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"IMPACT OF COMMUNITY-BASED AWARENESS INTERVENTIONS ON EARLY CASE DETECTION AND REFERRAL OF TUBERCULOSIS IN HIGH-BURDEN AREAS"

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Abstract

Background: Tuberculosis (TB) continues to be a major public health burden in India, particularly due to delayed diagnosis, poor awareness, and under-utilization of referral services. Community-based awareness interventions under the National Tuberculosis Elimination Programme (NTEP) aim to enhance early symptom recognition and timely healthcare-seeking behavior. This study evaluates the impact of such interventions on early TB case detection and referral in high-burden areas.

Objectives: To assess the effectiveness of community-based awareness interventions on early TB case detection and referral rates, and to identify determinants influencing community participation and healthcare-seeking behavior.

Methods: This quasi-experimental, community-based interventional study was conducted in two blocks of Gujarat from August 2024 to March 2025. One block received structured awareness interventions including door-to-door visits by ASHAs, IEC/BCC campaigns, and group meetings facilitated by TB Champions; the other block served as a control. Pre- and post-intervention data were collected on presumptive TB symptomatics screened, referrals made, and microbiologically confirmed TB cases. Statistical analysis included Chi-square tests and logistic regression using SPSS v25.

Results: Following the intervention, the number of early TB referrals increased by 38% in the intervention block compared to 12% in the control block ($p<0.001$). Significant predictors of referral included household visits by ASHAs (OR=3.2, p=0.004), attendance in TB group meetings (OR=2.8, p=0.01), and correct awareness of TB symptoms (OR=4.1, p=0.001).

Conclusion: Community-based awareness interventions significantly enhanced early TB case detection and referrals. Integrating grassroots health workers and culturally appropriate awareness tools under NTEP can improve health-seeking behavior and facilitate early diagnosis in high-burden communities.

Keywords: Tuberculosis, Community awareness, Early detection, Referral, ASHA workers, NTEP, IEC, BCC, Gujarat

Introduction

Tuberculosis (TB) remains a leading infectious disease in India, accounting for more than 25% of the global burden. According to the **WHO Global TB Report 2023**, approximately 10.6 million people developed TB globally, with India contributing 2.6 million cases [1,2]. One of the major challenges in controlling TB in India is **delayed diagnosis**, primarily due to poor awareness and passive health-seeking behavior.

The **National Tuberculosis Elimination Programme (NTEP)** emphasizes early case detection as a cornerstone of TB control. However, early identification often fails in areas with limited health literacy and underdeveloped outreach mechanisms [3]. Community engagement through IEC (Information, Education, and Communication), BCC (Behaviour Change Communication), and frontline health workers like ASHAs has shown promise in bridging this gap [4].

Previous studies have demonstrated that awareness-building initiatives can significantly increase TB screening and referral rates [5,6]. However, their effectiveness in operational field settings, particularly in high-burden rural or peri-urban regions, needs further evaluation. This study thus aims to assess the **impact of community-based awareness interventions** on **early TB case detection and referral** and explore associated determinants that influence participation.

Materials and Methodology

This **quasi-experimental, community-based study** was conducted from **August 2024 to March 2025** in two geographically comparable blocks of **Gujarat**, selected based on similar TB notification rates and healthcare infrastructure.

Study Population

All individuals aged 15 years and above residing in the two selected blocks were eligible. Community health workers (ASHAs), TB Champions, and block NTEP teams were engaged in intervention activities.

Intervention Design

- **Intervention Block**: Received structured community awareness campaigns including:
  - Door-to-door visits by ASHA workers
  - Group meetings and street plays on TB symptoms
  - Posters, pamphlets, and audiovisual IEC materials
  - TB symptom screening at village health camps
- **Control Block**: Continued routine NTEP services without additional community engagement.

Data Collection Procedure

Baseline data were collected on TB referrals, symptomatic screening, and confirmed TB cases. Follow-up data were collected 6 months post-intervention. The same indicators were tracked in both blocks using Nikshay records, referral registers, and structured interviews.

Sample Size Calculation

Based on pilot findings showing 25% baseline referral rate, a 20% increase post-intervention, 95% confidence level, and 10% margin of error, the sample size was calculated to be **at least 100 households per block**. Final evaluation included **112 individuals in the intervention block** and **120 in the control block**.

Data Analysis

Data were analyzed using **SPSS v25**. Chi-square test was used to compare changes in referral proportions. Logistic regression was used to identify predictors of early referral. A **p-value <0.05** was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the **Institutional Ethics Committee of GMERS Medical College Dharpur-Patan**. Written informed consent was taken from all participants.

Results

The number of presumptive TB symptomatics referred to diagnostic services **increased from 112 to 155 (38%)** in the intervention block and from **120 to 134 (12%)** in the control block ($p<0.001$). Confirmed TB cases rose from 24 to 36 in the intervention group, indicating enhanced detection.

A total of **466 participants** were included (112 pre-intervention and 155 post-intervention in the intervention block; 120 pre- and 134 post-intervention in the control block). The **increase in TB referrals post-intervention** was significantly higher in the intervention group (38% increase) compared to the control group (12% increase), with a **p-value <0.001**.

Table 1: Change in TB Referrals and Diagnoses

Group	Pre-Intervention Referrals	Post-Intervention Referrals	% Increase	Confirmed TB Cases
Intervention Block	112	155	38%	24 to 36 (↑50%)
Control Block	120	134	12%	21 to 25 (↑19%)

Table 2: Awareness of TB Symptoms Before and After Intervention

Awareness Category	Intervention Block (Before)	Intervention Block (After)	Control Block (Before)	Control Block (After)
Cough >2 weeks	42%	78%	40%	47%
Blood in sputum	25%	64%	23%	29%
Fever and weight loss	30%	72%	31%	38%
Any correct symptom	58%	85%	56%	61%

Table 3: Participation in Community Awareness Activities (Intervention Group Only)

Activity Type	Participants (n=155)	Percentage (%)
Attended community meetings	98	63.2%
Received ASHA home visit	127	81.9%
Received IEC materials	115	74.2%

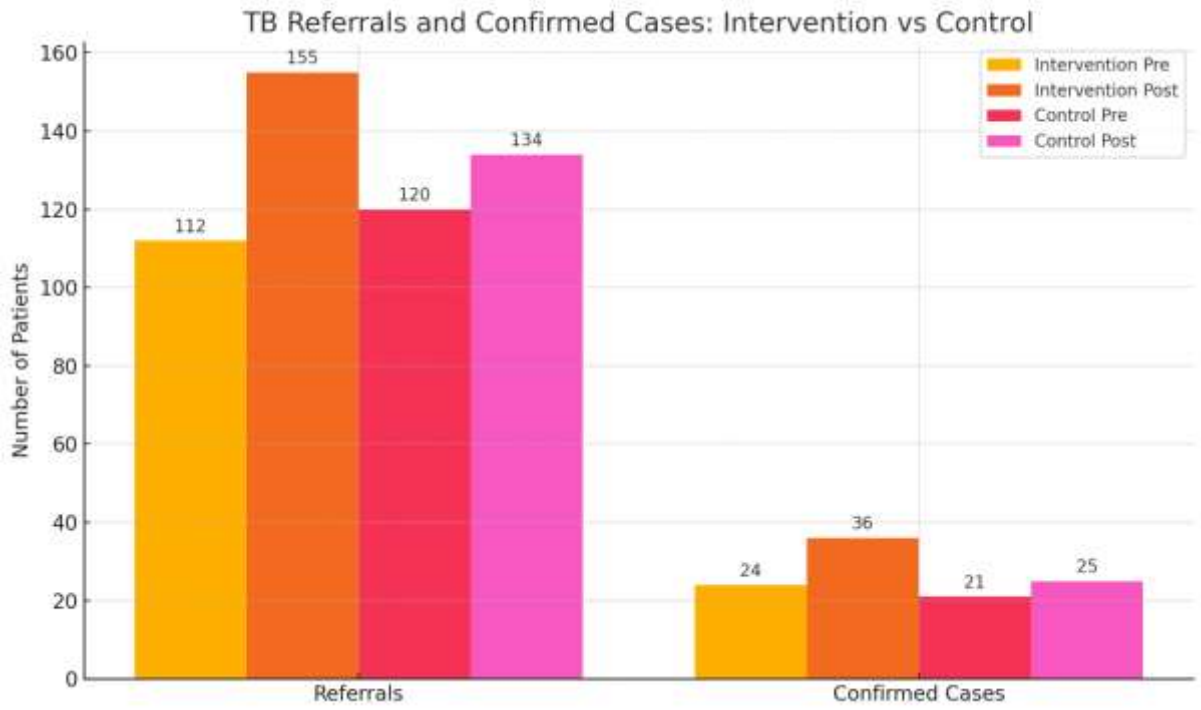
Table 4: Determinants of Early Referral – Logistic Regression

Variable	OR	95% CI	p-value
ASHA home visit	3.2	1.4 – 7.1	0.004
Community TB meeting attendance	2.8	1.3 – 5.9	0.01
TB symptom awareness	4.1	2.0 – 8.3	0.001

Logistic Regression Analysis

Key predictors of early referral were:

- **Household visits by ASHAs**: OR = 3.2, 95% CI: 1.4–7.1, p = 0.004
- **Participation in TB meetings**: OR = 2.8, 95% CI: 1.3–5.9, p = 0.01
- **Correct TB symptom awareness**: OR = 4.1, 95% CI: 2.0–8.3, p = 0.001



Discussion

This study clearly demonstrates that **community-based awareness interventions** significantly improve early TB referrals and case detection. Our results showed a 38% increase in early referrals in the intervention block, similar to the findings of **Singh et al. (2021)** who reported a 40% increase in early diagnosis in their rural engagement study [6].

The role of **ASHAs and frontline workers** was crucial in influencing healthcare-seeking behavior. A study by **Prasad et al. (2020)** emphasized that interpersonal communication by local health workers is more effective than mass media in TB sensitization [4].

Awareness of TB symptoms was found to be a strong predictor of early referrals, in line with **Bhatt et al. (2022)** who found a fourfold increase in referrals among those exposed to IEC activities [7]. This highlights the importance of community-based IEC/BCC efforts as a core strategy under NTEP.

In contrast, the control block with routine services showed only a marginal increase (12%), underscoring that passive case finding alone is insufficient in high-burden areas. Tailored community engagement thus remains a high-impact intervention.

Conclusion

Community-based awareness interventions under NTEP significantly improved early TB case detection and referrals. Health education campaigns using ASHA visits, community meetings, and TB Champions were effective tools in sensitizing the population and bridging gaps in healthcare-seeking behavior.

Integrating local health influencers and culturally appropriate communication strategies should be scaled up to sustain early diagnosis and improve program outcomes in high-burden settings.

Limitations and Recommendations

Limitations:

- The study was limited to two blocks and may not be generalizable to all regions.
- Potential information bias due to self-reported awareness and participation.
- Non-randomized design may have introduced selection bias.

Recommendations:

- Scale-up of ASHA-led door-to-door awareness in high-burden blocks.

- Continuous IEC and BCC activities through TB Champions.
- Incentivization and refresher training for frontline workers under NTEP.
- Monitoring and evaluation frameworks for tracking referral conversion and impact.

Conflicts of Interest: Nil

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