

## Original Research Article

# Community based interventional study on dengue awareness and vector control in a rural population in Ernakulam, Kerala

Leyanna Susan George\*, Aswathy S., Nimitha Paul, K. Leelamoni

Department of Community Medicine, Amrita Institute of Medical Sciences, Amrita University, Kochi, Kerala, India

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### \*Correspondence:

Dr. Leyanna Susan George,

E-mail: [leyanna.george@gmail.com](mailto:leyanna.george@gmail.com)

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## ABSTRACT

**Background:** Dengue fever is an acute infectious disease for which there are currently no specific drugs or effective vaccines available. Therefore its prevention & control solely rest on vector control strategies, for which behavioural change of the community is a requirement. Hence, the aim of our study was to implement a standardised behaviour change communication intervention strategy (BCC) and to measure its impact on the population in terms of awareness, attitude and practice regarding dengue and its vector control.

**Methods:** This study was carried out in a ward in Njarackal Panchayath in Ernakulam district of Kerala. An initial baseline survey was conducted to assess the current awareness, attitude and practices of dengue & its vector control among the residents of the ward. This was followed by the implementation of standardized BCC Intervention strategy. A post intervention survey was carried out two months later to analyze its impact.

**Results:** This BCC strategy resulted in increasing the awareness regarding dengue and its vector control even though it was found not to be statistically significant. However, the strategy was able to bring about a significant change in the attitude and practice of the people with regard to dengue prevention and control strategies.

**Conclusions:** This BCC strategy was successful in this population due to community acceptance, however it requires constant reinforcement for its sustainability.

**Keywords:** Dengue, Prevention, Control, Behaviour change communication

## INTRODUCTION

Dengue is a neglected tropical disease and is endemic in 16 states of India including Kerala.<sup>1</sup> An arthropod - borne viral disease, with four antigenically distinct dengue viruses (DEN-1, DEN-2, DEN-3 or DEN-4) that belong to the genus Flaviviridae is responsible for causing the disease. Infection with one of the viruses would produce lifelong immunity against that particular virus only and not for the other viruses since it lacks cross immunity. This is one of the reasons why the disease can either be asymptomatic or can manifest itself as Dengue fever or severe Dengue. Transmission is mainly through the bite of either the infected female *Aedes aegypti* mosquito or by *Aedes albopictus*. Artificial containers near human

dwelling harbor the immature stages of the *Aedes* mosquito.<sup>2</sup>

Dengue as a disease presents a highly complex pathophysiological, economic and ecologic problem.<sup>3</sup> The absence of vaccines or specific drugs for the treatment of dengue makes the focus on vector control practices an imperative.<sup>4</sup> Over the years, different types of dengue vector control strategies have been developed and implemented such as space spraying of insecticides for adult mosquito control which are difficult to adhere and costly too.<sup>5</sup> Integrated vector control programmes, dry day maintenance, environmental management, personal protection, clean up campaigns etc with knowledge and active participation of the community has also been

advocated.<sup>6</sup> In order to achieve effective dengue control, larval source reduction with community participation should be carried out. Research has shown that for any community participation to be successful, the key is to bring about a behavioural change among the residents of the community.<sup>7</sup> Moreover, behavioural change in terms of water storage practices, dry day maintenance, environmental management and personal protection against the dengue vector would prove to be very cost effective when compared to other methods.<sup>8</sup>

Over the years, the number of Dengue cases in Kerala has shown a drastic rise from 2597 cases in 2010 to 7204 cases in the year 2016.<sup>9</sup> Ernakulam district in Kerala is known to be a Dengue prone area and the National Health Mission has identified coastal areas Njarackal and Elankunnapuzha Panchayath of the district to be the worst affected. Over the years, repeated outbreaks of Dengue have continued to occur in Njarackal, a rural coastal village in one of the most population dense areas of Vypin Island. This is probably due to the fact that there is a severe water shortage in these areas due to the poor functioning of the public distribution system which only provides for alternate day supply for a restricted duration of time. Moreover, due to salinity ground water cannot be used. Therefore the people residing in this area are forced to store water in containers which in turn favour the breeding of *Aedes* larve and pupae.<sup>10</sup> Previous studies done in Kerala and in these areas have also shown that the vector *Aedes aegypti* has been completely replaced by *Aedesalbopictus*.<sup>11</sup> Therefore by keeping these facts in mind, we decided to implement a standardized Behaviour change communication (BCC) activity in Njarackal Panchayath which will create awareness, bring about a positive attitude and thereby improve the practices of dengue vector control among the local population.

Hence, the objectives of the study were (i) to conduct a baseline pre-interventional survey to understand the awareness, attitude and existing practices regarding dengue and its vector control among the study population, (ii) implement a standardized behavior change communication (BCC) intervention strategy regarding dengue and its vector control practices and (iii) to undertake a post-interventional survey to measure the impact of the standardized BCC intervention strategy with regard to awareness, attitude and practice of dengue and its vector control.

## METHODS

The study was conducted after obtaining Institutional ethical committee clearance in the rural coastal region of Njarackal Panchayath in Ernakulam district of Kerala. Out of the 16 wards in Njarackal Panchayath, ward number 14 was selected randomly for conducting the study. At the household level, after obtaining informed written consent, a single member of each household aged 18 years and above was included in the study. Residents who were unavailable on 2 consecutive visits were

excluded from the study. An initial baseline survey was conducted in the month of March to assess the awareness, attitude and practices of Dengue & its vector control among the residents of the ward. It was then followed by a standardized behaviour change communication intervention on dengue and its vector control practices. After a period of two months, a post intervention survey was carried out in June in order to analyze the changes that have occurred regarding the awareness, attitude and practices among the people. Even though, it was planned to interview the same participant for both the pre and post interventional surveys, due to practical difficulties this was not possible in all houses.

A pretested semi-structured questionnaire was used to collect data at the household level. The questionnaire consisted of four parts. Firstly, the socio-demographic profile of the respondents such as age, sex, marital status, religion, education and socio-economic status using the nine point poverty index were collected. Their awareness regarding dengue was assessed by asking questions related to the mode of dengue transmission, species transmitting the disease, age groups affected, climatic conditions favoring its transmission, time of bite, breeding sites of the vector and available methods of prevention and control of vector including vaccine availability. The attitude of the rural population with regard to one's own role and government's role in preventing and controlling dengue was also assessed. Practice of dengue control was evaluated by examining the surroundings of the house for artificial water collections, coverage of water storage containers, use of personal protective measures, dry day practices, and participation in community health programs related to dengue.

There were in total 20 questions for assessing the awareness, attitude and practice of the people. The correct answers were given a score of 1 and incorrect answers were given a score of 0. The 50<sup>th</sup> percentile was taken as a cut off to demarcate the answers into good and poor.

Behavior change communication (BCC) interventions on dengue and its vector control covered key areas such as the species transmitting the disease, age groups affected, climatic conditions favoring its transmission, time of bite, breeding sites of the vector, signs and symptoms of dengue, available methods of prevention and control of vector including vaccine availability etc.

The BCC interventions consisted of an initial distribution of leaflets on dengue and its symptoms, control measures etc. A week later, the families of Ward number 14 of Njarackal Panchayat were invited to the nearby school where a dengue awareness programme was conducted, consisting of talks and role play highlighting the mode of transmission, clinical features, prevention & control of dengue. Two months later there was an intensive house to house BCC campaign by trained health workers. In pairs,

they covered 25 to 35 houses over a period of 2 days thus covering the entire ward. This was again followed by the distribution of health education leaflets for reinforcement.

The data collected was tabulated using MS Excel and analyzed using SPSS 20.0.

## RESULTS

### *Socio-demographic profile*

In the baseline survey a total of 273 houses were visited, of which 72 houses were locked and 14 of them did not provide consent resulting in a total study population of

186. While in the post interventional survey, 81 houses were locked & 2 were unwilling to participate resulting in a total study population of 190. The age of the respondents ranged from 18 to 80 years, with 39.2% of the majority being in the age group between 41 to 60 years (mean  $46.17 \pm 15.94$ ). Females constituted 75% of the study population and the majority were Hindus (60.8%), followed by Christians (38.2%) and Muslims (1.1%). Most of the participants were married (81.7%), had a maximum education up to high school (33.9%) and belonged to above poverty line category (97.3). The socio-demographic profile of the participants of the pre interventional survey was found to be comparable to that of the post interventional survey except for the marital status as seen in Table 1.

**Table 1: Distribution of participants based on their socio demographic profile.**

Socio demographic profile	Pre interventional Survey (%)	Post interventional survey	P value
<b>Age</b>			
18 - 20	4.3	4.9	0.586
21 – 40	36	30.4	
41 – 60	39.2	45.7	
Above 60	20.4	19.0	
<b>Gender</b>			
Female	75.8	82.1	0.1636
Male	24.2	17.9	
<b>Marital Status</b>			
Ever Married	81.7	85.8	0.023
Unmarried	8.6	6.3	
Others*	9.7	4.2	
<b>Religion</b>			
Hindu	60.8	61.1	0.970
Christian	38.2	36.8	
Muslim	1.1	2.1	
<b>Education</b>			
Up to Middle school	22.6	29.9	0.30
High School & Higher Secondary	52.2	48.6	
Degree & Above	25.2	21.5	
<b>Point Poverty Index</b>			
APL	97.3	95.8	0.599
BPL	2.7	4.2	

**Table 2: Distribution of participants based on their awareness regarding dengue and its vector.**

Awareness regarding dengue and its vector control	Pre interventional Survey (%) (Total= 186)	Post interventional survey (%) (Total 190)	P value
<b>Mode of transmission</b>	84.4	88.4	0.199
<b>Age group affected by dengue</b>	51.6	57.4	0.221
<b>Climatic conditions favoring the spread of dengue</b>	64.5	90	0.001
<b>Species of mosquito transmitting dengue</b>	29	43.2	0.0031
<b>Time of <i>Aedes</i> mosquito bite</b>	20.4	49.5	0.001
<b>Availability of vaccine for dengue</b>	31.7	36.8	0.249

### Awareness regarding dengue & its vector control

Majority of the people (98%) had heard about dengue and their sources of information were from the print and audio visual media (42%). Post intervention there was an increase in the awareness regarding modes of dengue transmission (84.4 % to 88.4%), age groups commonly affected (51.6 % to 57.4%), climatic conditions favoring its spread (64.5% to 90%), vaccine availability (31.7 % to 36.8%), mosquito species transmitting the disease (29% to 43.2%) and its time of bite (20.4% to 49.5%). However, statistically significant increase in awareness was noted regarding the climatic conditions ( $p=0.001$ ), species ( $p=0.0031$ ) and time of bite ( $p=0.001$ ) of the mosquito transmitting dengue. Table 2 shows the difference in the awareness of the participants both pre and post intervention.

### Attitude towards dengue vector control

The study brought out few interesting findings regarding the attitude of the participants towards dengue vector control even though most of the findings were found not to be statistically significant. It was observed that the BCC intervention strategy were able to improve the attitude of the people especially by creating a self realization that the common man is capable of preventing dengue and plays an important role in doing so (91% to 93.2%). Even though, three fourths of the population are aware of the fact that dengue is a fatal disease, only a minority have realized that they too are prone for acquiring dengue. At the end of the intervention a significant proportion believed that prevention of dengue was not the responsibility of the health workers but theirs too. The BCC intervention was able to bring about a significant difference in the attitude of the population with regard to the fact that prevention of dengue fever is

not the sole responsibility of the health workers but of each and every member of the community ( $p=0.001$ ). The details of which are provided in Table 3.

### Practice of dengue vector control

Though the attitude hadn't improved much, practice showed a significant improvement with regard to vector control practices. It was observed that even though there was no significant association in the attitude of the respondents towards dengue vector control, the respondents incorporated dengue vector control practices into their daily lives. This finding was statistically significant too. Most common sites that the respondents checked for mosquito larvae were flowerpots and coconut shells. Mosquito coils/ mats and liquid devices were the most common personal protective measures used by the respondents. 30% of them used more than one method of personal protective measures. 57.9% of the population reported that they were approached by community action groups like kudambashree and ASHA for various cleaning programs as given in Table 4.

### Impact of standardized behaviour change communication intervention on the community

On scoring knowledge, attitude and practice, there was a significant improvement in good attitude and practice indicating an overall effect on the community. Though individual domains under awareness showed significant improvement, when the scores were grouped, improvement in awareness was not significant. This intervention was also able to bring about a significant change in the community by creating a positive attitude resulting in the implementation of effective vector control strategies against dengue as shown in Table 5.

**Table 3: Distribution of participants based on their attitude towards dengue vector control.**

Attitude towards dengue vector control	Pre interventional Survey (%) (Total= 186)			Post interventional survey (%) (Total 190)			P value
	Agree	Not Sure	Disagree	Agree	Not Sure	Disagree	
<b>I can prevent dengue fever</b>	77.4	12.9	9.7	81	13	6	0.459
<b>Prevention of dengue fever is the responsibility of the health workers &amp; Panchayath alone</b>	30	8	62	13	3.1	83.9	0.001
<b>It is my responsibility to keep my house and surroundings clean</b>	96.8	1.6	1.6	94.2	3.2	2.6	0.315
<b>The common people play an important role in the prevention of dengue</b>	91	5	4	93.2	4.7	2.1	0.557
<b>I have a chance to be affected by dengue</b>	43	27.4	29.6	36	35	29	0.526
<b>Dengue can be a fatal illness</b>	74	16	10	75	13	12	0.833

**Table 4: Dengue vector control practices.**

Distribution of participants based on their Dengue vector control practices.	Pre interventional Survey (Total= 186)	Survey (%)	Post interventional survey (%) (Total 190)	P value
Regular checking for mosquito larvae once a week	68.8		88.9	0.002
Practicing of dry day in the past 2 months	68.8		86.8	0.001
Covering of water storage containers	91		99	0.001
Participation in community action programs for dengue vector control	2.7		36.8	0.001
Regular use of personal protective measures to prevent mosquito bites	95.2		97.8	0.08

**Table 5: Post interventional changes in awareness, attitude and practice regarding dengue & its vector control.**

Domain	Pre interventional Survey (Total= 186)	Survey (%)	Post interventional survey (%) (Total 190)	P value
<b>Awareness</b>				
Poor	94 (50.5)		75 (39.5)	1.6
Good	92 (49.5)		115 (60.5)	0.23
<b>Attitude</b>				
Poor	181 (97.3)		95 (50)	109.9
Good	5 (2.7)		95 (50)	<0.001
<b>Practice</b>				
Poor	89 (47.8)		60 (31.6)	16.2
Good	97 (52.2)		130 (68.4)	<0.001

## DISCUSSION

Over the years it has been observed that, despite the growing levels of knowledge and awareness regarding dengue and its vector control measures, people are still not taking actions regarding its prevention and control.<sup>12</sup> This has resulted in a continuing dilemma for finding effective ways for encouraging the adoption of healthy behaviours at individual, household and community levels. Many different approaches have been used in the past, such as the provision of Information, Education and Communication (IEC) activities. It was initially believed that people were not adopting health behaviours due to their lack of awareness about it. However, it has now become more and more evident that, creating awareness alone is just not sufficient and the behavioural change of the people has now become the need of the hour. Therefore, the approach has now shifted from IEC to Behaviour Change Communication (BCC).<sup>13</sup>

The BCC approach has been defined as “a research-based consultative process of addressing knowledge, attitudes and practices through identifying, analysing and segmenting audiences and participants in programmes by providing them with relevant information and motivation through well-defined strategies, using an audience-

appropriate mix of interpersonal, group and mass-media channels, including participatory methods.”<sup>14</sup> Therefore, by using multi-pronged BCC strategies we were able to bring about an increase in the awareness of the local population, even though not found to be statistically significant. This could probably be due to the fact that, the general awareness of the people was quite high even before the BCC intervention. It was also observed that this BCC strategy was able to translate this increase in knowledge into the creation of a positive attitude there by enabling the population of ward number 14 of Njarckal panchayath to practice appropriate dengue vector control practices. However, one of the limitation of the study was that the pre interventional survey was carried out in the summer season and the post interventional survey in the rainy season. This difference in season could have affected the dengue vector control practices, since people are more conscious of mosquito breeding in stagnant waters during the rains than in the summer.

To conclude, this standardize BCC strategy was found to be to successful in this population due to community acceptance, however it requires constant reinforcement for its sustainability. Hence, the recommendation from this study is that BCC strategies play a crucial in the control of dengue in communities. Hence, similar BCC



strategies need to be advocated as a part of our routine dengue prevention & control activities.

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