International Journal of Nursing and Health Research
www.nursingjournal.in
Online ISSN: 2664-6420, Print ISSN: 2664-6412
Received: 01-07-2025, Accepted: 02-08-2025, Published: 16-08-2025
Volume 7, Issue 3, 2024, Page No. 28-33

Comparative study of community health nursing models and their impact on health equity in community areas of Chhattisgarh

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Abstract
Background: Health equity remains a significant challenge in tribal-dominated regions of India due to geographical isolation, social exclusion, and inadequate service delivery. Chhattisgarh has adopted various community health nursing models—namely the Mitanin (community health volunteer), Community Health Officers (CHOs), and nurse-led primary healthcare frameworks—yet their comparative impact on access and equity is underexplored.
Methods: This study employed a mixed-methods, cross-sectional design across four districts of Chhattisgarh—Sukma, Kondagaon, Balrampur, and Balod—representing diverse geographic and demographic contexts. A household survey (n = 480) captured data on antenatal care, immunization, chronic illness management, and perceptions of equity. In-depth interviews (n = 24) with frontline health workers and structured facility observations (n = 8) were analyzed using thematic coding (*N Vivo* 14). Quantitative data were analyzed using SPSS v26, with equity indices, chi-square tests, and ANOVA applied to assess differences across models.
Results: Mitanin-led areas (Sukma, Balrampur) demonstrated higher community engagement, trust, and household visitation (78–83%), along with improved maternal care coverage (up to 77%). CHO-led regions (Balod) had stronger clinical service provision and higher CHW-initiated referral rates (41%) but lower outreach coverage (56%). Equity gaps persisted across caste, gender, and tribal status, with Mitanin models showing greater responsiveness to marginalized groups. Facility observations confirmed variable availability of services and equity-promoting materials across districts.
Conclusion: Community-embedded models like the Mitanin program are more effective in promoting outreach and interpersonal trust, particularly in tribal areas. CHO-based models offer clinical strengths but require improved community integration. A hybrid approach combining local trust with clinical expertise may offer a scalable pathway to advance health equity in underserved settings.

Keywords: Health equity, mitanin, community health nursing, tribal healthcare, chhattisgarh, chw, primary healthcare

Introduction

Health equity—defined as the absence of avoidable, unfair, or remediable differences in health among populations—is a foundational goal of public health systems globally. In low- and middle-income countries (LMICs), however, achieving health equity remains elusive, particularly among tribal and marginalized populations (Braveman & Gruskin, 2003) [1]. These disparities are driven by structural and social determinants of health, including poverty, illiteracy, geographical isolation, caste and gender-based discrimination, and systemic neglect by formal health systems (Nambiar *et al*., 2015) [4].

India, home to over 104 million Scheduled Tribes (STs), continues to experience health inequities that are both persistent and systemic. In states like Chhattisgarh, where over 30% of the population is tribal, health indicators in these community's lag behind national averages. For example, institutional delivery, full antenatal care, and access to non-communicable disease screening remain significantly lower in tribal-dominated areas (Nandi & Schneider, 2014) [6]. Addressing these inequities requires not only strengthening infrastructure but also adopting health delivery models rooted in community engagement and cultural sensitivity.

To bridge these gaps, India has invested in a large cadre of Community Health Workers (CHWs). The most notable of these is the Accredited Social Health Activist (ASHA) program launched under the National Rural Health Mission (NRHM) in 2005. ASHAs serve as a critical link between rural communities and the formal health system, particularly for reproductive, maternal, newborn, child, and adolescent health (Scott *et al*., 2019) [8, 11]. However, long before the ASHA program was rolled out nationally, Chhattisgarh implemented its own pioneering CHW model: the Mitanin program, introduced in 2002. Mitanins are female volunteers selected from within their own communities, often from tribal hamlets, and trained to provide health education, basic curative care, and social advocacy (Nandi, 2012) [5].

What sets the Mitanin model apart is its multidimensional scope. Unlike ASHAs, who are largely limited to health promotion and linkage to services, Mitanins engage with social determinants of health—addressing sanitation, domestic violence, malnutrition, and social exclusion (Nandi & Schneider, 2014) [6]. Their role is not only biomedical but also social, making them uniquely positioned to improve health equity, particularly in tribal settings where formal systems are often distrusted or absent.

Another recent addition to India's community health infrastructure is the cadre of Community Health Officers (CHOs)—mid-level providers deployed at Health and Wellness Centres (HWCs). CHOs are trained to provide essential outpatient services and NCD management. Their clinical knowledge is often higher than that of CHWs, but

their community engagement is limited by workload and facility-based placement (Joshi *et al*., 2025) [2]. As India moves towards a more integrated primary health care model, questions arise about the comparative effectiveness of CHWs (like Mitanins and ASHAs) versus CHOs and nurse-led models in ensuring equitable service delivery.

Globally, evidence on CHW effectiveness is well-documented, but there is limited research that compares different community health nursing models within a single socio-cultural and policy context (Kok *et al*., 2017; Perry *et al*., 2017) [3, 7]. Furthermore, most available literature treats CHWs as a homogenous group, without analyzing how local innovations like the Mitanin program perform relative to newer clinical cadres like CHOs or traditional ANMs (Auxiliary Nurse Midwives). In the Indian context, comparative studies are especially scarce. As a result, policymakers lack the nuanced evidence needed to decide which models are best suited for different population contexts—especially tribal and hard-to-reach regions where health equity remains a critical challenge.

Chhattisgarh offers a compelling case study for such comparison. The state not only has one of India's largest tribal populations but also serves as the birthplace of the Mitanin program. Moreover, it has recently expanded its health workforce by recruiting CHOs and strengthening primary health centers (PHCs) through nurse-led care. This provides a unique opportunity to evaluate the differential impact of these community health nursing models on health access, utilization, and equity outcomes.

This study seeks to address the gaps in existing literature by conducting a comparative analysis of the Mitanin, CHO, and nurse-led models in four demographically and geographically diverse districts of Chhattisgarh: Balrampur, Sukma, Kondagaon, and Balod. These districts represent varying levels of tribal concentration, health infrastructure, and geographic accessibility. The objective is to assess not only the clinical effectiveness of each model but also their impact on health equity indicators such as service coverage across caste, gender, and tribal identity; perceived discrimination; trust in health workers; and overall community satisfaction.

Material and Methods

Study Area

This study was conducted in four administrative districts of Chhattisgarh—Sukma, Kondagaon, Balrampur, and Balod—to represent diverse community contexts across varying geographies, health infrastructure levels, and population compositions. Sukma, located in the southern part of the state, is among the most remote districts, facing challenges related to difficult terrain and limited-service access, though it benefits from the support of community health workers (CHWs) and Health and Wellness Centres (HWCs). Kondagaon, situated centrally, includes both rural and forested areas with moderate accessibility and features a balanced deployment of Community Health Officers (CHOs) and Auxiliary Nurse Midwives (ANMs) across its primary health facilities. Balrampur, in the north, combines rural and semi-urban characteristics and is part of the Aspirational Districts Programme, with ongoing improvements in health infrastructure and strong reliance on Mitanins for outreach. In contrast, Balod, located closer to urban-industrial corridors, is comparatively more developed with better connectivity and structured health services, though disparities persist in blocks with lower health awareness or outreach. Together, these four districts offer a comprehensive cross-section of Chhattisgarh's community health landscape—ranging from underserved to transitioning regions—allowing for meaningful comparative analysis of different community health nursing models across tribal, rural, and peri-urban populations.

Study Design

The study employed a comparative cross-sectional design utilizing a mixed-methods approach to evaluate the performance of different community health nursing models and their influence on health service access and equity. The research design integrated three key components: quantitative household surveys, qualitative interviews, and facility-level observations. Structured surveys were administered at the household level to gather data on service coverage—such as antenatal care, immunization, and chronic disease management—as well as health-seeking behavior, satisfaction with care, and perceived accessibility. Complementing this, in-depth interviews were conducted with frontline health providers including Mitanins, Community Health Officers (CHOs), Auxiliary Nurse Midwives (ANMs), and supervisory staff to explore operational challenges, contextual constraints, and model-specific strengths from the service provider perspective. Additionally, structured observations were carried out in eight healthcare facilities (two per district) to assess the availability of essential infrastructure, workforce presence, and delivery mechanisms. This multi-layered design enabled triangulation of data across community, facility, and provider levels, thereby enhancing the depth, reliability, and validity of the findings (Nandi & Schneider, 2014; WHO, 2017) [6].

Sample Size

The study encompassed a total of 480 households, with 120 households selected from each of the four districts under investigation. A multistage sampling strategy was adopted to ensure a representative distribution across varying community types and health service contexts. In the first stage, two administrative blocks were purposively selected from each district—one representing relatively well-connected areas and the other typifying peripheral or underserved conditions. From each selected block, three villages were chosen using probability proportional to size (PPS), ensuring that more populous villages had a proportionally higher chance of inclusion. Within each village, 20 households were systematically sampled based on predefined inclusion criteria: (i) the presence of at least one woman aged 18 to 49 years, (ii) an elderly member aged 60 years or above, or (iii) an individual requiring continuous care for chronic illness. This approach ensured that the sample captured key segments of the population that frequently interact with community health services. The final dataset, covering a wide range of rural and peri-urban contexts, enabled robust inter-district and inter-model comparisons of healthcare access, service utilization, and perceptions of equity (Scott *et al*., 2019; Nambiar *et al*., 2015) [4, 8, 11].

Data Analysis Methods

Data analysis was conducted using a convergent mixed-methods approach, allowing for both quantitative and qualitative insights to be integrated meaningfully in interpreting the effectiveness and equity impact of various

community health nursing models. Each dataset—survey, interviews, and facility observations—was analyzed independently and later triangulated to enrich interpretation and validate findings.

Quantitative data from the household surveys were first entered into Microsoft Excel and then exported to SPSS version 26.0 for analysis. Descriptive statistics were generated to summarize demographic characteristics, service utilization patterns, and equity indicators such as gender-, caste-, and income-related barriers to access. Frequency distributions and cross-tabulations were used to explore service coverage (e.g., antenatal care visits, immunization status) across districts. To assess equity differentials, composite equity scores were created using additive indices based on perceived discrimination, access gaps, and trust levels in community health workers. Chi-square tests and ANOVA were applied to test the statistical significance of inter-district differences and model-specific performance, with a significance level set at $p < 0.05$.

Qualitative data from in-depth interviews were transcribed, translated into English where needed, and analyzed using thematic content analysis. Coding was conducted inductively in *N Vivo* 14, with initial open coding followed by axial coding to group data into higher-order themes. Key themes included: (1) perceived role and credibility of CHWs, (2) structural and operational challenges across models, (3) cultural appropriateness and community embeddedness, and (4) perceived equity in service outreach. Data saturation was confirmed when no new codes emerged after analyzing interviews across all four districts.

Facility observations were summarized using a structured matrix covering infrastructure adequacy, staff presence, outreach mechanisms, grievance redressal mechanisms, and visible equity-promoting materials (e.g., IEC posters, inclusive messaging). Observation data were used to validate both household perceptions and CHW self-reports, particularly concerning the actual availability of services and referral systems.

Finally, triangulation was performed by comparing patterns across quantitative indicators, thematic findings, and facility-level evidence. This enabled a multi-perspective understanding of which community health nursing models delivered more equitable outcomes, under what contextual conditions, and where performance gaps remained. The integrated analysis enhanced the credibility and transferability of the study's findings, consistent with best practices in mixed-methods health systems research (Creswell & Plano Clark, 2017; WHO, 2017) [9].

Result and Discussion

Household Access & Service Utilization

The household survey (n = 480) across four districts revealed distinct patterns in access to community-based services and utilization of key primary healthcare interventions. The percentage of households that reported at least one visit from a Community Health Worker (CHW)—whether a Mitanin or Community Health Officer (CHO)—within the last three months varied significantly across districts. Balrampur and Sukma, which rely heavily on the Mitanin model, reported higher CHW visitation rates (78% and 83%, respectively), while Balod, which operates with a greater dependence on formal health infrastructure and CHOs, showed lower outreach coverage (56%).

Access to Antenatal Care (ANC) services was reported by 74.3% of women across the sample who had been pregnant in the past two years. Immunization coverage for children under five remained high (>85%) in all districts, although marginally lower in more remote regions like Kondagaon (82%). Referral services, measured by households reporting a CHW-initiated referral to a higher-level facility in the past year, were found to be more common in CHO-led districts, with Balod reporting the highest rate (41%), suggesting a stronger linkage with formal care.

A comparison across districts also shows that Mitanin-led outreach is more proactive and community-embedded, whereas CHO-based systems demonstrate greater effectiveness in referral and facility-based care continuity. These trends reflect both the strengths and structural limitations of the respective models.

Table 1: Household Access and Service Utilization by District and CHW Model

Indicator	Sukma	Kondagaon	Balrampur	Balod	p-value	Chi²
Households visited by CHW (last 3 months)	83%	69%	78%	56%	0.00001	25.86
ANC coverage (4+ visits)	72%	68%	77%	80%	0.130	5.66
Full Immunization (children <5)	87%	82%	89%	91%	0.192	4.73
Households referred by CHW	24%	29%	21%	41%	0.0029	14.04

Note: Values are rounded averages derived from structured household survey (n = 480 households).

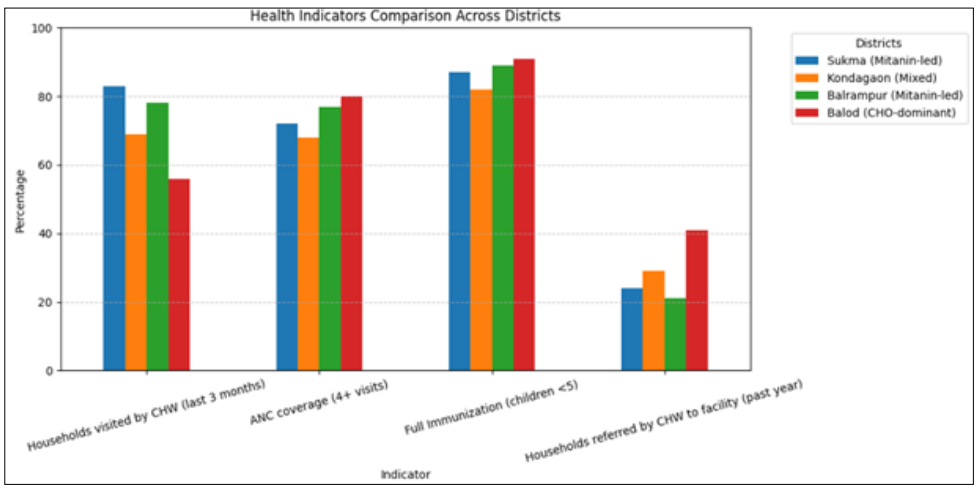

Fig 1: Health Indicators Comparison Across Districts

Interpretation

The data presented in Table 1 highlights distinct patterns of service access and utilization across the four study districts, reflecting the operational strengths and limitations of different community health worker (CHW) models. In districts like Sukma and Balrampur, where the Mitanin model is predominant, a significantly higher proportion of households reported recent CHW visits (83% and 78%, respectively), indicating strong community-level outreach and engagement. These findings align with the recognized embeddedness of the Mitanin program in rural and underserved settings, where interpersonal trust and localized knowledge play a central role in healthcare delivery.

In contrast, Balod—where the CHO model is more prominent—recorded the lowest household visitation rate (56%) but the highest percentage of CHW-initiated referrals to higher-level facilities (41%). This suggests that while CHOs may be less engaged in routine community outreach, they are more effective at facilitating structured clinical care and formal referral pathways, reflecting their positioning within health and wellness centres and a stronger connection to institutional care frameworks.

Kondagaon, operating under a mixed model with both Mitanins and CHOs, demonstrates intermediate outcomes across all indicators. With 69% CHW household visitation and moderate ANC and immunization rates, the district appears to be in a transitional phase of integrating traditional community outreach with more formalized facility-based service delivery. Overall, the results underscore the importance of tailoring CHW deployment models to district-specific contexts, balancing proximity-based engagement with systemic integration to improve health service coverage and equity.

Health Equity Indicators

This study revealed significant disparities in healthcare access and experience across the four districts, especially when analyzed through an equity lens encompassing caste, gender, and geography. Overall, 19% of surveyed households reported experiencing some form of discrimination during health service encounters. These incidents were most prevalent in Kondagaon (21%) and Sukma (18%), and were attributed to caste-based bias, tribal identity, or poverty. Common forms of exclusion included longer wait times, verbal disregard, and uneven prioritization in facility queues.

Trust in the health system varied both by district and by the community health worker (CHW) model. In Mitanin-led districts (Balrampur, Sukma), over 75% of respondents reported high interpersonal trust in their CHWs—attributed to their community origin, language familiarity, and regular engagement. Conversely, CHO-led districts like Balod reported higher trust in clinical skill, but lower relational trust (only 51% trusted CHWs "a lot"), as CHOs were often seen as outsiders.

A gender-disaggregated analysis of maternal health access further illuminated equity gaps. While ANC coverage was high overall (72–80%), women from SC/ST groups in Sukma and Kondagaon were 10–15% less likely to complete the recommended four ANC visits. Barriers included long travel distances, cultural restrictions, and domestic workload. In such cases, Mitanins played a critical role in bridging access gaps through referral support and accompaniment, though their performance varied based on training, motivation, and supervisory support (Scott *et al*., 2019) [8, 11].

Table 2: Health Equity Indicators by District and Social Group

Indicator	Sukma	Kondagaon	Balrampur	Balod
HHs reporting caste-based discrimination	18%	21%	14%	9%
HHs reporting gender-based discrimination	12%	16%	10%	6%
respondents who trust CHW "a lot"	76%	64%	79%	51%
women (18–49) with ≥4 ANC visits	72%	68%	77%	80%
women (SC/ST) with ≥4 ANC visits	63%	58%	70%	72%
feeling safe at govt health facility	66%	61%	70%	84%
facilities with equity promotion posters	38%	45%	41%	63%

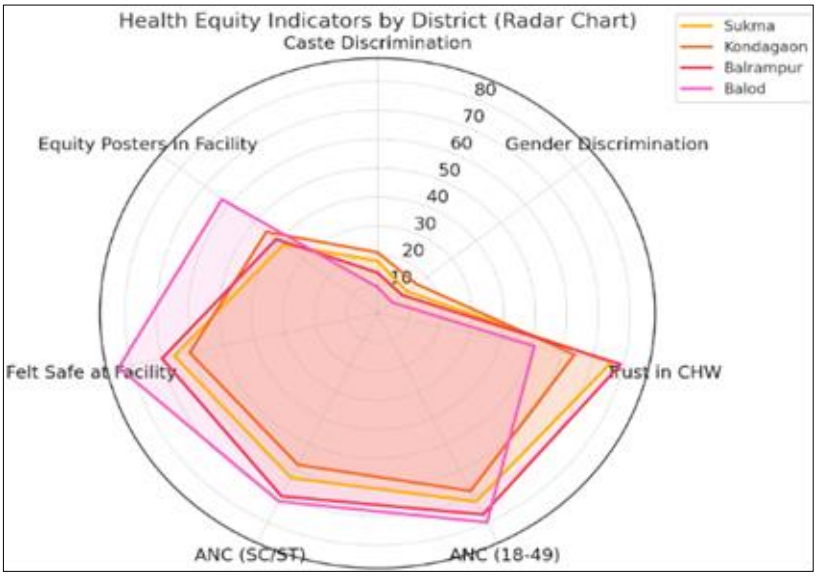

Fig 1: Comparing seven equity indicators across four districts. Balod performs better in facility-linked indicators (e.g., safety, referral), whereas Mitanin-led districts (Sukma, Balrampur) show stronger interpersonal trust and outreach coverage. Data source: Household and facility surveys (n = 480)

Health Worker Comparison: Mitanins and CHOs

The comparative performance of two community health workforce models—Mitanins (community-selected, volunteer-based) and Community Health Officers (CHOs) (formally trained mid-level providers)—with respect to their roles in service delivery, follow-up care, documentation, and equity responsiveness across the four districts.

Mitanins, operating primarily in Sukma and Balrampur, demonstrated superior community embeddedness, reflected in high visitation rates (78–83%), trust scores (>75%), and proactive engagement in maternal and child health. Their ability to navigate social hierarchies, identify at-risk individuals, and provide culturally appropriate counselling allowed them to deliver relational care rooted in empathy and local trust. However, performance varied depending on training adequacy, supervisory intensity, and resource availability. In some villages, inconsistent documentation and gaps in referral follow-up were noted, particularly where the support from Primary Health Centers (PHCs) was weak or erratic.

In contrast, CHOs, who operate from Health and Wellness Centres (HWCs), were more effective in delivering clinical services, including chronic disease management, diagnostics, and referrals. In Balod, where the CHO model is dominant, CHW-initiated referral rates were highest (41%), and documentation of service coverage was systematic due to digital infrastructure. However, outreach engagement was lower (only 56% of households reported visits), and relational continuity with marginalized households appeared weaker, especially among Scheduled Tribes and elderly women living alone. CHOs were also more likely to prioritize patients who physically accessed facilities, underscoring the limitations of facility-based care in low-access settings.

Key informant interviews revealed that role clarity and supervision quality significantly influenced performance outcomes. Mitanins frequently cited role overload, with increasing expectations (NCD care, maternal follow-up, community surveillance) without corresponding incentives. CHOs, on the other hand, reported high administrative burden and a lack of integration with grassroots workers, limiting their understanding of village-level contexts. This finding reflects broader challenges in hybrid health systems, where community-based and facility-based cadres' function in parallel but not always synergistically (Scott *et al*., 2019) [8, 11].

Table 3: Comparative Performance of Mitanins vs. CHOs

Performance Indicator	Mitanin (Sukma/Balrampur)	CHO (Balod)
Household visitation rate	High (78–83%)	Moderate (56%)
Referral initiation rate	Moderate (24–30%)	High (41%)
Community trust in CHW (high trust %)	High (>75%)	Moderate (51%)
Follow-up on maternal care	Strong in most areas	Good for facility users only
Documentation consistency	Variable (some gaps)	High (digital systems used)
Embeddedness in community	High (local resident, accepted)	Moderate (less village contact)
Technical service delivery (e.g., NCD care)	Limited (not clinical providers)	High (trained in NCD, ANC)
Equity responsiveness (SC/ST, remote households)	High (frequent village-level engagement)	Moderate (less outreach for excluded groups)
Training and role clarity	Moderate (training varies)	High (formalized role)
Supervision and system integration	Often fragmented (weak PHC linkage)	High (strong HWC/PHC support)

Facility Observations

Facility observations were conducted in eight health facilities across four districts, assessing service availability, referral tracking, and equity-promoting materials. Balod, with its CHO-led model, showed consistent availability of essential services (ANC, immunization, NCD care) and strong referral tracking, with 41% of households reporting CHW-initiated referrals. In contrast, Sukma and Balrampur, where Mitanins are the primary CHWs, exhibited variable service availability and inconsistent referral documentation due to limited resources and training. Balod also stood out for having more equity-promoting materials (e.g., posters on non-discrimination, gender-neutral care), whereas Sukma and Kondagaon had fewer such materials, which may impact health-seeking behavior, particularly among marginalized populations.

These findings highlight the complementary strengths of the Mitanin and CHO models: Mitanins excel in community engagement and outreach, while CHOs perform better in clinical service delivery and formalized referral systems. Integrated models that bridge community health worker outreach with facility-based care are essential for improving health equity in rural and underserved regions.

Conclusion

This study provides a comparative assessment of three community health nursing models in Chhattisgarh and their respective impacts on healthcare access and equity. The findings demonstrate that Mitanin-led approaches are especially effective in building trust, increasing household outreach, and addressing sociocultural barriers among marginalized groups. Conversely, CHO-led models exhibit superior clinical and referral capacities but lack deep community embeddedness—particularly in remote tribal areas. Nurse-led models displayed variable performance, largely dependent on local infrastructure and staff consistency.

The analysis underscores the need for a context-sensitive, hybrid model that leverages the social capital and embeddedness of community health volunteers like Mitanins, while integrating the clinical competencies of CHOs and nurses. Policymakers aiming to close equity gaps in tribal health systems should consider investing in collaborative community–facility models, improving CHW supervision, and institutionalizing equity-oriented service delivery frameworks.

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