights, inputs, clinical services and infection control) are scored 0 (non-compliant), 1 (partially compliant) or 2 (fully compliant) and expressed as a percentage of the total possible score.

A Primary Health Centre was classified as good if the score was at least 70%, fair if the score was 36%–69%, and poor if the score was 35% or below.[16] There were 46 PHCs in the district: 12 (26.1%) were rated good, 29 (63.0%) fair and 5 (10.9%) poor on the ANC NQAS score, as reported in our earlier assessment.[17] We defined lower-performing PHCs as those rated poor or fair (34 of 46) and selected them on priority basis; this strategy maximises information about constraints but limits statistical representativeness. Because NQAS weights infrastructure and inputs heavily, selecting on it may have predisposed the data towards service-readiness findings; this is discussed as a limitation. Participants were purposively recruited across the cadres delivering ANC - medical officers, female health workers (FHWs, equivalent to Auxiliary Nurse Midwives) and accredited social health activists (ASHAs) - plus district-level officials. We conducted 32 in-depth interviews with providers (10 medical officers, 12 FHWs and 10 ASHAs) and two key-informant interviews with district officials: 34 interviews with 34 participants. Providers were recruited from poor-performing and then fair-performing PHCs, with one FHW and one ASHA approached per PHC; sample size was guided by information power and judged by thematic sufficiency within each cadre (see Data collection). Facility-based participants were eligible with at least six months' service in the same PHC and gave written informed consent; those responsible for more than one PHC were interviewed once. The district informants were selected irrespective of their duration of services. Participants were contacted by telephone beforehand, which also served to establish rapport; no one approached declined to take part.

Data collection:

A semi-structured guide, developed in English and translated into Kathiyawadi (the local dialect), explored barriers, facilitators, service-delivery experience, system responses and possible strategies. Interviews were one-to-one, audio-recorded with consent, and field notes were kept. Interviews were conducted in person in a private room at the PHC, at a time and place agreed during the preceding telephone contact, with no one other than the interviewer and participant present. The interview guide was pilot tested before use. Interviews were conducted cadre by cadre, and the research team judged thematic sufficiency, rather than absolute saturation, as the point at which further interviews yielded no new codes. This was reached after ten interviews in medical officers and in ASHAs; in FHWs, two further confirmatory interviews (12 in total) were conducted to check that no new codes were emerging, after which recruitment ceased. Sample size was guided by information power, given a narrow descriptive aim, participants with directly relevant experience and a

focused interview guide, although interview depth was limited by brevity, and by empirical estimates that code saturation is usually reached within about 9–17 interviews in relatively homogeneous groups with narrowly defined aims.[18,19] No repeat interviews were required, and transcripts were not returned to participants because of logistical constraints. Two Gujarat-specific terms recur in the Results: a Mamta card is a mother-and-child ANC tracking card, and Mamta Divas is a fixed-day, fixed-site monthly outreach session at which the FHW, ASHA and Anganwadi staff jointly provide antenatal, immunisation and nutrition services, evaluated previously in this district.[20]

Data analysis:

The first author (AR), a male physician who had attended a workshop on qualitative research methodology and has previously published research, conducted all interviews; two co-investigators (PD and RD) provided methodological oversight, and the team discussed preconceptions and emerging interpretations throughout. Audio recordings were transcribed verbatim and translated into English by the three authors, and two co-investigators independently checked the accuracy of the verbatim transcripts and translations against the audio. Coding was managed in Microsoft Excel. All 34 transcripts were coded independently by two investigators (AR and PD), who reached consensus and developed the themes together; the third co-investigator (RD) provided methodological oversight and critically reviewed the analysis and interpretation. The analysis followed a staged process from familiarisation through initial coding, codebook development, theme construction, negative-case review (findings reported under Theme 1), framework mapping and matrix synthesis, drawing on the phases of thematic analysis[21] and the framework method.[22] First-cycle coding was inductive; CFIR and WHO categories were not used as codes. Once themes had stabilised, they were mapped onto CFIR 2.0 domains[9] and WHO building blocks, in contrast to studies that apply CFIR deductively from the outset.[23] Because CFIR was developed to study a bounded innovation rather than routine service delivery, we used its constructs as descriptive, context-organising categories rather than as predictors of an implementation outcome. Participant characteristics and interview duration were summarised descriptively; no inferential statistics were computed, because the sample was purposive with no comparison group or independently measured outcome, and theme frequencies were not tabulated.

Trustworthiness:

We applied Lincoln and Guba's criteria.[24] Credibility: double coding, iterative codebook development and negative-case review. Dependability: documented progression from codes to themes, with consensus resolution of discrepancies. Confirmability: reflexive discussion of researcher position, and checking of the reported quotations and themes against the source transcripts. Transferability: detailed contextual description, with claims restricted to selected lower-performing PHCs in one district. Member checking, patient perspectives and independent facility observation were not undertaken.

Ethical considerations:

The study was approved by an Institutional Ethics Committee (approval no. 984/2020) Government Medical College – Bhavnagar dated on 30th Sep 2020. Administrative permission to conduct the study in the district's PHCs was obtained from the district health authority (letter no. GMCB/2020/12/08, dated 14 December 2020). Participants were informed of the study purpose, voluntary participation and the researcher's role, and gave written informed consent; quotations are reported without identifying information. Patients and members of the public were not involved in the design, conduct or planned dissemination of this study.[25]

Results

Participants and interviews:

We conducted 34 interviews: 32 with providers (10 medical officers, 12 FHWs and 10 ASHAs) and two with district-level key informants (Table 1). Median age ranged from 32.5 years among medical officers to 39.0 years among ASHAs; median professional experience ranged from 7.0 to 9.5 years. The two district informants had held their posts for two months and three years. Interviews lasted a mean of 20.8 minutes (Range 15.8–37.3).

Overview: constraints, consequences, adaptation and residual gaps:

Analysis produced six themes: service readiness; workforce capacity; information and diagnostics; community engagement; governance and supervision; and frontline adaptability. Across domains, participants described a recurring sequence: a structural constraint produced an operational consequence for ANC delivery; frontline workers then improvised or organised a response; and the response lessened, but did not close, the resulting gap (Table 2). Illustrative quotations are provided for five of the six themes; for workforce capacity, the only candidate quotation could not be matched to a listed participant cadre and was withheld rather than attributed speculatively.

Theme 1. Service readiness

Participants described limited physical space, absent dedicated ANC areas, constraints for newborn care, intermittent supplements and inconsistent equipment access - experienced as conditions shaping how ANC could be organised rather than as isolated shortages. Some facilities were described as clean and functional, pointing to heterogeneity rather than universal deficiency.

"We don't have enough space for ANC check-ups; sometimes women have to wait outside." - Female health worker, rural PHC

Theme 2. Workforce capacity

Participants described shortages of female medical officers and specialists, high patient volumes and uneven staff distribution, alongside motivation, training and flexible working as enabling conditions.

Theme 3. Information and diagnostics

Delayed laboratory reporting and fragmented documentation meant women sometimes returned several times before results were available; community-generated due lists and Mamta cards were low-cost continuity mechanisms that compensated for weak information flow.

"Women may have to come back two or three times before results are available." - Medical officer, PHC

Theme 4. Community engagement

Delayed ANC initiation, vaccination hesitancy and limited male involvement were barriers to timely, continuous care, while ASHA networks, local governance engagement and outreach platforms such as Mamta Divas supported uptake and follow-up - the same community context could constrain or enable care depending on how it was engaged.

"Some women come only in the last months; they feel early visits are not necessary." - ASHA worker

Theme 5. Governance and supervision

Participants reported variable supportive supervision; visible district engagement was described as supporting accountability and motivation, so governance was experienced through the regularity of supervision more than through formal policy.

"There's no regular check on what we do; practices can vary." - Female health worker, PHC

Theme 6. Frontline adaptability

Remote populations were particularly affected by transport limitations, rigid referral pathways and limited 24×7 availability; providers responded with flexible scheduling, outreach and local coordination. These adaptive practices were the most important cross-cutting finding: frontline action could partly buffer system weakness but could not replace missing infrastructure, workforce or transport capacity.

"ANC services need to reach women, rather than

Table 1:
Characteristics of study participants (N=34).

Participant group	n	% of total (n = 34)	% of provider IDIs (n = 32)	Median age, years	Median experience/tenure, years
Medical officers	10	29.4	31.3	32.5	7
Female health workers	12	35.3	37.5	34	7.8
ASHAs	10	29.4	31.3	39	9.5
District-level Key Informants	2	5.9	–	Not reported	2 months and 3 years (individual)

Note. ASHA: accredited social health activist; IDI: in-depth interview.

Table 2:
Participant-described sequence from structural constraint to residual gap, by system level.

System level	Perceived constraint	Operational consequence	Frontline adaptation	Residual limitation
Facility	Limited ANC space and resources	Congestion; constrained privacy	Flexible use of available space; outreach	Structural capacity remains limited
Workforce	Staff shortages; high workload	Reduced time; service pressure	Task sharing; flexible scheduling	Workload cannot be fully absorbed
Information/ diagnostics	Delayed laboratory reporting	Repeated visits; delayed decisions	Due lists; Mamta-card follow-up	Diagnostic delay persists
Community	Delayed ANC initiation; limited male involvement	Late entry; continuity challenges	ASHA counselling; home follow-up	Demand-side barriers remain
Governance	Variable supervision	Inconsistent practices	Local problem-solving; district contact	Accountability remains variable
Referral/ access	Transport and referral constraints	Delayed access for remote populations	Outreach; family mobilisation	Transport lies outside frontline control

Table 3:
Strategies proposed by participants, by problem domain and implementation level.

Problem domain	Strategy proposed by participants	Implementation level
Infrastructure	Dedicated ANC consultation and service space	Facility
Supplies	Stock monitoring and buffer mechanisms	Facility/ district
Workforce	Recruitment and retention; protected time for ANC	District/ state
Diagnostics	Decentralised essential diagnostics	Facility/ district
Information	ANC tracking or dashboard with feedback loops	Facility/ district
Community	Early ANC counselling; male-inclusive engagement	Community/ PHC
Governance	Standardised supportive supervision with corrective action	District/ facility
Referral/ access	Transport support; flexible outreach	District/ PHC

Table 4:
Interpretive mapping of emergent themes to WHO building blocks and CFIR 2.0 domains.

Emergent theme	WHO health-system lens	CFIR 2.0 lens	Interpretive mechanism
Service readiness	Service delivery; medical products/technologies	Inner Setting (physical infrastructure; available resources)	Structural capacity shapes feasible care
Workforce	Health workforce	Individuals (capability, opportunity, motivation); Inner Setting	Capability and workload interact
Information/ diagnostics	Health information systems; service delivery	Inner Setting (access to knowledge/information; communications)	Information latency affects continuity
Community engagement	Service delivery; governance	Outer Setting (local attitudes; partnerships/connections)	Community context modifies uptake
Governance/ supervision	Leadership and governance	Inner Setting (implementation climate); Process (reflecting/evaluating)	Accountability shapes implementation climate
Adaptability	Service delivery	Implementation Process (adapting)	Frontline adaptation buffers constraints

Note. The mapping is interpretive; the frameworks were used as lenses, not as outcome measures.

expecting women to travel long distances." - Female health worker

Strategies proposed by participants:

Participants proposed strategies spanning infrastructure, supplies, workforce, diagnostics, information, community engagement, governance and referral/access, summarised by problem domain and implementation level in Table 3; these are participant-derived proposals whose feasibility and effectiveness were not tested by this study.

Discussion

This provider- and administrator-centred account found six interacting domains; the central finding was their interaction rather than any single, independently determining factor. Frontline workers absorbed some consequences through follow-up, outreach, flexible scheduling and local problem-solving - better understood as adaptive buffering than as evidence for one determining factor. For workforce capacity in particular, strong commitment coexisted with structural workload pressure that individual effort could not resolve, which we regard as the key analytic point for that theme. This fits health-system thinking that treats quality as the product of care processes and the structures that support them,[1,7] including the Lancet Global Health Commission's argument that quality should be built into system foundations rather than treated as a later aspiration.[7] Our study adds a local implementation perspective on the gap between formal service expectations and operational capacity.

Workforce shortages, supply interruptions and diagnostic delay are not new observations; the contribution here lies in examining what happens between a constraint and the care delivered. Participants described compensatory practices - ASHA follow-up and due lists compensating for fragmented information, flexible outreach compensating for difficult transport. Task shifting was central: assessment of public facilities in Bihar similarly found shifting of tasks from doctors to auxiliary nurse-midwives in every facility studied, alongside wide inter-facility variation in quality.[6] Qualitative work in rural Manipur similarly found ASHAs valued as link workers meeting communities' immediate needs while facing constraints in realising their multiple roles;[26] in our interpretation of the findings (not a directly reported participant statement), ASHA follow-up functioned as a continuity mechanism, with the risk of becoming an informal substitute for missing system capacity. This pattern echoes Lipsky's account of street-level bureaucracy: frontline workers facing high

caseloads, ambiguous goals and limited resources routinely exercise discretion to ration services and improvise workarounds, so that the policy delivered diverges from the policy designed;[27] read this way, due lists, flexible scheduling and informal follow-up are a predictable feature of frontline work under sustained constraint, and their existence is itself evidence of a gap between designed and delivered ANC. In resilience terms, the practices described are mainly absorptive and adaptive, sustaining services under strain, while transformative change of underlying structures rests with district and state decision-makers;[28] we borrow this framework, developed around acute shocks, for chronic strain as an interpretation to be tested rather than a finding of this study. Programmes focused only on frontline motivation may ask individual workers to compensate indefinitely for structural deficits, while infrastructure investment without attention to workflow, supervision and local adaptation may fail to convert resources into reliable care; layered strategies addressing both, along the lines summarised in Table 3, are indicated. Limited male involvement was named as a community-level barrier; a systematic review found interventions engaging men associated with better ANC attendance and other care-seeking outcomes, while cautioning that such interventions must be designed to avoid harming couple relationships,[29] supporting careful pairing of supply-side and community-engagement interventions.

The WHO building blocks describe macro system capacity; CFIR offers an implementation-oriented lens on context and process.[9–11] We used them as complementary tools (Table 4): themes were first kept in participants' own terms, and mapping showed how one experience could span levels - diagnostic delay, for example, was at once a service-delivery, information-system and implementation-context problem. Financing did not emerge as a distinct theme, plausibly because participants were frontline and programme actors rather than budget-holders. As noted in Methods, CFIR is designed around a bounded innovation, and standing ANC delivery is not one; our use of its constructs as descriptive categories, rather than as predictors of an implementation outcome, should be read with that adaptation in mind.

This study was not designed to measure ANC quality independently or to estimate causal effects, and we did not measure adaptive capacity as a construct; provider-reported constraints are perceptions of service delivery, and the adaptive practices described are those reported by participants, not statistically demonstrated determinants. This study should not be read as an assessment of women's experience of ANC: women, partners and community members were not interviewed, and no direct observation was conducted. Quality frameworks distinguish provision of care from experience of care, including communication, dignity and emotional support;[1,2] provider accounts illuminate system functioning, but a comprehensive quality assessment needs triangulation with women's accounts and independent assessment of care processes and readiness.

Pandemic context: Data collection (January 2021 to February 2023) overlapped the COVID-19 pandemic. Interviews were conducted in person at the PHCs after telephone contact to agree a time and place. Participants did not report that staff had been redeployed, and pandemic effects on staffing or ANC delivery did not emerge as a distinct theme; we cannot exclude, however, that the pandemic intensified some of the staffing, workload and continuity constraints described, or influenced how participants framed them.

Strengths and Limitations

Strengths include inclusion of three frontline cadres together with district-level informants (giving several vantage points on the same system, although no formal cross-cadre comparison is presented), a staged process separating inductive theme generation from framework mapping, a focus on lower-performing facilities that surfaced constraints in detail, and a mechanism-oriented interpretation. Limitations: ANC quality was not independently measured, so findings describe perceived mechanisms, not demonstrated determinants; purposive selection of lower-performing facilities limits representativeness, and because NQAS weights infrastructure and inputs heavily, selecting on it may have predisposed the data towards service-readiness findings; patient and community perspectives were not collected; no direct facility observation, record audit or independent readiness assessment was incorporated; the study covered one district, supporting contextual transferability rather than statistical generalisation; data collection (January 2021 to February 2023) overlapped the COVID-19 pandemic, which may have shaped participants' accounts of workload and service delivery; interviews were brief (mean 20.8 minutes) and conducted by a physician-investigator, which may have limited depth or moderated criticism from lower-hierarchy cadres; transcripts were translated and not returned for member checking; thematic sufficiency was a team judgement and was not formally tested, so meaning saturation cannot be assumed; and theme frequencies by cadre were not tabulated.

Conclusion

In these lower-performing rural PHCs, providers and administrators described ANC delivery as shaped by interacting constraints in service readiness, workforce capacity, information and diagnostics, community engagement, governance and referral access. Frontline adaptive practices partly buffered these constraints but could not substitute for structural capacity. The principal contribution is a mechanism-oriented account of how system constraints become operational pressures and how frontline actors respond; findings are context-specific hypotheses for quality improvement, not proof of causal determinants of ANC quality. Future work should combine women's perspectives, direct facility assessment, routine quality indicators and prospective evaluation of the strategies proposed here.

Declarations

Conflicts of Interest: None declared.

Funding: No external funding received.

AI usage declaration: Generative AI was used for improvement of language and readability. It was not used to generate or alter participant data, quotations, observations or findings. The authors reviewed the final text and remain responsible for the accuracy of all data, quotations, references and methodological statements.

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