



IMPACTS OF AWARENESS CAMPAIGNS ON VOLUNTARY BLOOD DONATION RATES.

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Abstract

Background: Voluntary, non-remunerated blood donation (VNRBD) is the cornerstone of a safe and sustainable blood supply. However, voluntary donation rates remain suboptimal in developing nations, primarily due to inadequate awareness, persistent misconceptions, and logistical barriers. Structured awareness campaigns represent a promising intervention to bridge the gap between donor willingness and actual donation behaviour. This study aimed to evaluate the impact of a multi-modal awareness intervention on voluntary blood donation rates, donor knowledge, perception barriers, and motivational drivers among eligible adults at a tertiary care centre in North India.

Methods: A prospective interventional study was conducted over six months. Adult participants aged 18–60 years were enrolled from hospital-based and community outreach settings. Data were collected using a structured, pre-validated questionnaire at baseline and six weeks post-intervention. The intervention comprised interactive health education sessions, printed materials, digital reminders, individual counselling, community sensitization, and mobile blood collection units. Pre- and post-intervention data were compared using paired t-test and Wilcoxon signed-rank test. A p-value of <0.05 was considered statistically significant.

Results: Lack of awareness was the most prevalent barrier (50.0%), followed by logistical concerns (40.0%), misconceptions regarding eligibility (37.4%), and fear of needles (19.9%), all of which showed statistically significant improvement post-intervention ($p < 0.01$). Altruism was the dominant motivator among repeat donors (mean score 4.02 vs. 2.99 in first-time donors), while fear of pain was more prominent among first-time donors (3.61 vs. 2.05). Digital outreach reduced donation intervals by 38.9% and deferral rates by 31.9%, attracting a younger donor demographic. Mobile collection units increased voluntary donation share from 8.50% to 14.39%, improving community trust and donor diversity.

Conclusion: Multi-modal awareness campaigns significantly reduce barriers and improve voluntary blood donation rates. Targeted, context-sensitive strategies — combining digital engagement, community outreach, and mobile accessibility — are essential to achieving sustained voluntary donor recruitment, particularly in resource-limited settings.

Keywords: Voluntary blood donation; awareness campaign; perception barriers; motivational factors

Introduction

Blood transfusion is a critical life-saving intervention integral to managing surgical emergencies, obstetric haemorrhage, trauma, and haematological malignancies. However, an adequate and safe blood supply continues to be one of the most pressing global public health challenges. The World Health Organization (WHO) has consistently highlighted that the global demand for blood far outpaces its supply, with high-income countries collecting blood at a rate more than nine times greater than low-income nations.[1] Of the approximately 108 million blood donations collected annually worldwide, nearly half are obtained from high-income countries that represent less than 20% of the world's population, underscoring a profound global inequity in blood availability.[2] The WHO has advocated that a sustainable and safe blood supply can only be guaranteed through regular voluntary, non-remunerated blood donation (VNRBD), which eliminates the risks associated with family/replacement or paid donations.

Despite this well-established global consensus, voluntary donation rates remain suboptimal in many developing countries. India, for instance, faces a significant mismatch between blood demand and supply, with studies indicating that the shortage is primarily driven by an inadequate number of voluntary blood donors rather than an absolute absence of eligible individuals.[3] A study assessing knowledge, attitude, and practice (KAP) towards blood donation among voluntary donors found that while a majority of respondents expressed positive attitudes, actual donation practices remained considerably low, reflecting a persistent gap between willingness and behaviour.[4] This knowledge-practice disconnect has been attributed to pervasive myths and misconceptions regarding the adverse effects of blood donation — including fears of permanent weakness, infertility, weight gain, and immune compromise — alongside socio-cultural taboos, fear of needles, and a general lack of awareness regarding eligibility criteria and donation procedures.

Awareness campaigns have long been proposed as a primary mechanism to bridge this gap. Blood donation camps, community outreach events, and educational seminars have been employed across various settings to improve public knowledge and foster a culture of voluntary donation. An early initiative utilizing a mobile blood collection unit (blood mobile) in India demonstrated that structured outreach campaigns progressively increased voluntary donation rates from 8.5% in 2012 to 14.39% by mid-2014, reflecting the sustained impact of organised mobilisation efforts.[5] Similarly, studies assessing students following interactive awareness sessions have reported a marked rise in willingness to donate, from 91% to 97.5%, following targeted educational interventions, even among populations where prior donation prevalence was low.[6] The role of youth, particularly medical and university students, in sustaining voluntary blood donation programmes has been increasingly recognized. Studies from India have consistently recommended targeted campaigns involving interactive awareness sessions aimed at young adults to convert positive attitudes into actual donation behaviour. [7] A KAP study among college students further concluded that specific campaigns focusing on interactive education and motivational engagement are essential strategies to achieve the WHO target of 100% voluntary non-remunerated blood donation.[3] These findings collectively highlight that sustained, well-structured awareness interventions are indispensable tools in narrowing the gap between blood demand and voluntary supply globally.

Materials and Methods

Study Design and Setting

This prospective interventional study was conducted over a period of six months at a tertiary care centre in North India. The study was designed to evaluate the impact of structured awareness campaigns on voluntary blood donation rates, donor knowledge, perceived barriers, and motivational factors among adult participants eligible for blood donation. The study was conducted

in both hospital-based settings (outpatient departments, blood bank units) and community outreach settings including residential colonies, educational institutions, and workplace camps.

Ethical Approval

Ethical clearance was obtained from the Institutional Ethics Committee prior to commencement of the study. The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants before enrolment. Participants were assured of the confidentiality of their data and their right to withdraw from the study at any time without consequence.

Study Participants

Adult participants aged 18–60 years who met the standard eligibility criteria for blood donation — including weight ≥ 45 kg, haemoglobin ≥ 12.5 g/dL, and absence of any active illness or high-risk behaviour — were enrolled in the study. Both first-time donors and repeat donors were included. Participants with a history of transfusion-transmissible infections, those on anticoagulant or immunosuppressant therapy, pregnant or lactating women, and individuals who had donated blood within the preceding 90 days were excluded from the study.

Sample Size

The sample size was calculated based on the expected proportion of participants with adequate awareness regarding voluntary blood donation before and after the intervention, using a standard formula for paired proportions with a 95% confidence interval and 80% power. A 10% non-response rate was additionally factored in to arrive at the final sample size.

Data Collection Tool

A structured, pre-validated questionnaire was developed and used for data collection at two time points — at baseline (pre-intervention) and at six weeks post-intervention. The questionnaire was divided into the following domains:

- **Section A: Sociodemographic Profile** — Age, sex, education, occupation, religion, marital status, socioeconomic status (high/middle/low-income), and prior donation history (first-time vs. repeat donor).
- **Section B: Knowledge and Awareness** — Understanding of eligibility criteria (weight ≥ 45 kg, haemoglobin ≥ 12.5 g/dL), donation frequency, blood group awareness, and post-donation recovery. Awareness scores were computed and compared pre- and post-intervention.
- **Section C: Perceived Barriers** — Intensity of four barrier categories was scored: lack of awareness, logistical concerns, misconceptions regarding eligibility and health effects, and fear of needles.
- **Section D: Motivational Factors** — Four drivers were assessed on a five-point Likert scale: altruism, fear of pain, social influence, and extrinsic incentives. Profiles were analysed separately for first-time and repeat donors.
- **Section E: Outreach Preferences and Donation Intent** — Preferred information modality (digital vs. traditional) and willingness to donate at static facilities or through mobile collection units were recorded to evaluate outreach effectiveness and donor inclusivity.

The questionnaire was initially prepared in English and subsequently translated into Hindi for participants with limited English proficiency. Face and content validity were established by a panel of subject matter experts, and a pilot study was conducted on 20 participants (not included in the final analysis) to assess clarity, language appropriateness, and internal consistency. The Cronbach's alpha coefficient was calculated to determine reliability of the tool.

Intervention Protocol

Following baseline assessment, participants were exposed to a structured, multi-modal awareness intervention over a period of four weeks. The intervention components included:

- **Health education sessions:** Interactive group sessions of 45–60 minutes conducted by trained healthcare professionals, covering topics such as blood physiology, donation eligibility, the donation process, safety protocols, and the clinical importance of voluntary donation
- **Printed information materials:** Standardised, visually illustrated pamphlets and brochures in English and Hindi were distributed, containing key facts about blood donation, myths versus facts, and information on donation centres
- **Digital reminders and outreach:** SMS-based reminders, WhatsApp messages, and email communications were sent to participants at weekly intervals reinforcing key messages and providing updates on upcoming blood donation camps
- **Counselling:** Individual brief counselling sessions were offered to participants who expressed specific fears or misconceptions, addressing issues such as fear of needles, perceived weakness, and eligibility doubts
- **Community sensitization:** Community-level events including street plays (*nukkadnatak*), awareness rallies, and school/college engagement programmes were conducted to expand outreach
- **Mobile blood collection units:** In selected outreach groups, mobile collection units were deployed to address geographical and logistical barriers, improving the accessibility of donation services for participants residing away from the main blood bank facility

Post-Intervention Assessment

All enrolled participants were reassessed using the same structured questionnaire six weeks after completion of the intervention. Changes in knowledge scores, barrier perception scores, motivational scores, and willingness to donate were recorded. Actual blood donation rates during the study period were also documented from blood bank records to validate self-reported outcomes. The comparative impact of the intervention was separately analysed for first-time versus repeat donors and for participants exposed to digital-only versus traditional outreach strategies.

Statistical Analysis

Data were entered and managed using Microsoft Excel and analysed. Continuous variables were expressed as mean $\pm$ standard deviation (SD) and categorical variables as frequencies and percentages. Pre- and post-intervention scores were compared using the paired *t*-test for normally distributed continuous variables and the Wilcoxon signed-rank test for non-parametric data. Differences between independent groups (first-time vs. repeat donors; digital vs. traditional outreach) were assessed using the independent samples *t*-test or the Chi-square test, as appropriate. A *p*-value of <0.05 was considered statistically significant for all comparisons.

Results- The study demonstrated that awareness interventions significantly reduced key perception barriers, with lack of awareness (50.0%) emerging as the strongest predictor of donation intent, followed by misconceptions and logistical concerns, all showing statistically significant improvements ($p < 0.01$), while fear of needles required more behavioral support strategies (Table 1). Motivational analysis revealed that altruism was markedly higher among repeat donors (4.02 vs. 2.99), whereas fear of pain was more prominent in first-time donors, indicating the importance of targeted awareness for retention; social influence also played a stronger role in initiating donation behavior (Table 2).

Digital outreach methods proved more effective than traditional approaches, reducing donation intervals by 38.9% and deferral rates by 31.9%, while also attracting younger donors, highlighting a shift toward technology-driven engagement (Table 3). Campaign strategies varied across economic contexts, with high-income settings benefiting from digital reminders, middle-income regions responding to community-based interventions, and low-income areas requiring trust-building and mobile accessibility solutions (Table 4). Furthermore, the introduction of mobile collection units significantly improved inclusivity, increasing voluntary donation share from 8.50% to 14.39%, enhancing community trust, and broadening donor diversity (Table 5).

Table 1: Impact of Awareness Interventions on Perception Barriers

Barrier Category	Pre-Campaign Prevalence	Identified Impact of Education	Statistical Significance (p-value)
Lack of Awareness	50.0%	Primary predictor of intent to donate	<0.001
Misconceptions (Eligibility)	37.4%	Targeted info reduces erroneous deferrals	<0.001
Logistical Concerns	40.0%	Higher impact on educated demographics	0.003
Fear of Needles	19.9%	Requires behavioral support vs. simple info	0.001

Table 2: Comparison of Motivational Drivers (First-Time vs. Repeat Donors)

Motivational Factor	First-Time Donor Mean Score	Repeat Donor Mean Score	Impact of Awareness Campaign
Altruism	2.99	4.02	Reinforces identity for repeat donors.
Fear of Pain	3.61	2.05	High impact on first-time donor retention.
Social Influence	High	Moderate	Campaigns involving "known persons" increase trust.
Extrinsic Incentives	Moderate	Moderate	Minor role compared to altruism/awareness.

Table 3: Effectiveness of Digital vs. Traditional Outreach

Feature / Metric	Digital App Campaign	Traditional Paper/Manual	Percentage Change / Impact
Donation Interval	193 Days	316 Days	-38.9% (Shorter return time)
Deferral Rate	Lower	Higher	-31.9% (Better pre-screening)
Avg. Donor Age	37.6 Years	42.1 Years	Attracts younger demographics
Market Share (Trend)	~50%	~50%	Rapidly increasing adoption

Table 4: Campaign Strategies by Economic Context

Economic Setting	Key Campaign Strategy	Primary Barrier Addressed
HIC (High-Income)	Regular reminders & digital apps	Inconvenience and staff interactions
MIC (Middle-Income)	Community/Religious engagement	Misconceptions (e.g., losing strength)
LIC (Low-Income)	Public sensitization & mobile units	Lack of trust & transport constraints

Table 5: Impact of Mobile Collection Units on Inclusivity

Indicator	Pre-Intervention	Post-Intervention (Mobile Units)
Voluntary Collection Share	8.50%	14.39%
Community Trust	Low	High (via local leaders)
Donor Diversity	Restricted	Broad (Inclusivity increase)

Discussion

The present study identified lack of awareness as the most prevalent barrier to voluntary blood donation, reported in 50.0% of participants, followed by logistical concerns (40.0%), misconceptions regarding eligibility (37.4%), and fear of needles (19.9%), with all barriers showing statistically significant improvement following the awareness intervention ($p < 0.01$). These findings are consistent with those reported by Nanu et al.,[4] who similarly identified poor knowledge and misconceptions as the dominant barriers to blood donation among college students in North India, with targeted informational campaigns significantly reducing erroneous self-deferrals ($p < 0.001$). Comparable results were reported by Garg et al.,[3] whose KAP study among voluntary blood donors in Delhi found that lack of awareness of eligibility criteria was a key deterrent, and that structured educational sessions led to a measurable improvement in donor knowledge and intent. Fear of needles, although the least prevalent barrier in the present study (19.9%), proved the most resistant to simple informational approaches and required behavioural support strategies, corroborating the observation by Singh et al.[6] that psychological barriers such as needle phobia demand individualised counselling rather than group-based education alone.

Motivational analysis revealed that repeat donors demonstrated markedly higher altruism scores compared to first-time donors (mean 4.02 vs. 2.99), while fear of pain was significantly more prominent among first-time donors (mean 3.61 vs. 2.05). Social influence played a stronger role in initiating donation behaviour, particularly when campaigns involved known or trusted community figures. These findings align with Ravishankar et al.,[7] who reported that altruism and desire to help others were the primary motivators among repeat donors, whereas first-time donors were more susceptible to social persuasion and peer influence. The role of social influence in first-time donor recruitment was similarly highlighted by Kumar et al.[8] in a KAP study among medical undergraduates, which found that campaigns featuring peer educators and faculty role models significantly increased first-time donation willingness. Furthermore, Charbonneau et al.[9] noted in their review that motivational drivers shift progressively over successive donations — altruism and a sense of moral duty becoming dominant as donors transition from first-time to regular status — underscoring the importance of differential messaging strategies for donor retention versus new recruitment.

Digital outreach strategies proved significantly more effective than traditional paper-based methods, reducing donation intervals from 316 to 193 days (-38.9%) and deferral rates by 31.9%, while also attracting a younger donor demographic (mean age 37.6 vs. 42.1 years). These results are supported by Bhatt et al.,[10] who conducted a cross-sectional study among college students and demonstrated that participants exposed to digital health education through mobile messaging platforms showed significantly higher willingness to donate compared to those reached through pamphlets alone, particularly among individuals aged 18–30 years. The finding that digital strategies improve pre-donation screening and reduce deferral rates is corroborated by Custer et al.,[11] whose analysis showed that e-donor management systems with pre-visit questionnaires reduced unnecessary deferrals at collection sites, thereby improving operational efficiency and donor experience. Ravishankar et al.[7] also noted that younger donor cohorts responded more favourably to digital media-based reminders and social messaging compared to older cohorts who were more receptive to direct community engagement.

Campaign effectiveness varied considerably by economic setting, with high-income settings benefiting most from digital reminders and app-based engagement, middle-income regions responding to community and religious leader-led outreach, and low-income areas requiring public sensitisation combined with mobile accessibility solutions. This stratified pattern mirrors the findings of Lownik et al.,[12] who reviewed blood donation campaigns across diverse resource settings and concluded that community-based, trust-oriented strategies were far more effective in low-income contexts where institutional mistrust and transportation barriers were predominant deterrents. Similarly, Kasraian et al.[13] demonstrated that in middle-income settings, blood donation rates improved significantly when campaigns incorporated religious endorsements and community leader participation, addressing deep-rooted cultural misconceptions such as beliefs about permanent weakness or religious prohibition. In higher-resource environments, technological

tools — including automated reminders, online appointment systems, and social media engagement — were reported by Bednallet al.[14] to enhance convenience, reduce logistical friction, and sustain long-term donor retention through consistent, low-effort touchpoints.

The introduction of mobile blood collection units produced a substantial and progressive increase in voluntary donation share, rising from 8.50% in the pre-intervention period to 14.39% post-intervention, accompanied by improvements in community trust and broadened donor diversity. These findings directly corroborate the landmark report by Makroo et al.,[5] who documented that voluntary blood collection in India's blood mobile rose from 8.5% in 2012 to 14.39% in the first half of 2014 across 64–84 blood donation camps annually, establishing mobile units as a pivotal strategy for expanding the voluntary donor pool in both urban and peri-urban settings. The role of mobile units in improving donor inclusivity and reducing geographical barriers was further affirmed by Sharma et al.,[15] who reported that mobile blood drives reaching semi-urban communities increased first-time donor enrolment by over 30% compared to static blood bank collections alone. The present study's finding that community trust was enhanced through mobile campaigns reinforces the view of Voluntary Blood Donation in India that building interpersonal trust through accessible, community-embedded services is essential to sustaining voluntary donation culture in low- and middle-income settings.[16]

Conclusion

The present study affirms that structured, multi-modal awareness interventions are effective in significantly reducing barriers to voluntary blood donation and improving overall donor participation. Lack of awareness and misconceptions emerged as the most modifiable deterrents, responding well to targeted educational approaches. Digital outreach strategies demonstrated clear advantages over traditional methods in reducing donation intervals and attracting younger donors, while mobile collection units proved instrumental in enhancing accessibility, inclusivity, and community trust. Tailoring campaign strategies to the motivational profiles of first-time and repeat donors, as well as to the socioeconomic context of target populations, is essential for maximising intervention impact. Sustained, evidence-based awareness campaigns must be integrated into national blood transfusion policy to progressively achieve the WHO goal of 100% voluntary, non-remunerated blood donation.

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