

Original article

**Understanding Dengue Fever: Community Perspectives on Transmission, Prevention, and Health seeking behavior in suburban areas of Kancheepuram district**

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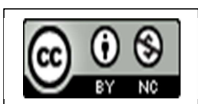
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**Abstract:**

Dengue fever is a viral infection transmitted by *Aedes aegypti* mosquito and is caused by dengue virus. The World Health Organization estimated a rise in reported cases globally between 2000 and 2019, rising from 500,000 to 5.2 million. As per the report of TN Govt, 8527 cases reported in 2019, and 6039 in 2021. A cross sectional study was done among 370 participants in a sub urban neighborhood of Kancheepuram and data was analyzed using SPSS software. The mean age and standard deviation of the sample was 44.3 ±15.6 years. Almost all the participants were >40 years of age (55.7%). The awareness about dengue among the participants was found to be 204 (55.1%). People with income < 20,000 Rs has inadequate knowledge about dengue when compared to people earning >20,000 Rs ( $p=0.000$ ,  $OR=2.883$ ,  $95\%CI -1.659-5.008$ ). Preventing breeding of mosquito is responsibility of healthcare professional and community. Community awareness and understanding of dengue fever and the need for targeted management strategies that take the bionomics of the relevant vector species into account. To further reduce dengue incidence and its effects, preventative measures including educational programs and methods to control vectors ought to be undertaken. Promoting vaccination programs can play a major role in reducing dengue outbreaks and safeguarding susceptible groups when integrated into public health campaigns.

**Key words:** Dengue, *Aedes-Aegypti* borne disease, Socio-economic factors, Community participation

**Introduction:**

The global spread of dengue virus involves transmission between human and aedes mosquitoes. Key risk factors include bite of the infected mosquito, population density, human mobility, unreliable water supply, and poor water storage practices, especially in unplanned semi-urban and rural areas<sup>1</sup>. Dengue fever had a predominant urban distribution a few decades earlier, but are now also reported from semi-urban as well as rural areas<sup>2</sup>. Dengue fever has risen significantly in number across the world over the past two decades, posing an imminent threat to public health. Global cases surged tenfold from 2000 and 2019, from 500,000 to 5.2 million, according to the WHO. 2019 saw a significant increase in cases,

affecting 129 countries. Following a temporary decrease during the COVID-19 pandemic, the number of cases increased again in 2023, spreading to new areas. Ten out of eleven nations in the WHO's Southeast Asia area have an endemic dengue outbreak, with the Philippines, Vietnam, Bangladesh, and Malaysia having the highest rates of cases. In India, dengue is also a major factor in admissions to hospitals<sup>3,4</sup>. India reported 157,315 cases with 166 deaths in 2019 and 94,198 cases with 91 deaths in 2023<sup>5</sup>. Dengue cases in Tamil Nadu surged, with 4,486 cases in 2018, 8,527 in 2019, and a recent rise to 6,039 cases reported in 2021, according to the health department<sup>6</sup>. The time a mosquito takes to replicate dengue virus (DENV) after feeding on an infected person

is called the extrinsic incubation period (EIP), influenced by factors such as temperature, viral strain, and concentration. Once infectious, mosquitoes carry DENV for life. Transmission can occur two days before symptoms appear and up to two days after fever subsides, affecting symptomatic, pre-symptomatic, and asymptomatic individuals. High DENV-specific antibody levels reduce mosquito infection risk, while high viremia and fever increase it. Viremia typically lasts 4-5 days but can extend up to 12 days. Prior DENV infection increases the risk of severe dengue<sup>7</sup>. Furthermore, the effective vaccine is unavailable, resistance to drugs, resistance to insecticides, complex agent host interaction, lack of community awareness about the bionomics of mosquito, its breeding sites, preventive strategies are all the factors which has led to this unfruitful situation<sup>7</sup>. Individual, Community and government participation is vital for effective and sustainable control of vector. This study aims to assess household awareness, adopted control measures, and health-seeking behavior related to fever. It also examines the implementation of sustainable vector control practices and their impact on community susceptibility to dengue. Understanding local perspectives is key to identifying gaps and designing culturally appropriate prevention strategies, which help to identify the factors that encourage communities to adopt healthy behaviors and effective control practices.

#### **Materials and Methods:**

**Study design:** It is a community based cross sectional study conducted from June to November 2023.

#### **Study population and place:**

The field practice area of the Rural Health Training Center of a tertiary care hospital in Kancheepuram District serves a population of 45,130, comprising approximately 10,610 households, which was the study population.

#### **Sample size and Calculation:**

In a cross-sectional study done in Kolkata by Debayan *et al*<sup>7</sup>, reported that 68.4% of the population was aware about dengue. The sample size was calculated based on this with prevalence of 68.4%. Considering confidence interval of 95 % with  $Z_{1-\alpha/2}=Z_{0.95}=1.96$  and absolute error (L) of 5%. Therefore, using formula  $N = \frac{z^2pq}{L^2}$ ,

where  $P = 68.4$   $q = 100 - 68.4 = 31.6$ , estimated sample size was 370.

#### **Data collection and procedure:**

A pre tested semi structured questionnaire was used. The household list in the locality was obtained from the staff of the health center and 370 households was randomly chosen by simple random sampling using lottery method. The head of the house hold, his wife or any family member more than 18 years of age available at the house during the time of visit was the study subject and they were interviewed to obtain the data. From each house hold just one person was interviewed. Data was collected from 370 participants and analyzed using Statistical Package for the Social Sciences (SPSS) v22.

#### **Results**

Data was collected from 370 participants. The mean age and standard deviation (SD) of the sample was  $44.3 \pm 15.6$  years. Almost all the participants were more than 40 years of age (55.7%). 46% were male and remaining were female. In our study 77% of the participants were married and almost 74 % studied up to higher secondary school and only 26.5 % are graduated up to college. Most of the participants lived in pucca house 57% with income of less than 20,000 Rs (63%). Almost 70% of the participants lived in nuclear family. Table 1 below shows socio-demographic data of the study participants.

The awareness about dengue among the participants was found to be 204(55.1%). The univariate analysis of level of awareness with socio-demographic data indicated that individuals earning less than ₹20,000 had significantly inadequate dengue awareness compared to those with higher incomes ( $p = 0.000$ , OR = 2.883, 95% CI: 1.659–5.008). Bivariate analysis revealed education (OR = 1.672; 95% CI: 1.038–2.694) and low income (OR = 2.323; 95% CI: 1.494–3.612) as major risk factors for inadequate awareness, while unemployment served as a protective factor (OR = 0.469; 95% CI: 0.27–0.83). Factors significant at  $p < 0.05$  were included in multivariate logistic regression, which confirmed low income as a significant predictor of inadequate dengue awareness (AOR = 2.883;  $p < 0.001$ ).

**Table 1: Socio-demographic data of the study participants**

S.no	Variables	Frequency (n)	Percentage (%)
<b>1</b>	<b>Age</b>		
	18-25 years	45	13.1
	26-35years	80	16.8
	36-45 years	91	24.5
	>45years	163	45.6
<b>2</b>	<b>Gender</b>		
	Male	170	45.9
	Female	200	54.1
<b>3</b>	<b>Education</b>		
	Primary schooling	178	48.1
	Higher sec school	94	25.4
	College/ graduate	98	26.5
<b>4</b>	<b>Occupation</b>		
	Unemployed	156	42.2
	Self-employed	77	20.8
	Employed	137	37
<b>5</b>	<b>Income (rupees)</b>		
	<20,000	233	63
	>20,000	137	37

**Table 2: Binary Logistic Regression Analysis of Awareness and Preventive Measures for Dengue**

S.no	Variables	Awareness about dengue		N, (%)	Unadjusted OR (95% CI)	P	AOR (95% CI)	P
		Inadequate n=166	Adequate n=204					
<b>1</b>	<b>Signs of dengue consult doctor</b>							
	No	31(8.4%)	15(4.1%)	46(12.4%)	2.893 (1.5032-5.692)	0.001*	1.337 (0.621-2.881)	0.458
	Yes	135(36.5%)	189(51.1%)	324(87.6%)	1			
<b>2</b>	<b>Prevent breeding site of the mosquito</b>							
	No	39(10.5%)	17(4.6%)	56(15.1%)	3.3780 (1.8307-6.2330)	0.000*	2.431(1.102-4.974)	0.27
	Yes	127(34.3%)	187(59.6%)	314(84.9%)	1			
<b>3</b>	<b>Fogging prevents mosquito breeding</b>							
	No	62(16.8%)	53(14.3%)	115(31.15%)	1.698 (1.089-2.646)	0.019*	0.980 (0.563-1.705)	0.943
	Yes	104(28.1%)	151(40.8%)	255(68.9%)	1			
<b>4</b>	<b>Supervised control and monitoring of mosquito breeding</b>							
	No	42(11.4%)	28(7.6%)	70(18.9%)	2.1290 (1.252-3.619)	0.005*	0.978 (0.484-1.975)	0.950
	Yes	124(33.5%)	176(47.6%)	300(81.1%)	1			
<b>5</b>	<b>Play a part to prevent dengue</b>							
	No	49(13.2%)	35(9.5%)	84(22.7%)	2.0222 (1.2343-3.3131)	0.006*	1.077 (0.587-1.975)	0.810
	Yes	117(31.6%)	169(59.1%)	286(77.3%)	1			
<b>6</b>	<b>Eradicating mosquito breeding is the responsibility of health professionals and volunteers</b>							
	Yes	120(32.4%)	123(33.2%)	242(65.7%)	1	0.016*	0.372 (0.219-0.631)	0.000*
	No	46(12.4%)	81(21.9%)	127(34.3%)	1.718 (1.106-2.669)			
<b>7</b>	<b>Responsibility of the individual, family and community to prevent dengue</b>							

	No	41(11.1%)	21(5.7%)	62(16.8%)	2.8583 (1.6116-5.0695)	0.000*	1.848 (0.966-3.534)	0.063
	Yes	125(33.8%)	183(49.5%)	308(83.2%)	1			
8	<b>Containers of water/wells in residence covered</b>							
	No	71(19.2%)	55(14.9%)	126(34.1%)	2.0247 (1.3091-3.1315)	0.001*	1.319 (0.727-2.391)	0.362
	Yes	95(25.7%)	149(61.1%)	244(65.9%)	1			
9	<b>Close water containers/wells once used</b>							
	No	65(17.6%)	45(12.2%)	110(29.7%)	2.2739 (1.4433-3.5827)	0.000*	1.394 (0.754-2.576)	0.290
	Yes	101(27.3%)	159(43%)	<b>260(70.3%)</b>	1			
10	<b>Checked discarded container or plastic in residence</b>							
	No	97(26.2%)	85(23%)	182(49.2%)	1.9681 (1.2988-2.9824)	0.001*	1.204 (0.703-2.062)	0.500
	Yes	69(18.6%)	119(32.2%)	188(50.8%)	1			
11	<b>Remove containers that can collect water</b>							
	No	77(20.8%)	66(17.8%)	143(38.6%)	1.8090 (1.1848-2.7620)	0.006*	1.098 (0.650-1.855)	0.726
	Yes	89(24.1%)	138(37.3%)	227(61.4%)	1			

Bivariate analysis was done by cross tabulating awareness and preventive measures of dengue. Significance was determined by Pearson Chi-square Test. Values in \* are statistically significant at  $p < 0.05$ . All the p values are two tailed= 370, % = row proportion of N (percentage). Values which were statistically significant in bivariate analysis was considered for binary logistic regression to eliminate the confounders. AOR – Adjusted Odd’s Ratio

Table 2, Summarizes the results of both univariate and bivariate analyses, revealing statistically significant associations between awareness and preventive measures of dengue. Participants who did not consult a doctor when experiencing signs of dengue had 2.893 times higher odds of having inadequate awareness compared to those with adequate awareness (OR=2.893, CI=1.5032-5.692,  $p=0.001$ ). Additionally, 15% of the participants did not prevent water stagnation around their houses, which serves as breeding sites for mosquitoes.

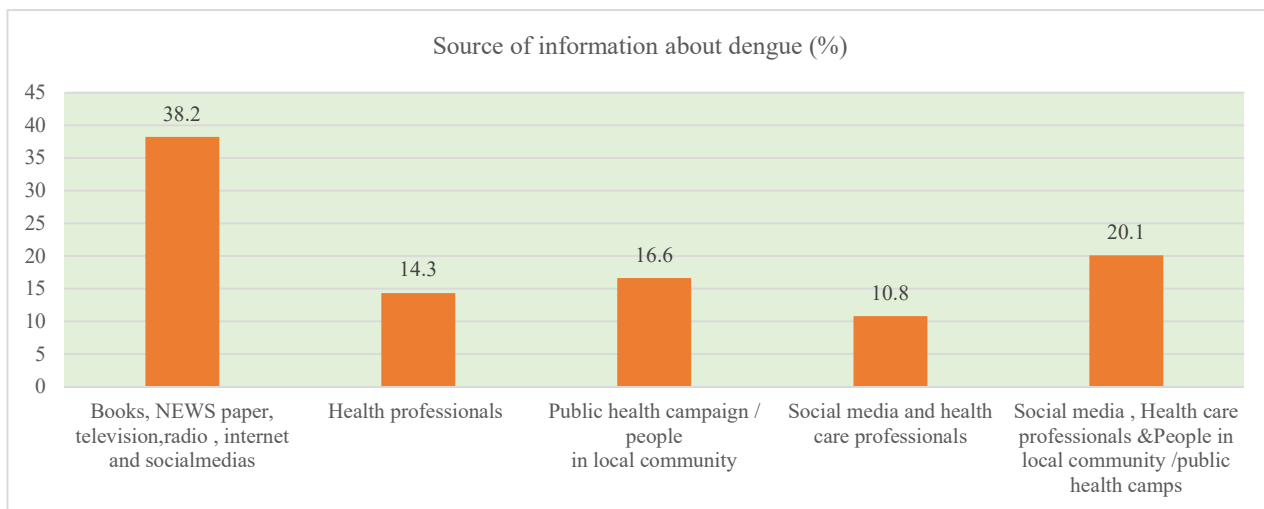
These individuals had 3.3780 times higher odds of having inadequate knowledge (OR=3.3780, CI=1.8307-6.2330,  $p=0.000$ ) compared to those who actively prevented mosquito breeding sites. Furthermore, 34% of the participants believed that eradicating mosquito breeding sites was solely the responsibility of healthcare professionals and volunteers. These individuals had 1.718 times higher odds of having inadequate awareness about dengue (OR=1.718, CI=1.106-2.669,  $p=0.016$ ) compared to those with adequate awareness.

Factors with p-values less than 0.05 were included in the multivariate analyses. Notably, the belief that eradicating mosquito breeding sites is the responsibility of healthcare professionals and volunteers remained significant, with a higher adjusted odds ratio of 0.372 (95% CI=0.219-0.631, p=<0.000) for inadequate awareness about dengue, compared to participants with adequate awareness.

Regarding health-seeking behavior towards dengue fever, 328 participants (88%) reported

that they took antipyretics when they had a fever. Nearly 300 participants (81%) visited government hospitals, while 220 (59.5%) sought treatment at private hospitals when they had a fever. More than half of the participants 232 (62.7%) sought treatment from a general practitioner or a nearby hospital. Furthermore, 232 (62.7%) participants used natural or herbal remedies, and only 177 (47.8%) reported that they knew health insurance can be used treatment for dengue.

**Fig 1: Sources of information about dengue**



**Discussion:**

Our community-based research was done to explore community perception, mode of spread and control measures of dengue and health seeking behavior among sub urbans parts of Kancheepuram district. Just 55.1% of survey participants had sufficient information of dengue, and only 35.1% were aware that the Anopheles mosquito is the dengue carrier, according to the present study. Half of the participants claimed discarded food containers, tyres and one third of them said unclosed water reservoirs were the breeding place for dengue carriers. More than half of the participants stated fever, nausea, vomiting, head ache, body pain and orbital pain are the most common symptoms of dengue infection. Studies done in other parts of the world reported varying proportions of dengue awareness among rural areas. Studies done in Nepal and Yemen reported

higher prevalence of awareness about 77% and 90% which is contrast to our study findings<sup>8,9</sup>. A study done in North Thailand also showed 67% higher prevalence of knowledge about dengue when compared to the present study<sup>10</sup> these higher prevalence of knowledge about dengue varies significantly based on regional difference ,educational level, socioeconomic factors, variation in survey methodologies government initiatives for disease control and prevention . A study done in Jamaica reported 54% had good knowledge about dengue which is almost similar to our study findings may be due to shared epidemiological context and health Infrastructure<sup>11</sup>. A study done in India, Tamil Nadu stated 66.3% of participants have heard about dengue but only 33.3% had adequate knowledge about dengue also study done in Puducherry stated 86.5% of the

participants have heard of dengue which is contrast to our study findings<sup>12,13</sup> these differences may be due to variations in cultural beliefs, attitude

In our research almost 38% of participants reported NEWS, television, social media, internet as the source of information of dengue (shown in Fig.1), and also in our study 49.5% claimed it is the responsibility of individual, family and community together to prevent dengue which are similar to other studies done in other parts<sup>11</sup>. A study done in Yangon region and in Malasia stated almost 70-80% and 70% respectively<sup>14,15</sup> and the participants have covered /checked the source of breeding sites of mosquito in and around their residence and 88% used to discard and change water frequently on a weekly basis these are contrary to our findings were only 60 %of the have closed their wells/tanks in their residence. Among them only 32% who had good awareness have checked discarded plastic or containers in and around their house which act as a breeding site of mosquito for prevention of dengue and only 1/3<sup>rd</sup> of the participants has made effort to remove the containers that can collect artificial water which act as a source of mosquito breeding for dengue. A study done in Nepal<sup>8</sup> stated 80-90% of them used mosquito nets, repellents coils. Which is contrast to our study were nearly 48% of participants use mosquito coils, sprays and wear long sleeved clothing and 49% of them use mosquito nets to prevent the bite of mosquito has preventive measure. A study done in Pakistan<sup>16</sup> stated 30-68% preferred fogging which is similar to our study findings were 70% have claimed fogging can prevent dengue. Our findings on dengue prevention are in line with national study done in socio economic group of Pakhtunkhwa<sup>17</sup> and those of Thailand<sup>18</sup> Yemen<sup>9</sup>, and in Malasia in hot spot and non-hotspot areas<sup>19</sup>. The disparities may be due to the level of knowledge in communities suggests the differences in the results might be the result of different governments' education and awareness campaigns in dengue-endemic nations. Nevertheless, in light of methodological variations (such as question type, community type, background dissimilarity of respondents, scoring system, etc.), inferences made from this research should be regarded cautiously.

In a KAP study it stated that 32.2% of them would seek health care if they have fever among them only 19%claimed they would self-medicate drugs like paracetamol for fever<sup>20</sup>. Similar study done on health

towards health care and preventive behaviors related to dengue can also impact the level of awareness.

seeking behavior in Venezuela also stated 60% would first prefer medical help also<sup>21</sup>. In a household survey it stated that 44.6% had adequate health seeking behavior and 19 % had dengue prevention behavior by the participants<sup>22</sup>. All these findings are contrast to our study where the participants or any family members develop fever 86% of them would seek care from a general practitioner would go to the nearby hospital and 89% of them would buy take antipyretics e.g. paracetamol and wait to see if symptoms improve, 62% of them takes traditional herbal remedies for dengue immediately and only 48% of the participants said that health insurance is covered for treatment of dengue if hospitalized others are unaware. These disparities in findings could be due do health care infrastructure between countries can probably impact health seeking behavior, the proximity and availability of health care facilities also determines if households seek medical care. The variation in government policies, health care system organizations, trust in health care providers, differences in insurance coverage, rules and regulations, also health care financing the quality of health care services can also affect individual's decision to seek in professional medical assistance.

#### **Conclusion:**

This study highlights the intricate interplay between dengue awareness, mode of transmission, control measures, and health-seeking behavior. Our findings highlight the critical need for community about dengue fever and targeted management strategies that consider the bionomics of relevant vector species. To reduce dengue incidence and its impact, effective preventive measures, including educational programs and vector control strategies, are essential. Promoting proactive health-seeking behavior is vital for ensuring prompt diagnosis and treatment while preventing dengue-related complications. Given their accessibility, dengue vaccinations can significantly lower infection rates and disease burden in Tamil Nadu. Integrating vaccination campaigns into public health initiatives is crucial for protecting vulnerable populations and reducing outbreaks. Collaborative efforts among healthcare professionals, policymakers, researchers, and communities are necessary to implement evidence-based policies for dengue elimination and

public health safeguarding. Addressing the concerns raised in this study may enhance community capacity

to prevent and control this serious public health issue.

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