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COMMUNITY PERCEPTIONS ON VECTOR CONTROL MEASURES IN DENGUE-ENDEMIC AREAS: A QUALITATIVE STUDY

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Abstract

Background: Dengue fever continues to pose a significant public health challenge in India, with vector control serving as the primary preventive strategy in the absence of effective antiviral treatment. Despite ongoing governmental initiatives, community participation remains inconsistent, and the factors shaping these behaviours require further exploration.

Methods: A qualitative exploratory study was conducted in dengue-endemic urban and peri-urban areas of Chennai, Tamil Nadu, between March and April 2024. Purposive sampling was used to recruit adult residents (≥18 years) and key community stakeholders, including Accredited Social Health Activists (ASHAs) and local leaders. Data were collected through six Focus Group Discussions (FGDs) and ten In-Depth Interviews (IDIs), transcribed, translated, and analysed thematically.

Results: Twenty participants (60% female, aged 20–55 years) took part in the study. While most were aware that dengue is transmitted by Aedes mosquitoes breeding in stagnant water, knowledge often failed to translate into consistent preventive practices. Barriers identified included infrastructural challenges (irregular water supply, open drains, poor waste disposal), financial constraints limiting access to repellents and nets, seasonal awareness campaigns, and community apathy with reliance on government fogging measures. Misconceptions—such as believing dengue occurs only in rainy seasons or that fogging alone is sufficient—further reduced household action. Facilitators included strong family and neighbourhood support, visible government efforts, and health education through media and ASHAs. Participants suggested sustained awareness campaigns, free distribution of protective materials, and regular monitoring to strengthen vector control.

Conclusion: Community perceptions of dengue control in Chennai reflect a complex interplay of knowledge gaps, socio-structural barriers, and cultural beliefs. Although awareness exists, its translation into sustained preventive action is inadequate. Strengthening year-round community engagement, addressing misconceptions, and integrating health education with infrastructural improvements are essential for sustainable dengue control.

Keywords: Dengue, Aedes aegypti, vector control, community perceptions, qualitative study, Chennai

INTRODUCTION

Dengue fever is a viral infection transmitted by mosquitoes, presenting a considerable public health issue in tropical and subtropical areas, especially in South and Southeast Asia. The World Health Organization (WHO) estimates that dengue affects around 390 million individuals each year, with roughly 96 million cases showing clinical symptoms (1). Over the last decade, India has experienced a concerning rise in dengue cases, primarily due to rapid urbanization, insufficient sanitation, ineffective waste management, and conducive climatic conditions for mosquito reproduction. The main vector responsible for the transmission of dengue is Aedes aegypti, a mosquito that bites during the day and flourishes in and around human habitats, utilizing stagnant water as breeding grounds. Vector control is fundamental to dengue prevention, given the absence of specific antiviral treatments and the limited uptake of vaccines (2,3). Traditional vector control methods encompass source reduction, chemical control (including larvicides and insecticides), biological control (such as larvivorous fish and copepods), and personal protective strategies (like

mosquito repellents and bed nets). These interventions are most effective when executed with community involvement and ongoing behavioral modifications (4).

The engagement of the community is crucial for the effectiveness of vector control initiatives. Since breeding sites are frequently located within residential areas, it is vital for residents to actively participate in eliminating stagnant water, covering storage containers, and upholding environmental cleanliness (5). Nevertheless, the community's compliance with these practices is affected by various factors, including awareness levels, cultural norms, risk perceptions, and trust in health authorities.

Perceptions regarding dengue and its control strategies differ significantly across various socio-economic and cultural contexts. While certain communities recognize the severity of dengue and the necessity of preventive measures, others view it merely as a seasonal illness that demands little effort for management. Misunderstandings about transmission dynamics, excessive dependence on chemical spraying by municipal authorities, and fatalistic views towards illness frequently obstruct preventive actions at the household level (6,7). Grasping these perceptions is essential for crafting effective, culturally attuned interventions that promote active community involvement in dengue control.

In spite of numerous initiatives from both government and non-governmental organizations under programs such as the National Vector Borne Disease Control Programme (NVBDCP) in India, dengue outbreaks persist, often resulting in severe health and economic repercussions. Research has indicated that interventions that concentrate solely on environmental or chemical strategies, without addressing community behaviors, yield limited long-term effectiveness (8). Consequently, investigating community perceptions, attitudes, and beliefs regarding dengue prevention is vital for identifying barriers and facilitators to compliance with vector control measures.

Qualitative research methodologies offer a comprehensive understanding of these perceptions, which quantitative approaches may fail to capture. By involving communities in open dialogues, researchers can reveal socio-cultural norms, gender roles, and local practices that affect vector control behaviors (9,10). Such insights can inform the creation of community-led strategies that improve participation and the sustainability of interventions.

This study seeks to examine the perceptions and experiences of residents in areas endemic to dengue concerning vector control measures, aiming to pinpoint gaps in knowledge, attitudes, and practices, and to guide the development of more effective, context-specific interventions.

Objectives

1. To assess community knowledge and awareness regarding dengue transmission and prevention.
2. To explore community attitudes and perceptions toward various vector control measures
3. To identify barriers and facilitators influencing community participation in vector control activities.

MATERIALS AND METHODS

Study Design: A qualitative exploratory study design will be adopted to understand community perceptions and attitudes in depth.

Study Setting: The current research was a qualitative exploratory study carried out in chosen dengue-endemic urban and peri-urban regions of Chennai, Tamil Nadu, from March 2024 to April 2024. The objective of the study was to investigate community perceptions, attitudes, and experiences related to the vector control measures employed for dengue prevention**.**

Study Population: The study involved adult residents (aged 18 years and older) from the chosen dengue-endemic regions who had resided in the area for a minimum of six months. Additionally, key informants, including community leaders, Accredited Social Health Activists (ASHAs), and local health officials, were incorporated to offer a more comprehensive viewpoint.

Sampling Method: Purposive sampling was utilized to guarantee the participation of individuals from various socio-economic backgrounds, age categories, and genders. This method facilitated the collection of a broad spectrum of perspectives and experiences**.**

Sample Size: The concept of "saturation" was instrumental in determining the sample size for this research. In qualitative research, saturation signifies the stage at which further data collection fails to yield new information, insights, or themes pertinent to the research aims. In this investigation, saturation was achieved after conducting six Focus Group Discussions (FGDs) and ten In-Depth Interviews (IDIs). Participants were chosen purposefully to guarantee a variety of perspectives concerning dengue prevention and control. The study population comprised: Adult men and women (aged 18 years and older) living in dengue-endemic urban and peri-urban regions of Chennai. Key community stakeholders, including Accredited Social Health Activists (ASHAs), community health workers, and local leaders engaged in health awareness or dengue prevention initiatives. Household members tasked with water storage and sanitation practices. This selection process ensured representation from individuals directly involved in

executing preventive measures as well as those who play a role in decision-making at both household and community levels

Data Collection Tools:

- **FGD Guide:** Semi-structured guide focusing on awareness of dengue, preventive practices, perceptions of government measures, and barriers to participation.
- **IDI Guide:** Designed to capture detailed insights from key informants regarding community engagement and challenges.

Data Collection Procedure: Focus Group Discussions (FGDs) and In-Depth Interviews (IDIs) will be carried out in the local language, audio-recorded with the participants' consent, and accompanied by field notes. The sessions will occur in community halls or shared meeting areas to guarantee the comfort of the participants.

Data Analysis: The information gathered from Focus Group Discussions (FGDs) and In-Depth Interviews (IDIs) was documented with the participants' consent, transcribed in Tamil, and subsequently translated into English for the purpose of analysis. Thematic analysis was performed by coding and categorizing the data into significant themes associated with dengue prevention and vector control. An iterative methodology involving multiple reviews and investigator triangulation was employed to guarantee accuracy and reliability. This method effectively captured the experiences, attitudes, and socio-cultural elements that impact vector control practices among participants.

Ethical consideration: Informed verbal consent was secured from all participants before they took part in the study. The consent procedure encompassed a detailed explanation of the study's aims, data collection techniques including Focus Group Discussions and In-Depth Interviews, as well as the utilization of audio-recording devices. Participants were guaranteed that their identities would be kept confidential and that their involvement was completely voluntary, with the option to withdraw at any point without facing any negative repercussions. The study rigorously followed ethical standards for research involving human subjects, ensuring respect for autonomy, privacy, and dignity throughout the research process.

RESULTS

Sociodemographic Information

The study involved adult participants aged between 20 and 55 years, living in areas where dengue is prevalent. Out of the 20 participants, 12 (60%) were female and 8 (40%) were male. In terms of educational attainment, 5 (25%) had finished primary education, 7 (35%) had completed high school, 4 (20%) had received intermediate education, and 4 (20%) were university graduates. A majority of the participants (14, 70%) were married, while 6 (30%) were single. Concerning their occupations, 10 (50%) were homemakers, 5 (25%) were engaged in daily wage labor, and 5 (25%) held positions in either private or government sectors. With respect to socioeconomic classification, 11 (55%) were categorized as lower-middle class, 6 (30%) as lower class, and 3 (15%) as upper-middle class.

Knowledge and Understanding of Dengue and Vector Management

All individuals involved were aware of dengue fever, with the majority characterizing it as a "serious" or "hazardous illness." Numerous participants linked dengue to mosquito bites and stagnant water. A 35-year-old woman remarked: ***"Dengue is caused by mosquitoes that breed in unclean water. It can lead to severe illness, and in some cases, it can be fatal."*** (Participant 6) When inquired about their sources of information, most participants cited television, community health workers, and social media. One participant commented: ***"We primarily learn about dengue during the rainy season through television advertisements, and occasionally health workers visit our community to provide information."*** (Participant 11)

Understanding Vector Control Strategies

Participants recognized various preventive actions, including the elimination of stagnant water, the use of mosquito nets, the application of repellents, and the covering of water storage containers. Nevertheless, this awareness did not consistently lead to regular implementation. A 28-year-old male participant remarked***: "I understand that we should avoid allowing water to accumulate in open containers, but it occasionally occurs due to inadequate drainage in this area."*** (Participant 4) Additionally, another female participant commented: ***"Mosquito nets are effective, but during the summer, it becomes excessively warm to sleep beneath them."*** (Participant 8)

Community Involvement and Government Actions

Although numerous participants valued the fogging and spraying efforts carried out by local authorities, a number of them believed these actions were inadequate. A 42-year-old individual remarked: ***"They spray occasionally, but the mosquitoes return within two or three days. It ought to be done consistently."*** (Participant 14) Additionally, some participants indicated that community members seldom engage in cleaning initiatives***. "Individuals assume it is the***

responsibility of the government to maintain the drains. They are reluctant to take action themselves." (Participant 10).

Barriers to Effective Vector Control

1. **Lack of Continuous Awareness**: Participants noted that awareness campaigns are limited to specific seasons, primarily during outbreaks. ***"We only hear about dengue during the rainy season. After that, no one talks about it."*** (Participant 5)
2. **Infrastructure and Environmental Issues**: Open drains, inconsistent garbage disposal, and water shortages were mentioned as factors leading to the storage of water in open containers. ***"There is no regular water supply, so we keep water in big buckets. That is where mosquitoes breed."*** (Participant 7)
3. **Financial and Resource Constraints** Some participants indicated that mosquito repellents and nets are unaffordable for low-income families***. "The coils and sprays are costly, and you have to buy them every few days. Poor people can't afford that."*** (Participant 3)

THEMES	CATEGORIES	CODES
Individual factors	Lack of knowledge	Limited awareness about dengue transmission and prevention
	Psychological attitudes	Carelessness, negligence, overconfidence ("it won't happen to us")
	Lack of time	Busy work schedules, household responsibilities
Cultural and structural factors	Infrastructure challenges	Poor drainage, stagnant water due to irregular water supply
	Financial constraints	Cost of repellents, mosquito nets, and coils
	Misconceptions and myths	Belief that fogging alone prevents dengue, dengue spreads only in rainy season
Barriers to community participation	Apathy and dependency	Expectation that government alone is responsible for vector control
	Seasonal approach	Engagement only during outbreaks, not throughout the year
Facilitating factors	Role of family and community	Family involvement in cleaning activities, neighbors' cooperation
	Government support	Regular fogging, door-to-door awareness programs, distribution of free nets
	Awareness creation	Health education campaigns, TV/radio ads, pamphlets, social media awareness
	Policy suggestions	Free repellents, regular monitoring, stricter waste disposal enforcement

4. **Community Apathy**: Several participants conveyed that individuals are indifferent and tend to rely on government intervention instead of taking personal responsibility***. "Even if we tell them not to keep water outside, they don't listen. They think nothing will happen to them."*** (Participant 12)

Preferred Strategies Recommended by Participants

Participants recommended consistent fogging, complimentary distribution of mosquito nets, and ongoing educational initiatives in schools and communities. A 30-year-old woman remarked: ***"They should provide mosquito nets and sprays at no cost to underprivileged families. Additionally, health workers ought to make monthly visits, not just during the rainy season."***(Participant 9) Another participant, a man, highlighted the importance of community engagement: "If everyone in the neighborhood collaborates in cleaning up, then dengue can be averted. No single individual can achieve this alone." (Participant 13)

Table 1: "Themes, Categories, and Codes Related to Community Perceptions of Vector Control Measures in Dengue-Endemic Areas"

DISCUSSION

This qualitative research examined the perceptions, attitudes, and practices of communities concerning dengue vector control in urban and peri-urban areas where the disease is endemic. The results indicate a complex interaction of

knowledge, socio-structural elements, cultural factors, and systemic obstacles that influence community involvement in dengue prevention.

Initially, although there was a general awareness of dengue and its vector-control strategies—such as the removal of stagnant water and the use of protective measures—many participants struggled to convert this knowledge into consistent preventive behaviors. Similar trends have been observed in Kerala, India, where, despite a relatively high level of awareness, only about 25% of residents actively removed breeding sites from their homes (11). This underscores a prevalent challenge: the disconnect between knowledge and action, highlighting the necessity for approaches that extend beyond mere information sharing.

A significant barrier identified was the reactive nature of interventions. In our research, awareness campaigns and fogging operations were primarily initiated in response to outbreaks, which lessened their preventive effectiveness. In parallel, studies from Nepal revealed that both communities and local health workers viewed such reactive strategies as detrimental to long-term control, advocating instead for ongoing, proactive programming (12). Maintaining continuous engagement throughout the year even during non-epidemic times can enhance community resilience and lower the risk of outbreaks.

Infrastructure and environmental factors have emerged as significant structural obstacles, including inadequate drainage systems, inconsistent water supply necessitating household water storage, and the accumulation of waste. Comparable social-ecological observations from Machala, Ecuador, highlighted how insufficient municipal services, such as garbage collection and sanitation, are directly recognized as fundamental contributors to dengue risk (13). This emphasizes the necessity of integrating vector-control initiatives with comprehensive urban planning and service delivery systems.

Misunderstandings and cultural perceptions also significantly influenced the situation. Participants maintained beliefs such as the notion that fogging alone suffices for control, or that dengue is strictly seasonal that indicated a limited comprehension of dengue ecology. In line with this, research conducted in Puducherry, India, revealed confusion regarding Aedes behavior, with some participants mistakenly believing that dengue could be transmitted through contact (14). It is crucial to address these misconceptions through targeted communication to rectify preventive practices.

On a positive note, the facilitators of engagement comprised robust family and neighborhood support, visible government initiatives (such as fogging and the distribution of free nets), and accessible awareness campaigns via media. Evidence from Alappuzha, Kerala, corroborates this: community-based decentralized planning and the involvement of local committees resulted in significant reductions in key entomological indices following targeted interventions (15,16).

Moreover, the integration of health education interventions has proven to be effective. In the urban poor communities of Delhi, post-intervention surveys indicated a significant enhancement in knowledge, the adoption of protective behaviors, and increased participation in control efforts (17). This reinforces the notion that educational campaigns, when conducted regularly and tailored to specific contexts, can promote sustainable behavior change.

Crucially, government commitment and policy support have emerged as essential factors. In Punjab, campaigns led by ASHA workers, the provision of free mosquito nets, and localized surveillance under the “Har Shukarvar, Dengue Te Vaar” initiative resulted in a remarkable 50% decrease in dengue cases (18). This illustrates how policy-driven, community-integrated models can yield measurable outcomes.

Lastly, it is important to consider the dynamics of behavioral economics. A theoretical model indicates that when public authorities undertake vector-control efforts without community involvement, household preventive behaviors may diminish since individuals may perceive a decrease in personal responsibility (19). This suggests that strategies must strike a balance between institutional action and ongoing community engagement to prevent unintended complacency.

CONCLUSION

This research emphasizes that the perceptions and behaviors of the community regarding dengue prevention are influenced by a mix of knowledge, socio-cultural norms, infrastructural obstacles, and reliance on government actions. While there is some awareness of dengue, the conversion of this awareness into consistent preventive measures is still inadequate. Misunderstandings, seasonal beliefs, and a lack of community ownership further complicate the situation. Support from family, media-driven awareness campaigns, and visible government initiatives can improve community participation. To effectively control dengue, a comprehensive approach is necessary, which includes ongoing education, improvements in infrastructure, and active engagement from the community. It is essential to strengthen

policy-driven community involvement to achieve sustainable results. Future initiatives should aim to bridge the knowledge-practice gap and encourage a collective responsibility for vector control.

Strengths

- This research utilized a qualitative methodology that offered comprehensive, contextual insights into community perceptions and actions related to dengue prevention.
- The involvement of a range of stakeholders—pregnant women, women of reproductive age, husbands, and mothers-in-law—guaranteed a variety of viewpoints.
- Employing Focus Group Discussions (FGDs) and In-Depth Interviews (IDIs) facilitated a thorough comprehension of the socio-cultural elements affecting practices.
- Investigator triangulation improved reliability by reducing bias.
- Thematic analysis permitted a structured identification of recurring patterns and significant themes.

Limitations

- The research was confined to a particular geographic area, which may impact the applicability of the findings to other contexts.
- Self-reported behaviors during interviews may have been swayed by social desirability bias.
- The translation from Tamil to English could have resulted in a slight loss of meaning.

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