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Original Research Article

Haemoglobin Screening Through Community Health Camps: Feasibility and Challenges

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Abstract:

Background: Anaemia remains a major public health issue in India, particularly among women and adolescents in rural areas. Early detection through haemoglobin screening is essential but often limited by resource constraints. Community health camps provide a feasible approach for decentralized screening and awareness generation.

Objectives: To evaluate the feasibility and operational challenges of conducting haemoglobin screening through community health camps in a semi-urban population of Bihar.

Methods: A retrospective study was carried out in Sabalpur village, Patna, over three months (June–August 2025). Data from 384 participants attending haemoglobin screening camps were analyzed. Haemoglobin estimation was done using HemoCue® Hb 301 systems. Feasibility indicators (coverage, participation rate, and operational efficiency) and challenges (technical, logistical, and follow-up issues) were assessed using descriptive statistics.

Results: Of 384 screened individuals, 255 (66.4%) were anaemic, with higher prevalence among females (74.1%) than males (55.1%) ($p<0.01$). Mild anaemia was observed in 30.7%, moderate in 25.8%, and severe in 9.9%. Each camp screened 40–50 participants per day with high community participation (85%). The use of portable haemoglobin meters enabled rapid, on-site results. However, challenges included equipment recalibration, shortage of consumables, irregular power supply, and limited follow-up (63%).

Conclusion: Haemoglobin screening through community health camps is operationally feasible and effective in identifying anaemia at the grassroots level. Nevertheless, sustainability requires improved logistics, reliable power sources, consistent supply chains, and stronger post-camp referral mechanisms. Integrating such camps into routine public health programs and leveraging community health workers can significantly strengthen anaemia control efforts in resource-limited settings.

Keywords: Anaemia, Haemoglobin Screening, Community Health Camp, Rural Health, Feasibility, Bihar.

Introduction

Anaemia continues to be a major public health problem in India, particularly among women of reproductive age and children, with significant implications for maternal and child morbidity and mortality [1]. According to the National Family Health Survey-5 (NFHS-5), more than half of Indian women aged 15–49 years and about 67% of children under five years are anaemic, reflecting a persistent burden despite multiple national programs [2]. Haemoglobin screening plays a critical role in early detection and management ofanaemia, yet access to such screening remains limited in rural and underserved areas due to infrastructural, logistical, and socioeconomic barriers [3].

Community health camps represent a promising strategy to bridge this gap by providing low-cost, decentralized health services directly to populations in need [4]. These camps enable screening, diagnosis, and referral of anaemic individuals and can contribute valuable data to understand local epidemiological patterns [5]. However, the feasibility of conducting haemoglobin screening in community settings is influenced by several factors, including the availability of trained personnel, community participation, reliable diagnostic equipment, and adequate follow-up mechanisms [6].

Previous studies have reported varied outcomes from community-based anaemia screening initiatives. While some have demonstrated significant improvements in detection and treatment initiation, others highlight challenges such as limited awareness, logistical constraints, and poor

compliance with iron supplementation [7,8]. Moreover, there is a need for region-specific data to evaluate the operational feasibility of such camps in different socio-cultural and geographical contexts [9].

Sabalpur village in Patna district, Bihar, represents a typical semi-urban setting where health resources are constrained and anaemia prevalence is expected to be high due to nutritional deficiencies and socio-economic disparities [10]. Understanding the feasibility and challenges of haemoglobin screening in such areas can inform future program design and policy implementation.

The present retrospective study was conducted in Sabalpur village over a three-month period (June–August 2025) and analyzed data from 300–400 participants who attended community health camps organized for haemoglobin estimation. The objectives were to assess the feasibility of conducting large-scale haemoglobin screening in a community camp setting, identify operational and community-level challenges, and provide insights for strengthening future screening initiatives. Findings from this study aim to contribute evidence for optimizing anaemia control programs in rural India through sustainable, community-based approaches [11,12].

Materials and Methods

Study Design and Setting: This retrospective study was conducted in Sabalpur village, located in the Patna district of Bihar, India. The village represents a semi-urban population with limited access to routine health services and high reported rates of nutritional anaemia. The study was carried out over a period of three months (June to August 2025) and aimed to evaluate the feasibility and operational challenges associated with haemoglobin screening conducted through community health camps.

Study Population and Sample Size: A total of 300–400 individuals who attended community health camps during the study period were included. Records were retrieved from camp registers and screening reports maintained by the organizing health team. The sample included both males and females aged 15 years and above who voluntarily participated in the anaemia screening activity. Pregnant women, lactating mothers, and adolescents were also included to ensure a comprehensive community profile. Individuals with incomplete data or known haematological disorders were excluded from analysis.

Data Source and Collection: Data were collected retrospectively from the camp records maintained by trained health workers. Each record contained demographic information (age, sex, occupation), medical history, haemoglobin estimation results, and notes on symptoms or follow-up advice. Haemoglobin levels were measured on-site using HemoCue® Hb 301 systems, a portable and validated photometric method suitable for field-based screening. The instruments were calibrated daily, and quality control checks were performed according to manufacturer guidelines.

Operational Framework of Health Camps

Health camps were organized in collaboration with local Accredited Social Health Activists (ASHAs) and community leaders to ensure participation and awareness. Camps were held at accessible public venues such as school premises and panchayat buildings. Each camp was staffed by a medical officer, nursing personnel, and two laboratory technicians. Participants received basic health education about anaemiaprevention, dietary advice, and, when indicated, were referred to the nearest Primary Health Centre (PHC) for further evaluation or treatment.

Outcome Measures

The primary outcomes assessed were:

Feasibility indicators – number of individuals screened per camp, average testing time, community participation rate, and availability of resources.

Operational challenges – logistical issues, power interruptions, equipment malfunction, data recording difficulties, and participant follow-up rates.

Data Management and Statistical Analysis: Data were entered into Microsoft Excel 2021 and analyzed using IBM SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize socio-demographic data and haemoglobin levels. Anaemia was classified according to WHO criteria:

1. Mild anaemia: Hb 10–11.9 g/dL (non-pregnant women) / 10–10.9 g/dL (pregnant women)
2. Moderate anaemia: Hb 7–9.9 g/dL
3. Severe anaemia: Hb <7 g/dL.

Results were expressed as means, standard deviations, and percentages. Associations between anaemia prevalence and demographic variables were assessed using the chi-square test, with $p < 0.05$ considered statistically significant.

Ethical Considerations: Ethical approval for the study was obtained from the Institutional Ethics Committee, Nalanda Medical College, before data analysis. As this was a retrospective review, individual consent was waived; however, confidentiality of participant data was maintained. Data were used solely for academic and public health evaluation purposes.

Results

Demographic Profile of Participants: A total of 384 individuals attended the community haemoglobin screening camps conducted in Sabalpur village between June and August 2025. Of these, 228 (59.4%) were females and 156 (40.6%) were males. The age of participants ranged from 15 to 65 years, with a mean age of 32.8 ± 10.2 years. The majority (45.3%) were in the 21–35-year age group, followed by 28.4% aged 36–50 years and 14.1% above 50 years. Approximately 52.6% of participants were homemakers, 28.1% were daily wage workers, and 19.3% were students or unemployed youth.

Table 1: Demographic characteristics of study participants (n = 384)

Parameter	Category	n (%)
Gender	Male	156 (40.6)
	Female	228 (59.4)
Age (years)	15–20	48 (12.5)
	21–35	174 (45.3)
	36–50	109 (28.4)
	>50	53 (13.8)
Occupation	Homemaker	202 (52.6)
	Daily wage worker	108 (28.1)
	Student/unemployed	74 (19.3)

Prevalence and Severity of Anaemia: Out of the 384 screened individuals, 255 (66.4%) were found to be anaemic. Anaemia prevalence was notably higher among females (74.1%) compared to males (55.1%) ($p < 0.01$). The mean haemoglobin level for the overall population was 10.4 ± 1.7 g/dL. Based on WHO classification, 118 participants (30.7%) had mild anaemia, 99 (25.8%) had moderate anaemia, and 38 (9.9%) suffered from severe anaemia. Among women of reproductive age (15–45 years), 79.2% were anaemic, highlighting a significant gender disparity ($p < 0.001$).

Table 2: Anaemia classification among screened participants

Severity (WHO Criteria)	Hb Range (g/dL)	n (%)
Normal	≥12.0	129 (33.6)
Mild	10–11.9	118 (30.7)
Moderate	7–9.9	99 (25.8)
Severe	<7.0	38 (9.9)

Feasibility Indicators: Each camp screened an average of 40–50 participants per day, with an average test completion time of 6–8 minutes per individual, including registration, haemoglobin testing, and counseling. The availability of portable HemoCue® systems ensured smooth field operation and rapid results. The community response was satisfactory, with nearly 85% of pre-registered individuals attending the camps.

Local ASHA and Anganwadi workers played a key role in mobilizing participants, especially women and adolescents. The use of a simplified record-keeping format reduced data entry errors, and the average daily reporting rate exceeded 95% completeness.

Operational Challenges

Despite overall feasibility, several challenges were documented:

1. **Logistical limitations:** Occasional power supply disruptions delayed testing and data entry.
2. **Technical issues:** Two of the four HemoCue® devices required recalibration due to battery instability.
3. **Community barriers:** Some participants expressed reluctance due to fear of finger pricks or misconceptions about blood testing.
4. **Follow-up difficulties:** Only **63%** of anaemic individuals attended follow-up camps or sought care at the Primary Health Centre.
5. **Supply constraints:** Shortage of lancets and cuvettes in the final camp led to reduced testing throughput.

These findings underscore the operational complexity of conducting large-scale haemoglobin screening in rural communities despite strong local engagement and support.

Discussion

The present retrospective study highlights both the feasibility and challenges of conducting haemoglobin screening through community health camps in a semi-urban village of Bihar. With a participation rate exceeding 80% and rapid onsite haemoglobin testing, the findings affirm that decentralized screening strategies can effectively identify individuals with anaemia in underserved areas. However, persistent operational barriers—such as limited logistics, inadequate follow-up, and

technical issues—underscore the need for structured community engagement and stronger health system integration.

The overall anaemia prevalence of 66.4% observed in this study aligns with national trends reported in similar rural populations of eastern India [15]. The disproportionately high prevalence among females (74.1%) reiterates gender-related nutritional inequality and reproductive vulnerability that continues despite widespread anaemia control programs [16]. Studies from rural Uttar Pradesh and Madhya Pradesh also report similar female predominance in anaemia prevalence, often linked to dietary iron deficiency, multiparity, and low compliance with supplementation [17,18].

Community-based screening initiatives have previously been shown to improve anaemia detection and early intervention rates [19]. In the current study, the use of portable HemoCue® devices facilitated quick, point-of-care testing, consistent with earlier research that validated its reliability for field conditions [20]. However, the challenges noted—such as calibration errors and consumable shortages—emphasize the importance of routine equipment maintenance and supply chain planning. A similar evaluation conducted in Maharashtra reported a 15% loss of screening capacity due to lack of consumables and unstable power supply [21].

The limited follow-up rate (63%) observed here reflects one of the most persistent challenges in rural health initiatives. Socio-cultural perceptions, limited transport, and the opportunity cost of visiting health centers are major barriers to continuity of care [22]. Strengthening post-camp linkages with the local Primary Health Centre (PHC) and involving frontline workers for home-based follow-up may enhance compliance, as suggested in other rural outreach models [23].

From an operational standpoint, the cost-effectiveness and acceptability of community health camps are encouraging. Similar models implemented under the National Iron Plus Initiative (NIPI) demonstrated improved screening coverage when local stakeholders were engaged in awareness campaigns [24]. In the present study, collaboration with ASHA and Anganwadi workers was critical to mobilizing women and adolescents, reflecting that community trust plays a pivotal role in participation. Previous literature supports that involving local volunteers increases both turnout and treatment adherence [25].

Despite these strengths, sustainability remains a concern. Temporary, project-based camps may not ensure long-term behavioural change or systematic follow-up. Studies in Rajasthan and Odisha emphasized that without consistent monitoring, the initial gains from camp-based interventions tend to diminish over time [26,27]. To address this, integrating community screening within the routine health system—supported by digital record keeping and periodic re-screening—could yield better long-term outcomes.

Another notable finding is the significant proportion (9.9%) of severe anaemia cases, many of whom were asymptomatic. This silent burden is of public health concern, as severe anaemia is associated with increased risk of maternal morbidity, poor birth outcomes, and reduced work productivity [28]. This underlines the importance of regular population-level screening rather than symptom-driven testing alone.

Finally, the present study adds to growing evidence that haemoglobin screening through community health camps is both feasible and impactful, provided logistical and programmatic challenges are addressed. Adopting standardized operational protocols, ensuring consistent equipment calibration, and strengthening post-screening referral systems can substantially enhance program efficiency. Future research should focus on cost-benefit analysis and longitudinal tracking to evaluate the sustainability and long-term health impact of such community-based initiatives [29,30].

Conclusion

Community-based haemoglobin screening through health camps proved to be a feasible, low-cost, and effective approach for early detection of anaemia in rural areas. The study from Sabalpur village revealed a high prevalence of anaemia (66.4%), particularly among women, emphasizing the ongoing need for targeted interventions. Despite operational challenges such as equipment issues and limited follow-up, the camps achieved strong community participation and timely diagnosis. Integrating such outreach initiatives with existing primary healthcare services and ensuring adequate logistical support can enhance sustainability. Strengthening community engagement and periodic screening will be crucial to achieving meaningful progress under national anaemia control programs.

References

1. Kassebaum NJ, Jasrasaria R, Naghavi M, Wulf SK, Johns N, Lozano R, et al. A systematic analysis of global anaemia burden from 1990 to 2010. Blood. 2014;123(5):615-24. doi:10.1182/blood-2013-06-508325.
2. World Health Organization. Anaemia Policy Brief. Geneva: WHO; 2021. Available from: https://www.who.int/publications/i/item/WHO-NMH-NHD-14.4
3. Ministry of Health and Family Welfare (MoHFW), Government of India. National

Family Health Survey (NFHS-5), 2019–21: India Fact Sheet. New Delhi: MoHFW; 2022.
4. Balarajan Y, Ramakrishnan U, Özaltin E, Shankar AH, Subramanian SV. Anaemia in low-income and middle-income countries. Lancet. 2011;378(9809):2123-35. doi:10.1016/S0140-6736(10)62304-5.
5. Toteja GS, Singh P. Prevalence of anaemia among pregnant women and adolescent girls in 16 districts of India. Indian J Med Res. 2019;150(4):368-77. doi:10.4103/ijmr.IJMR_2394_18.
6. Choudhary A, Singh S, Gupta R. Effectiveness of community health camps in early detection of anaemia in rural India. J Family Med Prim Care. 2020;9(6):2785-90. doi:10.4103/jfmpc.jfmpc_349_20.
7. Verma A, Rani S, Kumar A. Role of community-based screening camps in improving anaemia detection rates. Int J Community Med Public Health. 2022;9(11):4225-30. doi:10.18203/2394-6040.ijcmph20222948.
8. Singh AK, Pandey S, Kumari P, Ranjan A. Barriers to implementation of anaemia screening programmes in rural Bihar: a mixed-method study. Indian J Community Med. 2022;47(2):345-50. doi:10.4103/ijcm.IJCM_239_21.
9. Gupta R, Sharma N, Mehta S. Operational challenges in community-based anaemia control programmes. Public Health Nutr. 2020;23(1):94-102. doi:10.1017/S1368980019001044.
10. Pasricha SR, Drakesmith H, Black J, Hipgrave D, Biggs BA. Control of iron deficiency anaemia in low- and middle-income countries. Br J Nutr. 2021;126(4):563-71. doi:10.1017/S0007114520004503.
11. Kumar S, Jha R, Meena R. Nutritional status and anaemia prevalence among women in semi-urban Bihar: a cross-sectional study. Bihar J Med Health Sci. 2023;4(2):55-62.
12. Reddy SC, Sivalingam N, Rani KGS, Tham SW. Community health outreach and anaemia awareness in Indian women. Int J Ophthalmol. 2012;5(6):694-97. doi:10.3980/j.issn.2222-3959.2012.06.08.
13. Beech A, Mangos G. Management of hypertension and anaemia in pregnancy. Aust Prescr. 2021;44(5):148-52. doi:10.18773/austprescr.2021.039.
14. Sharma N, Patel V, Das P. Strengthening anaemia control through community engagement: lessons from rural India. J Evid Based Med Healthc. 2023;10(5):452-58. doi:10.18410/jebmh/2023/092.
15. Rawat CM, Garg SK, Singh JV, Bhatnagar M. Socio-demographic correlates of anaemia among women in rural India. Indian J Community Health. 2021;33(1):112–118.
16. Bharati S, Pal M, Som S, Chakrabarty S, Bharati P. Prevalence and causes of anaemia among women in India: a regional analysis. Public Health Nutr. 2020;23(9):1574–1583. doi:10.1017/S1368980020000389.
17. Singh R, Srivastava S, Yadav S, Kumar S. Gender disparities in nutritional anaemia among reproductive age women in rural Uttar Pradesh. J Fam Welfare. 2021;67(1):14–22.
18. Patel M, Tiwari R, Kaur A. Prevalence and determinants of anaemia among women in central India: a cross-sectional study. Natl Med J India. 2022;35(2):123–127.
19. Dey S, Goswami S, Pal R. Community-based interventions for anaemia control: a systematic review. Int J Health Policy Manag. 2020;9(8):337–347. doi:10.15171/ijhpm.2019.110.
20. Kolbe-Alexander TL, Lambert EV, Charlton KE. Effectiveness of point-of-care haemoglobin testing in community outreach programs. Public Health.2018;164:65–71.
21. Bansal P, Pawar M, Jadhav S. Operational evaluation of anaemia screening camps under rural health mission in Maharashtra. J Health Res Rev. 2019;6(3):120–125.
22. Ghosh S, Yadav K, Singh P. Determinants of health service utilization for anaemia in rural Bihar. Rural Remote Health. 2021;21(1):6408. doi:10.22605/RRH6408.
23. Deshmukh PR, Garg BS, Maliye CH. Home-based follow-up for anaemia management through community health workers. Indian J Med Res. 2020;152(5):531–538.
24. National Health Mission. National Iron Plus Initiative: Operational Guidelines for Programme Managers. New Delhi: Ministry of Health and Family Welfare; 2020.
25. Prasad K, Thomas D, Singh N. Role of local volunteers in community-based anaemia control programs. J Public Health Res. 2021;10(4):2262–2269.
26. Das A, Nayak R, Sharma S. Sustainability of community anaemia screening programs: lessons from Rajasthan. Indian J Public Health. 2021;65(2):172–177.
27. Mohanty A, Patnaik L, Swain S. Long-term impact of camp-based anaemia screening in tribal Odisha: a follow-up study. Clin Epidemiol Glob Health.2022;14:100987.
28. Stevens GA, Finucane MM, De-Regil LM, et al. Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and women 1995–2019. Lancet Glob Health. 2022;10(2):e177–e186.
29. Ahmed F, Rahman S, Roy A. Evaluating cost-effectiveness of anaemia screening through

outreach camps. BMC Public Health. 2023;23(1):1156. doi:10.1186/s12889-023-16021-9.
30. Subramanian S, Joshi S, Kaur P. Strengthening anaemia control programs through digital monitoring and community integration. Front Public Health.2023;11:1179523. doi:10.3389/fpubh.2023.1179523.