Prevalence of mosquito borne diseases, awareness & use of personal protective measures against mosquito bites in a semiurban panchayat in Trivandrum district, Kerala

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DECLARATION

I hereby declare that this dissertation titled – "Prevalence of mosquito borne diseases, awareness & use of personal protective measures against mosquito bites in a semiurban panchayat in Trivandrum district, Kerala" is a bonafide record of my original research. It has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published and unpublished work of others has been duly acknowledged in the text.

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CERTIFICATE

Certified that the dissertation titled - “Prevalence of mosquito borne diseases, awareness & use of personal protective measures against mosquito bites in a semiurban panchayat in Trivandrum district, Kerala” is a record of the research work undertaken by Dr Swathi L , in partial fulfilment of the requirements for the award of the degree of Master of Public Health under my guidance and supervision.

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CHAPTER-1

INTRODUCTION

1.1 Background

According to the WHO, vector-borne diseases are conditions that affect people and are brought on by bacteria, viruses, or parasites that are spread by these agents. Mosquito-borne diseases are those that are transferred by the bite of a mosquito that is diseased. When the mosquito feeds on the blood of the affected person, it also ingests any viruses or parasites that are present in the blood, which are subsequently passed on to the next person the insect bites.

More than 17% of infectious illnesses are transmitted through vectors. The vectors and the VBD (Vector borne disease) control operations and preventions are implemented by the National Vector Borne Disease Control Program (NVBDCP) and National Centre for disease Control (NCDC) at national level. According to estimates, each year almost 700 million people get a mosquito-borne disease and are responsible for about 1 million deaths each year.(*MosquitoReviews*, 2022; Qureshi, 2018)

Nearly 3,500 mosquito species have been documented worldwide. There are around 400 species of mosquitoes in India alone, and nearly all of them are disease carriers. At the moment, at least one species of vector-borne pathogen infects 50% of the world's population.(Vector-borne diseases, 2020)

Dengue is one of the most rapidly spreading mosquito-borne viral diseases in the world. Dengue fever is the only mosquito-borne illness that affects 3.6 billion people globally.

The primary carrier of dengue and chikungunya is the aedes aegypti mosquito. India is one of the top 11 malaria-affected nations in the world because it is a tropical nation with ideal breeding conditions for mosquitoes.

Dengue infects over 390 million people yearly, and hundreds of millions more are afflicted with Zika, Chikungunya, and yellow fever.(Home | World Mosquito Program - Releasing hope, 2022)

Malaria, Dengue, Filariasis, West Nile virus, Chikungunya, Yellow fever, and Zika are examples of common mosquito-borne illnesses.

Zika

Zika is a virus-borne illness spread by mosquitoes. There are frequently no symptoms. Zika virus carriers who are pregnant run a significant risk of giving birth to kids who have problems like microcephaly.

Common symptoms are fever, headache, aches in joints and muscles, eye colour, rash.

Yellow fever

Around 30,000 people worldwide die from this illness each year.

Infected Aedes aegypti mosquitoes transmit the disease. It is a hemorrhagic acute viral illness. The name's yellow colour comes from the occasional occurrence of jaundice

Common symptoms are-Fever, Headache, Chills, Back pain, Fatigue and Vomiting

Chikungunya

An infectious viral disease called chikungunya infects people and is spread by infected Aedes aegypti mosquitoes. The patient's condition will usually get better within a week, although in rare occasions the joint pain may last for months or even years. Zika and dengue overlap certain clinical symptoms with chikungunya, which could lead to incorrect diagnosis in regions where these infections are common.(Mehdi et al., 2019)

The mosquito species Aedes albopictus and Aedes aegypti are responsible for the virus's human transmission. They typically bite during the day. Several species, including birds and rodents, may carry the virus [2](*Wikipedia*, 2022a)

Common symptoms are -Sudden fever, Joint and muscle pain, Rash, Headache and Fatigue.

Malaria

The plasmodium parasite, which causes malaria is spread via the bite of infected mosquitoes. Globally, in the year 2020, 241 million cases were predicted to be malaria cases.In 2020,627,000 malaria fatalities were anticipated.(Malaria, n.d.; Malaria - Symptoms and causes - Mayo Clinic, 2022)

Common symptoms are- Fever ,Chills, General feeding discomfort, Headache, Nausea, and vomiting, Diarrhoea ,Abdominal pain, Muscle or joint pain, Fatigue, Rapid breathing, Rapid heart rate, Cough (Piyaphanee et al., 2009)

Filariasis

A parasitic condition known as filariasis is brought about by an infection with roundworms of the filarioidea species. Black flies and mosquitoes, which feed on blood, are spread by these.They are a part of the helminthiases category of illnesses.

Common symptoms are:

- Elephantiasis, which is edoema with thickening of the skin and underlying tissues, is the most typical symptom of lymphatic filariasis.
- The first illness associated with mosquito bites seen was elephantiasis.
- When parasites infest the lymphatic system, the condition is called elephantiasis. This condition impacts the scrotum, vulva, breasts, legs, and arms.
- subcutaneous worms can appear with rashes, urticarial papules, arthritis, as well as hyper and hypo pigmented macules.
- River blindness (onchocerciasis) (*Wikipedia*, 2022b)

Tropical and subtropical areas frequently experience mosquito-borne diseases. The incidence is based on how different biological, ecological, social, and economic elements interact.

Table 1.1 List of mosquito borne diseases according to their vector and type of pathogen

Vector		**Disease caused**	**Type of pathogen**
Mosquito	*Aedes*	Chikungunya	Virus
		Dengue	Virus
		Lymphatic filariasis	Parasite
		Rift Valley fever	Virus
		Yellow Fever	Virus
		Zika	Virus
	Anopheles	Lymphatic filariasis	Parasite
		Malaria	Parasite
	Culex	Japanese encephalitis	Virus
		Lymphatic filariasis	Parasite
		West Nile fever	Virus

(News & Highlights :: National Center for Vector Borne Diseases Control (NCVBDC), 2022)

1.2 Know where and when the mosquitoes that spread these diseases are most commonly found

- Yellow fever, Zika, chikungunya, and dengue viruses:

- These are tropical mosquitoes who can lay their eggs in both natural and man-made environments, including on the surfaces of water storage tanks. They hatch and mature in about a week once the eggs are submerged in water.
- Adult mosquitoes live inside and outside of homes.
- These mosquitoes are most active just before and after sunrise, and they prefer to attack people during the day.
- Mosquito numbers are often low and bites can go unnoticed.
- Because these mosquitoes have evolved to coexist with people, urban areas are most at risk for severe illness epidemics.

- Malaria
  - Except for Antarctica, every continent has Anopheles mosquitoes. These mosquitoes are found not only in malaria-endemic areas but also in areas where malaria does not occur.
  - In a variety of environments, including marshes, swamps, ditches, the borders of streams, and transient rain pools, these mosquitoes lay their eggs directly on water.
  - Between dusk and dawn is when Anopheles mosquitoes are most active. Some species like indoor feeding, whereas others choose outdoor feeding.

1.3 Global Scenario

Parasites, bacteria, or viruses are the main causes of vector-borne illnesses. Each year, they account for more than 17% of all infectious diseases and result in more than 700 000 fatalities. More than one billion people worldwide contract a vector-borne disease each year, and over one million dies from it.(Vector-borne diseases, 2020).

Because of their severity and frequently fatal results, diseases spread by mosquitoes are seen as a severe threat to the public's health. Globally, it is recognized that more than half of the population is vulnerable. According to the World Health Organization (WHO), 2.1 billion people (or 80% of the total population) in the Asia and Pacific region, which includes 22 nations, are at risk of contracting mosquito-borne diseases.

1.4 Indian Scenario

Malaria, dengue, kala azar, chikungunya, filaria, Japanese encephalitis areconsidered the major mosquito borne diseases in India by NVBDCB. The communities with the favourable living conditions are where these diseases are most prevalent. These illnesses impact peri-urban, rural, and urban areas. In India, they have grown to be a severe public health issue that causes unnecessary illness and death.(*Wikipedia*, 2022b)

According to NVBDCB, about 95% of population in the country resides in malaria endemic areas. As per national programme,31 states reported 74,201 cases of dengue and 167 deaths in 2013.lymphatic filariasis is endemic in 15 states. Over 165 million people in India live in 54 endemic districts for kala azar in eastern states of India, namely Bihar, Jharkhand and west Bengal. Several chikungunya outbreaks have also been reported from different parts of the state.

1.5 Scenario in Kerala

Kerala is hyperendemic to dengue. Number of dengue cases in 2015 was4075 whereas in 2020 was 4399. Kerala recorded the highest number of dengue deaths (37) in 2017(acc to

NVBDCP). Hence, despite the efforts,dengue is still a persistent threat.

About 268 cases of malaria was reported in 2020

As per the yearly data of National VectorBorne Diseases Control Program (NVBDCP) in India in the year of 2017, a totalof 188401 cases of dengue and 325 deaths reported in India, with 19994 cases and 37 fatalities attributed to the state of Kerala. Recurrent outbreaks keep on occurring every year even after aggressive methods and newer policies. (https://timesofindia.indiatimes.com/city/thiruvananthapuram/dengue-fever-rears-its-head-again-in-the-district/articleshow/75166945.cms, 2020)

In Kerala, 11 districts are considered endemic to filariasis- Alappuzha, Ernakulam, Kannur, Kasaragod, Kollam, Kottayam, Kozhikode, Malappuram, Palakkad, Thrissur, Thiruvananthapuram.

The climatic condition in Trivandrum is said to favour the growth of these mosquitoes. In Trivandrum, monsoon season can be divided in to 4 categories

(i) post-monsoon season (January– March); (ii) summer season (April–June); (iii) southwest monsoon season (July–September); and (iv) northeast monsoon season (October–December). (Samuel et al., 2014)

1.6 Control measures

The main factors in the global decline in infection prevalence have been control measures like insecticide-treated bed nets and improvements in IRS treatment. In some places, socioeconomic progress and housing improvements have greatly aided transmission decreases(Tusting et al., 2013).

Improved housing amenities, chances to alter house designs to prevent mosquito house entry, and decreased mosquito production in and around the home are, in fact, viable interventions for the management of malaria (by removing stagnant water, by spreading awareness about the practices)

A recent development in the armory of tools against mosquitoes is the potential use of the symbiotic bacteria Wolbachia pipientis to reduce mosquito-borne illnesses. Compared to insecticide-based methods, it has the advantage of being more environmentally friendly and could potentially more cost effective. Wolbachia induced cytoplasmic incompatibility (CI) was proposed as a tool for Culex mosquito control as early as 1967 (Iturbe-Ormaetxe et al., 2011; O'Neill et al., 2019)

1.7 Programs in India

Some recent programs for control of mosquito borne diseases in India.

- Social Media Toolkit for Mass Drug Administration (MDA) 2022
- BCC/IEC Tools for Bihar, Jharkhand, UP and WB for Kala-azar
- Monthly Malaria Information System (MMIS)
- KAMIS Mobile App
- Mosquito and other Vector Control Response (MVCR) 2020
- National Guideline for Dengue case management during COVID-19 pandemic(Home :: National Center for Vector Borne Diseases Control (NCVBDC), 2022; News & Highlights :: National Center for Vector Borne Diseases Control (NCVBDC), 2022)

1.8 Risk factors

- Rapid unplanned urbanization and industrialization.
- Lack of awareness and knowledge among the population.
- Association with meteorological factors have emphasized that there are factors other than climatic conditions for dengue transmission.
- Environmental
- socio-economic
- host-pathogen interactions
- population immunological factors
- population movement(Dhiman, 2014)

1.9 Burden of dengue fever

An estimated 40 percent of the world's population, or more than 2.5 billion people, are thought to be at danger of contracting dengue fever, making it one of the mosquito-borne illnesses that spreads the fastest in the world. WHO estimates that there are more than 100 million infections each year, and 2.5% of those who are sick die. Between 2014 and 2017, there was an unacceptably rising incidence in India.

According to annual data from the National Vector Borne Diseases Control Program (NVBDCP) in India, there were a total of 188401 dengue cases and 325 fatalities reported in India in 2017. The state of Kerala was responsible for 19994 of these cases and 37 of these fatalities. Every year, recurrent outbreaks continue to take place even after regressive measures and policy implementations.

The key to controlling dengue is the adoption of a comprehensive strategy that includes consistent vector surveillance, integrated management of Aedes mosquitoes through biological and chemical control, environmental management, legislation, as well as action at the household and community levels.(Kusuma et al., 2019)

Since 1945, dengue has been recognized in India, and the typical dengue fever (DF) was primarily characterized by feverish sickness and joint symptoms. Dengue shock syndrome (DSS) and dengue hemorrhagic fever (DHF), both of which have a mortality rate of 44%, are symptoms of the severe form of the virus. The first DHF/DSS outbreak in India was identified in Delhi in 1988. However, endemic transmission of all four dengue serotypes had been documented before then (WHO 1997)(Tewari et al., 2004)

Many studies have been done worldwide to formulate tools and strategies for surveillance and control of dengue.(Wilder-Smith et al., 2012)

1.10 Dengue Fever

The dengue virus is the cause of dengue fever, a condition spread by mosquitoes. Typically, three to fourteen days after infection, symptoms appear. In some circumstances, complications can happen and lead to internal bleeding, shock, or even death. In the event of severe dengue, careful hospital monitoring is necessary. More than half of the world's population is now at risk due to the dengue virus because of the rapid increase in prevalence over the past ten years. Dengue infection claims the lives of 36,000 individuals worldwide every year.(Kusuma et al., 2019)

Common symptoms are- Extreme fever, Headache, Vomiting, Rash, joint pain lasting for up to a week.

Aedes albopictus is regarded as a secondary vector of dengue, with Aedes aegypti serving as the primary vector. The Aedes aegypti mosquito breeds primarily in natural and artificial containers and inhabits metropolitan environments. Aedes albopictus has a broad geographic range and may endure in both rural and urban settings.

Dengue fever now has the highest morbidity and fatality rates of any arboviral disease.(M.Sc MLT Lab Technician, Govt. Medical College, Trivandrum and Mathew, 2017)

Some breeding sites are- Water tanks, coconut shell, Broken vessels ,Tarpaulin sheet, Potted plant with saucer, roof gutter, banana leaf, earthen pots, egg shell, ornamental pool or fountain, septic tank outlet, toilet outlet, refrigerator tray, plastic container, tires, leaves or anything that can hold water in it

1.11 Vector density

To compare the links between vector species and their habitats, metrics such as the Breteau index, container index, and household index can be used. In comparison to the use of dengue case data based on the occurrence of asymptomatic illnesses, the data on larval density is thought to be more effective in real-time indication of a future epidemic. While the male mosquito enjoys nectar eating, the female insect loves human blood. The former travels only short distances, and the majority of the population stays within a 200-meter radius of where they first emerged. Both natural and artificial habitats appeal to them.

1.12 Objectives of the study

Major

- To measure the prevalence of mosquito borne diseases in a semiurban panchayat in Kerala.
- To understand the awareness about mosquito borne diseases with particular reference on dengue among people in a semiurban panchayat in Kerala
- To assess and know the kind of personal protective and preventive measures that they practice against mosquito bites

Minor

- To assess the larval and pupal indices to understand the extent of **dengue vector** infestation in the households
- To observe the environmental management actions for control of larval habitats.
- To assess the health care seeking behavior among households in case of fever over past 6 months.

1.13 Rationale of the study

Mosquito borne diseases are one among the major public health issue worldwide which causes major outbreak during post monsoon period. Even though many studies are conducted about mosquito borne diseases, awareness and practices, such diseases are still a threat and is causing morbidity even today. In India, according to NVBDCP, major mosquito borne diseases are dengue, malaria, chikungunya, lymphatic filariasis, Japanese

encephalitis and kala azar. It is difficult to differentiate each and every mosquito borne disease since it requires diagnosis in clinical aspects. It is often found that most of the mosquito borne diseases remain un diagnosed and untreated. Kerala is hyperendemic to dengue therefore, conducting a study to assess the awareness and personal protective practices and quantifying the risks they are exposed to become important. Hence this study is proposed to assess the Prevalence, Awareness of mosquito borne diseases and use of personal protective measures against mosquito bites.

Chapter-2

LITERATURE REVIEW

Summary and review of a few studies that are relevant for the current research topic is presented in this chapter.

In a study it was found that respondents believing that dengue has a large impact to the society were more likely to adopt protective measures. While responders residential factors affected their adoption of indoor protective measures, other socio demographic factors affected their outdoor adoption of protection (Chan et al., 2021).

Following the 2003 epidemic, Kerala began regularly reporting dengue cases. Based on the 2006 dengue cases reported in Kerala, an epidemiological surveillance was started in the areas of the Thiruvananthapuram district where dengue cases had been recorded to determine the various factors involved in dengue transmission. Larval indices were employed to estimate adult vector abundance, quantify vector breeding sites, and identify productive water container types (Samuel et al., 2014).

India's dengue disease prevalence is not well measured. Due to the insensitivity of the current public health monitoring systems, mild febrile infections are less likely to be identified and reported. The information from the private sector, where the majority of patients seek treatment, is virtually unexplored. The majority of dengue infections—roughly 75 percent—are subclinical, however surveillance systems are not built to detect them. There are no population-based studies that calculate dengue incidence in India. The burden of dengue according to age, sex, and location could be determined through well planned population-based seroprevalence investigations (Murhekar et al., 2019).

Another study showed that majority people know dengue as a mosquito borne disease, one fourth know about malaria and Chikungunya and a very few know about filarial disease. But they have no idea about other mosquito borne diseases like Zika, Japanese encephalitis(Post Graduate Student, Department of Community Medicine, Amala Institute of Medical Sciences, Thrissur, Kerala, India and S, 2020).

A study assessing the changes of vector borne diseases with changes in wetland characteristics points out that, chikungunya incidence is significantly impacted by high/medium turbid coastal lagoons and inland water-logged wetlands with aquatic vegetation, while dengue and malaria are influenced by high and medium turbid coastal beaches, respectively. The sewage, sludge, and garbage from densely populated cities and towns are the main sources of the excessive turbidity in the water. The prevalence of vector-borne diseases is favoured by the enormous area of low-lying wetland (Sheela et al., 2015).

In a study measuring prevalence of dengue, chikungunya and zika among pregnant women, it was found that 32.7% had dengue and was associated with more frequent hospitalization. (Gupta et al., 2021)This means undiagnosed cases are prevalent among high-risk categories also (pregnant women).

Another study has shown that there is a lack of effective dengue surveillance and management. It is necessary to develop creative tactics to prevent dengue infections in youngsters by focusing on schools. Studying the risk of dengue's continued geographic spread and introduction into uninfected areas is important.(Wilder-Smith et al., 2012).

Another study has shown that through interventions, spreading awareness of the root cause, studying on how symptoms are perceived, and how mosquitoes behave in terms of breeding and biting habits, the use of personal defense techniques has considerably increased. Compared to the regular program , more persons participated during the intervention. Interventions based on health education are essential for enhancing people's knowledge and behavior (Kusuma et al., 2019).

Many studies on foreign backpackers against mosquito borne diseases have been conducted. Such a study has shown that although most travelers are aware of the risk of malaria in Southeast Asia, they frequently have misconceptions about the disease and don't follow recommended precautions like avoiding mosquito bites and receiving chemoprophylaxis (Piyaphanee et al., 2009).

A study mosquito borne disease awareness among a island communities in Malayaisa demonstrated that the majority of those surveyed knew little about diseases spread by mosquitoes, and that there was a significant difference between the different ethnic groups(Shafie et al., 2016).

Several studies have shown certain typical and characteristic practices being followed by a certain group of population. Knowledge, awareness and practices can be analyzed only when a particular population is studied which would be distinct from other population.

In one of the studies done in Kerala, Thrissur, larval indices were taken. Positive containers (containing larvae) were found in 375 of the 4055 possible containers, yielding a computed Breteau Index of 76.7 percent, House Index of 44.4 percent, and Container Index of 11.5 percent. All three indicators rose from May to June before declining by

August after reaching their peaks. The most typical breeding source was plastic containers (Vaz et al., 2019).

A study was conducted among migrant labors in Kerala which showed that leishmaniasis was not present in any of the 309 migrants who had been tested; nevertheless, 3.8 percent of them tested positive for malaria, and 3.6 percent for filariasis. In Kerala, there are 2.5 million migrant workers, making the situation extremely large (George et al., 2019).

Several studies have been done critically analyzing existing larval survey tools and surveillance methods. Traditional larval indicators used in dengue surveillance are said to be a poor proxy for detecting adult emergence and have little utility in determining transmission risk. Additionally, collecting larval indices requires a lot of labour and is challenging, especially in metropolitan areas. More efficient indicators are required for dengue vector surveillance and control because to the resurgence of the illness in many countries despite decreasing indices. With the aid of effective and suitable entomological tools, extremely reliable and beneficial indices might be created (Sivagnaname and Gunasekaran, 2012).

A study analyzing the global burden of dengue diseases reported that the actual number of cases in the country were 282 times that of the number which were reported by the national vector borne diseases control programme (Shepard et al., 2014, 2016).

In a study conducted in Puducherry, it was found that even though 86 percent of the participants had heard of dengue, 68 percent of the respondents believed that rubbish and drains were dengue vector breeding grounds, demonstrating a lack of adequate understanding on the subject. Only 25% of participants were aware that clean water is an

ideal environment for breeding. There was a lack of understanding of disease symptoms, with fever (59 percent) being the most prevalent symptom (Jeelani et al., 2015).

WHO recommends school based sampling in mosquito borne diseases endemic areas. The document has suggestions, methods for planning, conducting studies/surveys, guidelines for data collection, collection of samples ,analysis ,interpretation and finally result reporting (Informing vaccination programs: a guide to the design and conduct of dengue serosurveys, 2020).

In another study with similar settings done in Thrissur, Kerala it was found that out of the 274 participants, all were aware that mosquito-borne diseases are a significant issue. Only 2.6 percent of people were aware that mosquitoes bite during the day, and only 3.2 percent are aware that mosquitoes transmit filaria. 90.9% knew that dengue was a mosquito-borne disease. Most people thought that drains are where mosquitoes breed. The majority of responders protect themselves personally from mosquitoes by using mosquito nets. For most participants, health education serves as their primary information source(Post Graduate Student, Department of Community Medicine, Amala Institute of Medical Sciences, Thrissur, Kerala, India and S, 2020).

In a qualitative study done among malaria endemic areas have shown that a very crucial and sustainable intervention against malaria in the long term is improved socio economic status (Tusting et al., 2013) .

In a study conducted in Vietnam among livestock keeping and not keeping population, it was found that farmers were more likely than office workers to practice better preventive

measures (p 0.05). Improved knowledge was correlated with better MBD prevention strategies (p 0.001) (Nguyen-Tien et al., 2021).

Many studies have observed that rapid urbanistaion,climate change, increased population density and ineffective policy implementation as the root causes the mosquito borne diseases (Gubler, 2011; Struchiner et al., 2015).

In a study done in Haiti, it was found that in the urban clinic, 88 patients had a vector-borne illness, whereas there were none found in the rural population. It meant that despite the rural clinic's inefficiency for mosquito-borne disease prevention, no vector-borne diseases were observed there. This could be due to the under reporting of cases (Dickstein et al., 2014).

CHAPTER-3

METHODOLOGY

This chapter consists of information about the, Research design, Research setting, Sampling procedure and strategy, Methods and tools for data collection, Major concepts used, Data processing and data analysis and Ethical considerations.

3.1 Research Design

The aim of the study was to understand the prevalence of mosquito borne diseases, awareness and practices followed against mosquito bites and mosquito borne diseases in a semi urban grama panchayat. For this purpose, a Quantitative cross-sectional study was done.

3.2 Research Setting

The study was conducted in Karakulam grama panchayat, Trivandrum, Kerala. It is a semi urban panchayat. There are 23 wards in Karakulam grama panchayat. The first house was chosen at random from each ward and 18 houses were taken by cluster sampling from each ward.

3.3 Sampling Procedure and Strategy

Sample size -Assuming prevalence of mosquito borne diseases in the population to be 12%, with a design effect for cluster survey as 2, to a get a 95% Confidence interval with 5% precision, the minimum sample size was estimated as 325.

Sample size taken: 414

Sample selection-All 23 wards were selected for data collection. The first house was chosen at random from each ward and 18 houses were taken by cluster sampling from each ward. Any one member above the age of 18 years from the selected house was chosen at random.

3.4 Inclusion criteria

- Resident aged more than or equal to 18 years and staying at Karakulam panchayat for at least 6 months.
- A typical household defined as a residential house owned or rented and occupied by one or more than one family, sharing a common kitchen
- Any one adult household member selected at random

3.5 Exclusion criteria

- Not a resident for a period of time 6 months

3.6 Methods and tools for Data collection

Quantitative data was collected using a structured interview schedule from the 414 household members. Self-prepared tool was used. Responses were marked accordingly by the principle investigator. Any one member above the age of 18 years was chosen at random.

3.7 Study tools

The cross-sectional survey was conducted using an interview schedule which was developed for this study based on the conceptual framework, reviewed literature. The interview schedule was translated into Malayalam.

3.8 Data collection

Data collection was done by the investigator alone. Written informed consent was sought from the respondents before proceeding with the survey. Responses where collected via structured interview schedule from the 414 household members. 18 household members were studied from each ward.

3.9 Data Processing and Analysis-

Data were edited for completeness, accuracy and consistency. Data analysis was done using IBM SPSS for Windows software version 25. Statistical methods like Means, Standard Deviations, Medians, Percentages were used to summarize variables whereas Cross-Tabulation was done to compare proportions and Chi square tests was done. Logistic regression was done to find adjusted Odds Ratios.

Larval indices were calculated based on the following formulae:

$$\textbf{House index (HI)} = \frac{\textbf{Number of positive houses infected}}{\textbf{Total number of houses inspected}} \times 100$$

$$\textbf{Container index (CI)} = \frac{\textbf{No. of positive containers infested}}{\textbf{Total number of containers inspected}} \times 100$$

Breteau index (BI) = No of positive containers X 100

Total number of houses inspected

3.10 Ethical Considerations

The study was approved by the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum.

Participants were explained about the nature and purpose of the study and their written consent was taken.

The participants were told that, there are no direct benefits for the participants by involving in this study. However, from public health point of view, the information may prove to be of great importance with respect to understanding the prevalence and awareness level of the community against mosquito bites and diseases.

Anonymity of the participants was ensured.

CHAPTER-4

RESULTS AND EXPLANATIONS

This chapter discusses the data collected from the participants which has been analyzed to measure the prevalence, understand the awareness and practices against mosquito bites and mosquito borne diseases. Data has been analyzed across different variables for prevalence, awareness and practices and an attempt has been made to understand the relationship between the prevalence, awareness and practices and the associated variables.

A total of 414 households were involved in the study from Karakulam grama panchayat. Self-reported prevalence of dengue among any household member over past 6 months was recorded.

1.Sociodemographic characteristics

Table 4.1- Sociodemographic characteristics of the participants

VARIABLES	CATEGORIES	N	PERCENTAGE
Age (years)	19-34	94	22.7
	35-49	136	32.9
	50-65	135	32.6
	66 and above	49	11.8
Sex	female	244	58.9
	male	170	41.1
Education	unsure	4	1

	highschool	121	29.2
	higher secondary	104	25.1
	graduate	185	44.7
Current occupation	unemployed	71	17.1
	student	15	3.6
	self employed	59	13.5
	government employed	53	12.8
	private employee	71	17.1
	homemaker	137	33.1
	labourer	8	1.9
Number of household members	0-4	271	65.5
	5-8	139	33.6
	9-12	4	1
Religion	christian	110	26.6
	hindu	268	64.7
	muslim	30	7.2
	refused to answer	6	1.4
Main material of the floor	natural	2	0.5
	cement	80	19.3
	ceramic tiles	189	45.7
	polished stone/marble/granite	143	34.5
Main material of the roof	tiles/asbestos sheet	73	17.6
	fibre/cement/concrete	341	82.4
Main material of	brick	16	3.9

the wall	concrete	8	1.9
	cement blocks	34	8.2
	brick with lime/cement	356	86
Type of house	kutcha	1	0.2
	semi pukka	2	0.5
	pukka	411	99.3
Kind of water storage facility in the house	drum/bucket	29	7
	well water	44	10.6
	tank	340	82.1
	other	1	0.2
Type of drainage facility of households	closed drainage	414	100
Type of toilet facility	flush/pour flush toilet	414	100
What is the main source of drinking water	well water	157	37.9
	pipe water	104	25.1
	bore well	12	2.8
	pipe water and well water	111	26.8
	pipe water and bore well	30	7.2

The data were collected from 414 household members from Karakulam grama panchayat. 32.9% of participants belong to the age group of 35 to 49. 32.6% belong to 50-65 age group.22.7% belonged to the age group 19-34 and 11.8% were 65 and above.

Out of the 414 participants, 58.9% were females and 41.1% were males.

Majority of the participants were graduates which constituted to about 44.7% .29.2% had education till high school and 25.1% had education till higher secondary.

One third was homemakers. 17.1% were unemployed. 1.9% were students.

65.5% of the household had less than 5 members, 33.6% had 5 to 8 members and only 1% had more than 8 members.

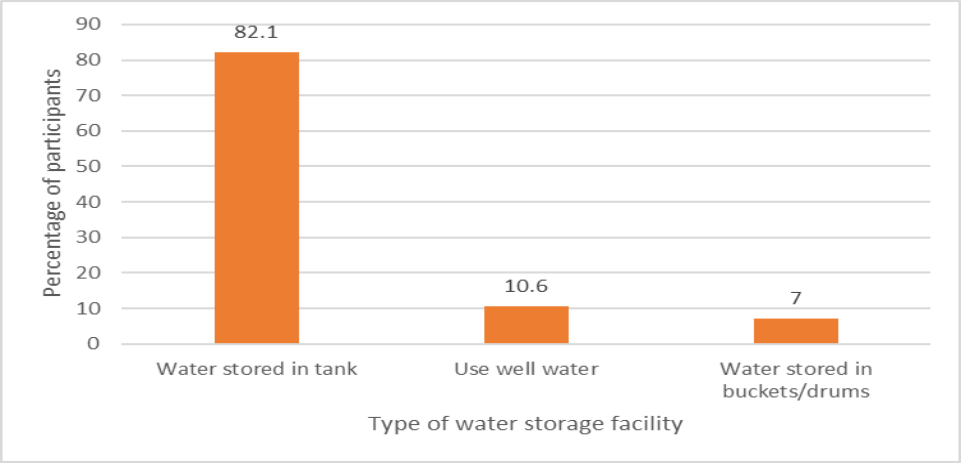
Majority of the participants were Hindus which constituted about 64.7%.

Most of the households had Ceramic tiles (45.7%) followed by Polished stone/marble/granite as the main material of the floor (34.5%).

82.4% had concrete, fiber or cement (82.4%) as the main material on the roof. Only 17.6 % had tiles, asbestos or sheet.86% had brick with lime or cement as the main material on the walls.

A majority 99.3% had pukka house, that is 411 out of 414 households.Majority of the households use tanks for water storage which constituted to about 82.1%. The main source of drinking water is well water which was about 37.9% followed by those who used both well and pipe water which was about 26.8%. 25.1% used only pipe water for drinking purposes. 2.8% used bore well and 7.2% used both bore well and well water for drinking purposes.

Graph 4.1 Bar chart showing main water storage facility in the households

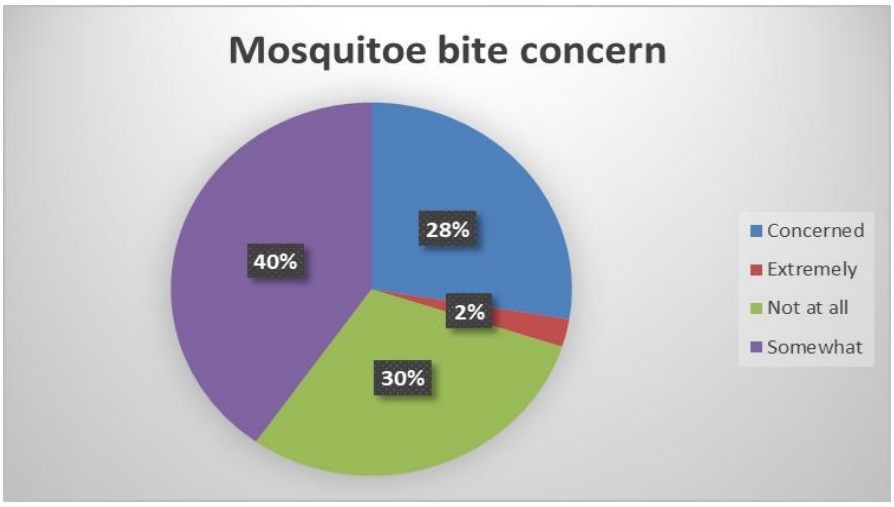


2.Mosquito borne diseases and awareness

Table 4.2 Whether mosquito is a problem or not

Variables	Categories	N	Percentage
Mosquitoes a problem or not	Problem	255	61.6
	Not a problem	159	38.4

Graph 4.2 Graph showing how much concerned households were about mosquito bite and associated diseases



61.6% of the household members thought mosquitoes are a problem in the area they live. Remaining 38.4% of the household members thought mosquitoes were not a problem.

Table 4.3 Table showing awareness about diseases caused by mosquito bites

VARIABLES	CATEGORIES	N	PERCENTAGE
Identification of diseases spread by mosquitoes	Dengue	414	100
	Malaria	364	87.9
	Chikungunya	343	82.9
	AIDS	9	2.2
	Chickenpox	31	7.5
	Mumps	48	11.6
	Filariasis	83	20.0
	Zika	73	17.6

The data showed that all the 414 households knew dengue was caused due to mosquito bite.

About 87.9 % and 82.9% knew that Malaria and Chikungunya was caused by mosquitoes respectively.17.6% of the participants knew Zika was caused due to mosquitoes.

2.2% thought that AIDS was caused due to mosquito bites.7.5% thought chickenpox was due to mosquitoes and 11.6 % thought Mumps could be spread by mosquitoes and 20% knew filariasis was due to mosquito bites.

Table 4.4 awareness about mosquito breeding sites

VARIABLES	CATEGORIES	N	PERCENTAGE
Most common breeding site	Storm water drain	296	71.5
	Water tank	189	45.7
	Stagnant clean water	339	81.9
	Wetlands	75	18.1
	Domestic containers	234	56.5
	Natural collections	201	48.6
	Stagnant polluted water	379	91.5
Time when mosquito bites are common in the area	Early morning	51	12.3
	Afternoon	5	1.2
	Evening	401	96.9
	Night	3	0.7

91.5% believed that the most common breeding site was stagnant polluted water followed by storm water drain (71.5%). Only 18.1% thought that wetlands are breeding sites.56.5% and 48.6% considered domestic containers and natural collections as breeding sites respectively.

96.9% of the households reported that mosquito bites were high during evening time followed by 12.3% who thought bites were high early morning. Only 0.7% thought bites were high during night.

Table 4.5 source of information and awareness about mosquito bite patterns

VARIABLES	CATEGORIES	N	PERCENTAGE
Time at which the respondents thought the bites spread disease	Morning	63	15.2
	Afternoon	13	3.1
	Evening	278	67.1
	Night	41	9.9
	All of the above	93	22.5
How often get bitten by mosquitoes inside home	Almost never	12	2.9
	Rarely	91	22
	Sometimes (once a week)	194	46.9
	Often (more than one bite per day)	115	27.8
Preventive practices against mosquito bites	Prevent stagnant water	269	65
	Burning of incense, leaves, agarbattis	293	70.8
	Mosquito bats	113	27.4
	Window and door nets	38	9.2
Time of the day such preventive measures are used	Day only	9	2.2
	Night only	10	2.4
	Both day and night	252	60.9
	None	152	36.7
Source of information regarding mosquito bite and associated diseases	News paper	374	90.3
	Health department	316	76.3
	Asha worker	218	52.7
	Television/Radio	354	83.3
	Internet	126	30.4

67.1 % of the respondents reported that they thought mosquito bite spread diseases during evening.22.5% thought that bites spread diseases all the time.

Majority of the respondents reported that they get bitten by mosquitoes once a week, inside their home which was about 46.9%.27.8% said that they get bitten mosquitoes more than one time every day.

70.8% used burning of incense, leaves and agarbattis as a preventive practice against mosquito bites in their households.65% reported that they prevent stagnant water in order to reduce mosquito breeding.27.4% used mosquito bats while 9.2% used window and door nets.

60.9% used such preventive measures both day and night.

90.3% household members reported to have acquired knowledge about mosquito bites and associated diseases from newspapers followed by TV/Radio which constituted 83.3%. 76.3% reported to have acquired the knowledge from health department while 52.7% reported that knowledge was obtained about mosquito borne diseases from Asha workers. only 30% of the population chose internet as a source of information.

3. Preventive measures against mosquito bites and mosquito borne diseases taken by LSGD, health authority and ASHA worker

Table 4.6 Preventive measures by LSGD, health authority and ASHA worker

VARIABLES	CATEGORIES	N	PERCENTAGE	
Did LSGD took any preventive measures.	Yes No	116 298	28 72	

	Did health authority take any preventive measures.	Yes No	16 398	3.1 96.1	
	Does the Asha worker observe dry day every month	Yes No	114 300	27.5 72.5	

28% of the respondents chose those preventive measures against mosquito bites and mosquito borne diseases were taken by LSGD. Only 3.1% responded that preventive measures were taken by health authority.

About 27% respondents said that Asha workers visited every month to check dry day every month.

4.Dengue awareness

Table 4.7 Awareness specific to dengue

VARIABLES	CATEGORIES	N	PERCENTAGE
How is dengue spread from one person to another	Mosquito bite	414	100
	Airborne	71	17.1
	Blood transmission	252	60.9
	Water borne	63	15.2
Type of mosquito causing dengue	Aedes	141	34.1
	Anopheles	24	5.8
	Culex	56	13.5
	Don’t know/Others	193	46.6

Households who could identify dengue causing mosquito	Could identify	169	40.8
	Could not identify	245	59.2
When was aedes active to bite	Day time	137	33
	Evening and night	86	20.8
	Any time	1	0.2
	Do not know	190	45.9
Symptoms of dengue fever	High fever	414	100
	Muscle and joint pain	245	59.2
	Chills	212	51.2
	Headache	247	59.7
	Extreme fatigue	211	51
	Loss of appetite	116	28
	Diarrhoea	102	24.6
	Nausea/vomiting	166	40.1

Questions were asked specific to dengue as Kerala is hyperendemic to dengue despite the preventive measures and programs undertaken. Awareness about dengue causing mosquito and how they spread were asked.

All the household members were aware that dengue was caused due to mosquito bite. But some people reported that dengue could be air borne (17.1%). 15.2% reported that dengue can spread via water sources or drinking water.

About 34% of the respondents could identify aedes as the dengue causing mosquitoes. About 47% did not know the kind of mosquito spreading dengue.40.2% households said they could identify the aedes mosquito but only very few respondents could correctly identify the patterns of aedes mosquito. About 60% said that they could not identify aedes mosquito.

About 46% of the respondents did not know when aedes was active to bite.33% identified that aedes bite only during day time while 20.8% said that aedes was active to bite at evening and night.0.2% said that aedes can bite any time of the day.

All the respondents could identify fever as a symptom of dengue fever. Headache, muscle and joint pain were identified as a symptom by about 60% of the respondents.

5 Prevalence of any fever over past 6 months

Table 4.8 Prevalence of fever over past 6 months for any household member

VARIABLES	CATEGORIES	N	PERCENTAGE
Whether any member had fever or not	Yes	227	54.8
	No	187	45.2
Diagnosis	Viral fever	31	13.5
	Covid 19	154	67.2
	Undiagnosed Fever	42	18.3

Data were collected regarding occurrence of fever over past 6 months.54.8% reported that at least any one household had fever over past 6 months.67.2% of the cases were Covid 19,13.5% were viral fever and undiagnosed fever constituted to about 18.3%.

6.Awareness about mosquito breeding sites inside and outside house

Table 4.9 awareness about mosquito breeding sites

VARIABLES	CATEGORIES	N	PERCENTAGE
Place where aedes mosquito breed inside house	Fridge tray	238	57.5
	Water container	352	85
	Opened water tanks	275	66.4
	Flower pot trays	216	52.2
Place where aedes mosquito breed outside the house	Flower leaves	183	44.2
	Abandoned tires	347	83.8
	Roof gutter	222	53.6
	Garbage	86	20.8

Inside the house, 85% reported that mosquitoes breed in water containers. 66.4%respondents believed that mosquitoes breed in open water tanks. 57.5% reported that fridge tray with stagnant water was a breeding site inside house while flower pot was reported as breeding sites by 52.2%.

Outside the house,83.8% believed that abandoned tires with stagnant water may be breeding sites, flowering leaves were believed as breeding sites by 44.2% and abandoned tires were reported by about 84%. Only 20.8% reported garbage dumps as breeding sites.

7. Practices done by household members-

Table 4.10 Practices done by household members

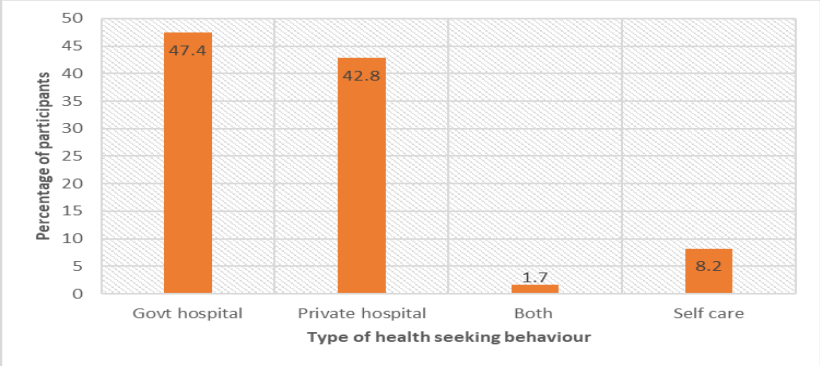
VARIABLES	CATEGORIES	N	PERCENTAGE
Vase/pot water change every week or not	Changed every week	62	15
	not every week	352	85
Drains checked for block every week or not	Checked	30	7.2
	not checked	384	92.8
Water from fridge tray changed every week or not	Change	105	25.4
	do not change	309	74.6
Water collections inside and outside house changed every week	Changed	326	78.7
	not changed	88	21.3

15% of the respondents reported that vase/pot water was changed every week while 85% did not change them every week.

Only 7.2% checked for blocks in drain every week while the majority of 92.8% did not check drains every week.

25.4% reported that they changed water from fridge every week but majority of respondents. That is, about 75% did not. About 79% respondents changed water collections inside and outside house every week while only 21.3% reported otherwise.

Graph 4.3 Type of health seeking behaviour in case of fever over past 6 months



47.4% of the population visited government hospital in case of fever over past 6 months.42.8% visited private hospitals while 1.7% visited both private and government health care facilities. Around did not go to hospitals for treatment. They opted self-care.

AWARENESS

Questions related to awareness were asked. Scores were given from 0-33.67th percentile(score=21) of the score was used to categorise awareness to good and poor. Awareness scores of both mosquito borne diseases and score specific to dengue awareness were added.

Good awareness- >/=21

Poor awareness- <21

Table number 4.11. Descriptive summary of the awareness scores

Mean	19.01
Median	19
Mode	18

Standard deviation	4.39
Minimum	7
Maximum	33
Percentile (66.7%)	21

Table4.12. Table showing frequency of awareness level among households

	Number of households	Percentage
Poor awareness	298	72.7
Good awareness	112	27.3

PRACTICES

Questions related to practices against mosquito bites and mosquito borne diseases were asked. Scores were given from 0-4. 67th percentile (Score=2) of the score was used to categorise practice to good and poor.

Good practice- >2

Poor practice-</=2

Table 4.13. Descriptive summary of the practice score

Mean	1.26

Median	1
Mode	1
Standard deviation	0.824
Minimum	0
Maximum	4
Percentile(66.7%)	2

Table 4.14. Table showing practice score and number of respondents with the score

Practice score	Number of respondents with the score
0	69 (16.7)
1	196 (47.3)
2	122 (29.5)
3	25 (6)
4	2 (0.5)

In the following section, the results of the comparisons of various associated factors with prevalence of fever is presented

Association between prevalence of fever and age

Table 4.15 Association between prevalence of fever and age

	Categories	**N**	**n**	**Percentage**	**P**

					value
Age (Years)	**19-34**	**94**	**50**	**53.2**	**0.805**
	35-49	**136**	**73**	**53.7**	
	50-65	**135**	**74**	**54.8**	
	66 and above	**49**	**30**	**61.2**	

Table above represents association between prevalence of fever over past 6 months and age of the participants. Among those who had fever over past 6 months, majority fall in the age group of 50 to 65 and 35 to 49 years. Also, we can see that among the age group of 66 and above, out of 49 individuals studied, 30 individuals had fever over past 6 months (61.2%).

On analysis no significant association was found between age group and prevalence of fever at p value > 0.05

Association between prevalence of fever and sex-

Table 4.16. Association between prevalence of fever and sex

	Categories	**N**	**n**	**Percentage**	**P value**
Sex	Female	244	138	56.6	0.398
	Male	170	89	52.4	

Table above represents association between prevalence of fever and sex of the person. Out of the 414 households studied, 56.6% females had fever over past 6 months and 52.4% men had fever past 6 months.

On analysis no significant association was found between sex and prevalence of fever at p value > 0.05

Association between prevalence of fever and education-

Table 4.17. Association between prevalence of fever and education

	Categories	N	n	Percentage	P value
Education	Unsure	4	2	50	0.308
	Highschool	121	59	48.8	
	Higher secondary	104	56	53.8	
	Graduate	185	110	59.5	

Table above shows association between education status and prevalence of fever. About 60% of the household members who were graduates reported to have had fever any time over past 6 months.

Association between prevalence of fever and current occupation-

Table 4.18. Association between prevalence of fever and current occupation

	Categories	N	n	Percentage	P value
Current Occupation	Unemployed	71	47	66.2	0.370

	Student	15	10	66.7	
	Self employed	59	29	49.2	
	Government employed	53	29	54.7	
	Private employee	71	37	52.1	
	Homemaker	137	70	51.1	
	Labourer	8	5	62.5	

Table above shows association between current occupation and prevalence of fever. It is found that prevalence was high among students, those who were unemployed and labourers which was close to 65% each.

On analysis no significant association was found between participants with higher education status and with prevalence of fever at p value > 0.05.

Association between prevalence of fever and number of household members-

Table 4.19. Association between prevalence of fever and number of household members

	Categories	N	n	Percentage	P value
Number of household members	0-4	271	136	50.2	0.008
	5-8	139	87	62.6	
	9-12	4	4	100	

Table above shows association between prevalence of fever and number of household members. It was found that those houses with a greater number of members had higher prevalence of fever. 62.6% of participants with household members 5 to 8 had fever over past 6 months and 100% of the participants with 9 to 12 members had fever over past 6 months.

On analysis significant association was found between prevalence of fever and number of household members at p value < 0.05

Association between prevalence of fever and socio-economic status-

Table 4.20. Association between prevalence of fever and socio-economic status

Variables	Categories	N	n	Percentage	P value
Main material of the roof	Cement/Fibre/concrete	341	178	52.2	0.020
	Tiles/asbestos sheet	73	49	67.1	

Table above shows association between prevalence of fever and main material on the roof which is an indicator of the socio-economic status. As seen from the table, those households with lower socio-economic status or those with tiles/asbestos sheet as main material of the roof (67.1%) had higher percent of prevalence than those with cement/fibre/concrete as the main material of the roof (52.2%).

On analysis significant association was found between prevalence of fever and socio-economic status (main material on the roof) members at p value <0.05

Association between prevalence of fever and awareness against mosquito bites and mosquito borne diseases-

Table 4.21. Association between prevalence of fever and awareness against mosquito bites and mosquito borne diseases

	Categories	N	n	Percentage	P value
Awareness	>20	112	67	59.8	0.214
	</=20	302	160	53	

The table above shows that more than half of the households with an awareness score of 20 and above had fever over past 6 months while about 53% of the households who had awareness score less than or equal to 20 had fever over past 6 months.

On analysis no significant association was found between prevalence of fever and awareness of household members at p value > 0.05

Association between prevalence of fever and practices against mosquito bites and mosquito borne diseases-

Table 4.22_Association between prevalence of fever and practices against mosquito bites and mosquito borne diseases

	Categories	N	n	Percentage	P value
Practice	Good practice	27	16	59.3	0.632

	Not good practice	287	211	54.5	

The table shows that among those household members who had good practice about 60% had fever over past 6 months and among those members who did not have good practice, about 55% had fever over past 6 months.

On analysis significant association was found between prevalence of fever and practices of household members at p value > 0.05

Association of awareness with age –

Table 4.23. Association of awareness with age

	Categories	**N**	**n**	**Percentage**	**P value**
Age (years)	19-34	94	37	39.4	0.025
	35-49	136	32	23.5	
	50-65	135	32	23.7	
	66 and above	49	11	22.4	

Table above shows that awareness is comparatively higher among 19 to 34 age group.

39.4% of respondents within age group 19-34 had good awareness against mosquito bites and diseases while only 22.4% respondents with 66 and above age group had good awareness. The percentage slightly decreases with an increase in age

On analysis no significant association was found between awareness and age group of household members at p value > 0.05

Association of awareness with sex-

Table 4.24. Association of awareness with sex

	Categories	N	n	Percentage	P value
Sex	Female	244	81	33.2	0.001
	Male	170	31	18.2	

Table above shows that females have higher awareness than males about mosquito bites and associated diseases. About 33% of females had higher awareness whereas only 18% men had good awareness.

On analysis significant association was found between awareness and age group of household members at p value < 0.05

Association of awareness with education-

Table 4.25. Association of awareness with education

	Categories	N	n	Percentage	P value
Education	Unsure	4	0	0	P<0.001
	Highschool	121	21	17.4	
	Higher secondary	104	22	21.2	
	Graduate	185	69	37.3	

Table shows that awareness increases with the increases in education level. Among graduates, 37.3% had good awareness while it is reduced to 21.2% in those with education uptil higher secondary education. Further, it becomes 17.4% in those with education till high school and finally those who were unsure till what class they studied;

the percentage of good awareness is decreased to 0. On analysis significant association was found between awareness and age group of household members at p value < 0.05

Association of awareness with current occupation-

Table 4.26. Association of awareness with current occupation-

	Categories	**N**	**n**	**Percentage**	**P value**
Current occupation	Unemployed	71	17	23.9	0.012
	Student	15	5	33.3	
	Self employed	59	7	11.9	
	Government employed	53	20	37.7	
	Private employee	71	15	21.1	
	Homemaker	137	47	34.3	
	Labourer	8	1	12.5	

The table above shows that 37.7% of those who had government job had good awareness which was followed by homemakers, which constituted to about 34.3%. Only 12.5% of laborers had good awareness.

On analysis significant association was found between awareness and age group of household members at p value < 0.05

Association of awareness with socio economic status-

Table 4.27. Association of awareness with socio economic status

	Categories	N	n	Percentage	P value
Main material on the floor	Natural	2	0	0	0.003
	Cement	80	15	18.8	
	Ceramic tiles	189	43	22.8	
	Polished stone/marble/granite	143	54	37.8	

The tables shows that 37.8% of those who had main material on the floor as polished stone/marble/granite had good awareness which indicates the socio-economic status of the houses. Among those who had ceramic tiles and cement as material on the floor, 22.8% and 18.8% had good awareness. We can see that as the socio-economic status is increased there is increased awareness.

A Fisher's exact test suggests that there is significant association found between main material on the floor (socio economic status) and awareness at p value < 0.05.

Association of awareness with main material on the floor (socio economic status)

Table 4.28. Association of awareness with main material on the floor (socio economic status)

	Categories	N	n	Percentage	P value
Main material of the roof	Cement/fibre/concrete	341	103	30.2	0.002
	Tiles/asbestos sheet	73	9	12.3	

This table shows that among those households with tiles/asbestos sheet as the main material on the roof, only 12.3% had good awareness. Among those with cement/fibre/concrete as the main material on the roof (better socioeconomic status),30.2% had good awareness.

Association of practices with age

Table 4.29. Association of practices with age

	Categories	N	n	Percentage	P value
Age (years)	19-34	94	10	10.6	0.299
	35-49	136	8	5.9	
	50-65	135	6	4.4	
	66 and above	49	3	6.1	

The table above shows the association between practice and age group. Good practices were found to be more among the age group 19 to 34 followed by those with age of 66 and above. With an increase in age, there was a slight decrease in good practice.

Association of practices with sex

Table 4.30 Association of practices with sex

	Categories	N	n	Percentage	P value
Sex	Female	244	21	8.6	0.040
	Male	170	6	3.5	

The values in the table shows that as compared to males, females tend to follow good practice more than men.

Association of practices with education

Table 4.31. Association of practices with education

	Categories	N	n	Percentage	P value
Education	Unsure	4	0	0	0.451
	Highschool	121	6	5	
	Higher secondary	104	5	4.8	
	Graduate	185	16	8.6	

The values in the table shows that those with higher education follow good practices. Here, 8.6% of graduates follow good practices while about 5% of people with higher secondary education and high school education follow good practices, but not statistically significant.

Association of practices with current occupation

Table 4.32. Association of practices with current occupation

	Categories	N	n	Percentage	P value
CURRENT	Unemployed	17	3	4.2	0.510
OCCUPATION	Student	15	0	0	
	Self employed	59	2	3.4	
	Government	53	4	7.5	

employed			
Private employee	71	5	7
Homemaker	137	13	9.5
Labourer	8	0	0

The table show that current occupation had no association with the kind of practices they follow. About 10% of homemakers follow good practices while about 7% of private and government employees follow good practices. Whereas, none among the labourers follow good practices.

Association of practices with religion-

Table 4.33. Association of practices with religion-

	Categories	**N**	**n**	**Percentage**	**P value**
Religion	Refused to answer	6	2	33.3	0.024
	Hindu	268	21	7.8	
	Christian	110	3	2.7	
	Muslim	30	1	3.3	

The table above showed an association with the practices followed and the religion of the person. Among the Hindus, 7.8% followed good practices. Among the Christians, 2.7% followed good practices and among Muslims, 3.3% followed good practices.

Association of practices with undiagnosed fever-

Table 4.34. Association of practices with undiagnosed fever

Categories	**N**	**n**	**Percentage**	**P value**

Undiagnosed fever	Yes	42	7	16.7	0.011
	No	187	10	5.3	

This table shows the association between cases of undiagnosed fever and practices. Among those who had undiagnosed fever, 16.7% followed good practices and among those who did not have undiagnosed fever only 5.3% followed good practices.

Association of practices with awareness against mosquito bites and mosquito borne diseases-

Table 4.35. Association of practices with awareness against mosquito bites and mosquito borne diseases

	Categories	**N**	**n**	**Percentage**	**P value**
Awareness	Good awareness	154	139	90.3	0.041
	Poor awareness	260	248	95.4	

This table shows that among those who had good awareness, 90.3% followed good practices and 95.4% of those who had poor awareness followed good practices.

Association between self-care and age

Table 4.36. Association between self-care and age

	Categories	**N**	**n**	**Percentage**	**P value**
Age	19-34	50	3	6	0.116

	35-49	74	15	20.3	
	50-65	74	13	17.6	
	66 and above	31	3	9.7	

From the table we can see that majority of 20.3% from the age group 35 to 49 seek self-care in case of fever.17.6% of the population belonging to the age group of 50 to 65 seek self-care in case of fever and only 6% and about 10% from the age group 19 to 34 years and 66 and above respectively seek self-care in case of fever over past 6 months.

The association was not significant but from the table we can see that those in the age group of 35 to 49 seek more self-care in case of fever.

Association between self-care and sex

Table 4.37. Association between self-care and sex

	Categories	**N**	**n**	**Percentage**	**P value**
Sex	Female	138	20	14.5	0.853
	Male	91	14	15.4	

This table shows that both females and males had almost equal chances for opting for self-care in case of fever.

Association between self-care and education

Table 4.38. Association between self-care and education

	Categories	N	n	Percentage	P value
Education	Unsure	2	1	50	0.045
	Highschool	60	13	21.7	
	Higher secondary	57	10	17.5	
	Graduate	110	10	9.1	

The above table shows that with an increase in level of education, there was a decrease in opting for self-care in case of fever.

Association between self-care and current occupation

Table 4.39. Association between self-care and current occupation

	Categories	N	n	Percentage	P value
Current Occupation	Unemployed	47	7	14.0	0.171
	Student	10	0	9	
	Self employed	29	6	20.7	
	Government	30	2	6.7	
	employed	37	5	13.5	
	Private employee	70	11	15.7	
	Homemaker	6	3	50	
	Labourer				

The table shows that 50% of the labourers tend to seek self-care in case of fever.20.7% of self-employed people seek self-care in case of fever and 15.7% of homemakers seek self-care in case of fever.

Association between self-care and those who had undiagnosed fever

Table 4.40. Association between self-care and those who had undiagnosed fever

	Categories	N	n	Percentage	P value
Among those who had fever-undiagnosed	Yes	42	25	59.5	P< 0.001
	No	187	9	4.8	

Among those who had undiagnosed fever, about 60 % eek self -care.

Association between self-care and those who were diagnosed with covid 19

Table 3.41. Association between self-care and those who were diagnosed with covid 19

	Categories	N	n	Percentage	P value
Diagnosed as viral covid 19	Yes	154	7	4.5	P<0.001
	No	75	27	36	

Among those cases which were diagnosed as covid 19, only 4.5 cases seek self-care

Association between self-care and awareness

Table 4.42. Association between self-care and awareness

	Categories	N	n	Percentage	P value
Awareness	<=20	134	24	17.9	0.122
	>20	95	10	10.5	

The table shows that among those who had less awareness,17.9% seek self-care and among those who had good awareness, only 10.5% seek self-care.

Factors associated with Prevalence of fever: Result of multivariate analysis using binary logistic regression analysis.

Table 4.43 Factors associated with prevalence of fever

VARIABLE	UNADJUSTED OR (95% CI)	P VALUE	ADJUSTED OR((5%CI)	P VALUE
NUMBER OF HOUSEHOLD MEMBERS				
• **0-6**	Reference category			
• **7-12**	2.89(1.21-6.91)	0.016	3.05(1.2-7.3)	0.013
MAIN MATERIAL OF THE ROOF				
• **CEMENT/FIBRE/CONCRETE**	Reference category			
• **TILES/ASBESTOS SHEET**	1.87(1.09-3.18)	0.021	2.15(1.24-3.73)	0.006
AWARENESS				
• **</=20**	Reference category			
• **>20**	1.561(1.041-2.343)	0.031	1.78(1.17-2.7)	0.007

OR –Odds Ratio; CI- Confidence Interval

Logistic regression was done to find association of prevalence of fever and number of household members (categorised as 0-6 and 6-12). Houses with number more than 6 had 3.05 more odds to have fever than houses with 0 to 6 members.

Socioeconomic status- Members with Tiles/asbestos sheet had 2.15 more odds of having fever than those who had cement/fibre /concrete as material on the roof.

Also, households with good awareness had 1.78 more odds of getting fever as compared to those with awareness score less than or equal to 20.

Factors associated with awareness against mosquito borne diseases and mosquito bites: Result of multivariate analysis using binary logistic regression analysis

Table 4.44. Factors associated with awareness against mosquito borne diseases and bites

VARIABLE	UNADJUSTED OR (95% CI)	P VALUE	ADJUSTED OR (95%CI)	P VALUE
AGE				
• **19-34**	Reference cat		Reference cat	
• **35-49**	0.47(0.26-0.84)	0.011	0.618(0.33-1.11)	0.12
• **50-65**	0.47(0.27-0.84)	0.012	0.72(0.38-1.37)	0.32
66 AND ABOVE	0.44(0.20-0.98)	0.045	1.003(0.39-2.5)	0.99
SEX				
• **FEMALE**	Reference	0.000	0.43(0.26-	0.001
• **MALE**	category		0.71)	

	0.44(0.28-0.71)			
EDUCATION				
• **HIGHSCHOOL**	0.441(0.269-0.732)	0.99	0.00	0.99
• **HIGHER SECONDARY**	0.353(0.20-0.61)	0.001	0.40(0.21-0.75)	0.005
• **GRADUATE**	Reference category			
MAIN MATERIAL OF THE ROOF				
• **CEMENT/FIBRE/CONCRETE**	Reference category	0.003	0.33(0.15-0.72)	0.005
• **TILES/ASBESTOS SHEET**	0.32(0.15-0.67)			

OR –Odds Ratio; CI- Confidence Interval

Logistic regression was done to establish association of awareness with age group. It was found that there was 0.47 less odds of good awareness among age group 35 to 49 and 50 to 65 as compared to the age group of 19 to 34 years. Also, those belonging to the age group of 66 and above had 0.44 less odds of having good awareness as compared to those

belonging to the age group of 19 to 34. The association was not significant in multivariate analysis.

Test to find the association of awareness with sex was done which showed that with reference to females, males had lesser awareness about mosquito borne diseases.

Those with higher secondary education had 0.4 less odds of having awareness than graduates. The association was significant in multivariate analysis.

Socioeconomic status- Members with Tiles/asbestos sheet had 0.33 less odds of awareness than those who had cement/fibre /concrete as material on the roof. This association was also significant in multivariate analysis

Factors associated with Practices against mosquito bites and associated diseases: Result of multivariate analysis using binary logistic regression analysis.

Table 4.45. Factors associated with practices against mosquito bites and associated diseases

VARIABLE	UNADJUSTED OR (95% CI)	P VALUE	ADJUSTED OR(95%CI)	P VALUE
SEX				
• **FEMALE** • **MALE**	Reference category 0.38(0.15-0.98)	0.046	0.70(0.23-2.1)	0.535

OR –Odds Ratio; CI- Confidence Interval

All the factors found significant was tested for association in logistic regression. Multivariate analysis did not show showed association between practices and any other factors. Other variables included in the model to get adjusted OR were – education level, religion, cases of undiagnosed fever, and awareness category.

Table 4.46. Factors associated with self-care as a health seeking behaviour in case of fever over past 6 months: Result of multivariate analysis using binary logistic regression analysis.

VARIABLE	ADJUSTED OR((5%CI)	P VALUE
UNDIAGNOSED FEVER		
• **NO**	Reference category	<0.001
• **YES**	19.5(4.0-93)	
EDUCATION		
• **HIGHSCHOOL**	5.8(0.11-286)	0.37
• **HIGHER SECONDARY**	2.1(0.7-6.3)	0.17
• **GRADUATE**	Reference category	
CASES DIAGNOSED AS COVID-19		

• **YES**	0.67(0.13-3.42)	0.63
• **NO**	Reference category	

OR –Odds Ratio; CI- Confidence Interval

Other variables included in the model to get adjusted OR were-education level and cases diagnosed as Covid -19. Multivariate analysis using multiple logistic regression was done to find the association between self-care and undiagnosed fever. People with undiagnosed fever have 19.5 times more odds to seek self-care in case of fever.

Table 4.47. Monthly household expenditure for preventive and personal protective agents

Table showing monthly household expenditure by each house to buy preventive and personal protective agents against mosquitoes and mosquito bites

Mean	97.24
Median	50.00
Minimum	0
Maximum	500

Amount spent each month for personal protective agents is about 97.24 rupees (taking the mean value)

Larval survey-

- Number of houses inspected -414
- Number of containers inspected- 1298

- Number of containers positive for larvae- 26
- Number of containers with water- 602

House index

$$\frac{\text{Number of houses infected}}{\text{Number of houses inspected}} * 100 = \frac{24}{414} * 100 = 5.7$$

Container Index

$$\frac{\text{Number of positive containers}}{\text{Number of containers inspected}} * 100 = \frac{26}{1298} * 100 = 2.0$$

Breteau Index

$$\frac{\text{Number of positive containers}}{\text{Number of houses inspected}} * 100 = \frac{26}{414} * 100 = 6.3$$

Prioritising areas

Priority 1- localities where an outbreak had occurred

Priority 2-localities with high larval indices HI>/=5% and or BI>/=20

Priority 3-localities with relatively low larval indices. HI<5% and /or BI<20

Priority 4-localities where there are no cases and low larval densities.

When to conduct larval surveys-

- Within 24 hours of first case from an outbreak locality
- Following outbreak based on priority classification of the locality
  - High risk areas (priority 1 and 2) = monthly or quarterly in 100% of the houses.

- Low risk areas (priority 3 and 4) = monthly or quarterly in at least 20% of the houses

➢ Before and after interventions

➢ When there is suspect of insecticide resistance.

Table 4.48 Colour codes

Code	interpretation	What to do
White	House index is <5% and/or Breteau index is <20%	• Continue IEC campaign on prevention and control • Continue clean-up activities • Continue monthly entomological survey by local health authorities • Maintain the code white in the community.
Red	House index is >/=5% and/or Breteau index is >/=20%	• Intensify IEC campaign on prevention and control • Mobilise residents of affected barangay to clean up campaign with the help of brigade. • Continue monthly entomological survey by local health authorities • Improve environmental sanitation • Start community vigilance: search for

		more areas with HI>/=5% and /or BI>/=20 • Apply larvicide

The house index in the semi urban panchayat studied was 5.7% which is slightly higher than normal value which assigns the panchayat the red colour code in terms of larval survey.

Figure-4.4 The figure compares the critical levels of the indices in our analysis to those discovered in other investigations of a similar nature.(Jesha et al., 2015; Kumar et al., 2014; Samuel et al., 2014)

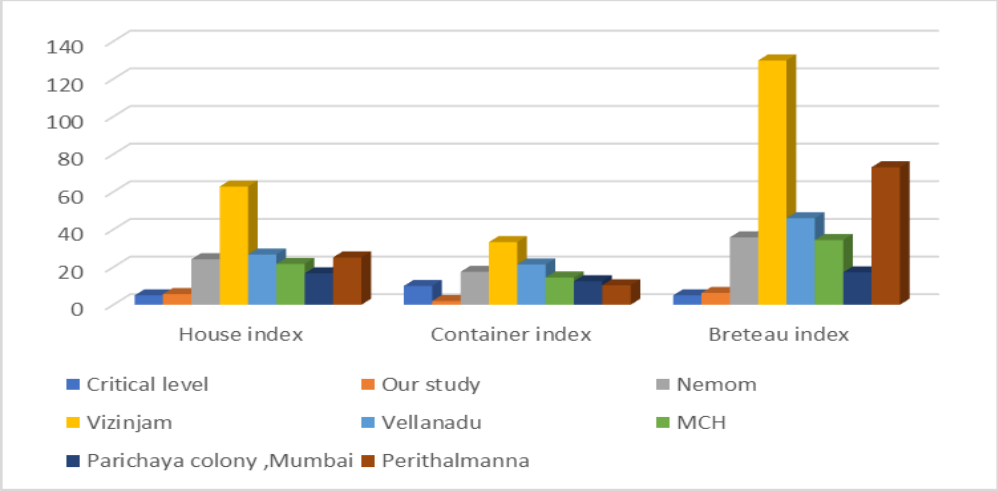


Table 4.49. Indices from other similar studies

	House index	Container index	Breteau index
Critical level	5	10	5

Our study	5.7	2	6.3
Nemom	24.2	17.5	35.8
Vizinjam	62.8	33.3	129.8
Vellanadu	26.7	21.4	46
MCH	21.7	14.5	34.4
Parichaya colony ,Mumbai	16.7	12.5	17.24
Perithalmanna	25.15	10.36	73.05

Observation was done to find the distribution of containers positive for mosquito breeding.

Plastic covers and wrappers with water collections were the most prevalent ones. In one of the houses there was watermelon pod with water.

- Following are some of the recurrent water sources/containers/potential breeding sources found around the houses-

Plastic containers, wrappers and covers

Rubber tire with water

Coconut shell, watermelon pods, egg shells

Ornamental pool or fountain

Potted plants with saucers

Tarpaulin sheets

Water storage tank without cover/lid

Earthen pots and Banana leaves

Chapter 5

Discussion and Conclusions

This study explored distribution of mosquito borne fever cases in a semi urban panchayat in Trivandrum, Kerala. For this, data on self-reported responses were collected using an interview schedule. The prevalence was found to be 0.5%. The low prevalence can be due to the majority of undiagnosed cases. In one of the studies conducted, it is said that India's mosquito borne diseases with special focus in dengue disease prevalence is not well measured. Due to the insensitivity of the current public health monitoring systems, mild febrile infections are less likely to be identified and reported. The information from the private sector is often not documented. The majority of infections (around 75 percent) are subclinical; however, surveillance systems are not built to detect them. There are no population-based studies that calculate incidence in India (Murhekar et al., 2019).

This study was done in a semi urban panchayat. Data from previous studies which were done in rural and urban settings were found which stated that, in India, urban areas had a higher seroprevalence of mosquito borne diseases (dengue in particular) than rural ones, and this pattern persisted across the country. But evidences from studies show that rural areas are equally affected but often go unreported (Murhekar et al., 2019).

Less prevalence could also be due to various programs like plastic waste collection by Harithakarmasena which was a part of Kudumbasree, an LSGD initiative. The list of programs for mosquito borne disease prevention done in past 1 year in the panchayat was collected from the FHC. Some of the programs were:

- Distribution of bleaching powder to houses with the help of health inspectors and ASHA workers.
- Training of Aarogya sena and Harithakarma sena for source reduction, indoor fogging, spraying and chlorination.
- Distribution of guppy fish to households (which was done only on demand by the household members)
- Following dry day
- Fever survey and vector borne diseases survey every month
- Training harithakarmasena for waste collection and disposal methods.
- Programs like mass drug administration program were mobilized with the help of local bodies. The FHC claim to have distributed morbidity management and disease prevention kits to lymphedema cases to manage them in the panchayat.

The study showed that though the programs were formulated, there were problems in the implementation. Some residents did not know about ASHA workers. Most of the ASHAs visited houses with children (in the age group of vaccination), bed ridden people, old people and economically weaker section.

Also, only 3.1% of the households reported that preventive actions were taken by health authority over past 6 months. About 30% reported that ASHAs visited every month to check the dry day and that LSGD took preventive measures.

Decentralization started in Kerala in 1990s. Almost 25 years of decentralization has given LSGs an upper hand in local level health programs in Kerala. The role of LSG in various programs has been studied in various studies (Jayalakshmi and Suhita, 2017).

Awareness and practices against mosquito bites and mosquito borne diseases were also studied. It was found that about majority had poor awareness regarding mosquito bites and associated diseases. Only a few of the respondents had a practice score of more than 2 which was considered as good practice.

Majority identified stagnant polluted water as main site of mosquito breeding. While 81.9% identified stagnant clean water as breeding site, a majority of respondents reported that they thought mosquito bite spread diseases during evening only and a few thought that bites spread diseases all the time. This point to the lack of in-depth knowledge about the differences in biting patterns of different mosquito species.

Majority used to burn incense, leaves and agarbattis as a preventive practice against mosquito bites in their households followed by preventing stagnant water in order to reduce mosquito breeding. A few used mosquito bats and window and door nets.

Such measures were used by majority of them during evening only. This highlights the knowledge gap about the biting behaviours of such mosquitoes. Which is line with another study done in slums of south India (Nagoor et al., 2017).

For the majority of the respondents, main source of information about mosquitoes and borne diseases were newspapers followed by TV/Radio. About half of them reported that health department had a role. The role of internet and social media were found to be less. The reason may be that majority of study population belonged to age group of 35 years

and above. In one of the studies with similar setting, it was found that, for most individuals, health education was their primary source of information (Post Graduate Student, Department of Community Medicine, Amala Institute of Medical Sciences, Thrissur, Kerala, India and S, 2020). In another study done about malaria in particular in Myanmar, it was found that the most popular source of knowledge regarding malaria was health facility workers. This in fact draws attention to the inadequate awareness programs by health department of the concerned panchayat.

All the household members were aware that dengue was caused due to mosquito bite. But some people reported that dengue could be air borne and that dengue can spread via water sources or drinking water.

About 34% of the respondents could identify aedes as the dengue causing mosquito.
All the respondents could identify fever as a symptom of dengue fever. Headache, muscle and joint pain were identified as a symptom by about 60% of the respondents. This was in line with the study done in Hong Kong (Chan et al., 2021)

Majority of the respondents did not know when aedes was active to bite. A few identified that aedes bite only during day time. This reflects the awareness gap among the respondents about aedes in particular.

Significant association was found between SES (type of residence) with awareness .This was in line with studies done in Indonesia. (Harapan et al., 2018). In univariate analysis, factors associated with good awareness regarding mosquito borne diseases were age, gender, higher levels of education, high SES (in terms of material on the roof). There was a robust association between formal education and awareness in the present study.

For example, a person with a higher secondary education was less likely to have good awareness as compared to a person who was graduate. One of the reasons for this may be that school and university curricula may affect the knowledge level. In addition, a strong association between age, gender and awareness level was found in the univariate analysis. However, our multivariate regression analysis revealed that age was a confounding factor and that gender, education level and SES were the independent predictor for the awareness domain regarding mosquito bites and associated diseases.

The awareness among female sex was more as compared to males which was statistically significant. Also, females tend to follow good practices than males. This was in line with a study done in Australia (Potter et al., 2016).

There was no significant association between level of awareness and good practice. It meant that it was not necessary that who had better awareness follow good practices. This outcome was consistent with findings from further research conducted in Jamaica (Shuaib et al., 2010), India (Nagoor et al., 2017) which also revealed the existence of an awareness -practice gap.

Larval survey was done in the households. Anything that hold water was taken as a container which was considered as a potential breeding site. Only containers around the houses and within the house walls were recorded. The house index calculated was 5.7% which was slightly more than the normal value. The Breteau index was 6.3 % and container index was 2%.In another study done in Thrissur, Kerala the calculated House

index (HI) was 44.4%, Container index (CI) is 11.5% and the Breteau Index is 76.7%. (Vaz et al., 2019). The study time period may be the reason for the difference in values.

This may be due to seasonal variation as our study was during April and May months which was partly summer and partly rainy season, while other studies were done during rainy season. Also, we counted potential breeding sources which were outside the house while other studies counted potential breeding sources both inside and outside the house.

There was an increase in all 3 indices from April to May if we take monthly index values. This could be explained by the irregular rains towards the end of May. Such a tendency was also reported in another study with similar setting in which all three indices increased from May to June, peaked in July and dropped by August. (Samuel et al., 2014)

In another study, 167 dwellings were inspected over the course of 8 days. Breteau Index = 73.05 percent, House Index = 25.15 percent, Container Index = 10.36 percent. This study was done in the month of October.

The figure compares the critical levels of the indices in our analysis to those discovered in other investigations of a similar nature.(Jesha et al., 2015; Kumar et al., 2014; Samuel et al., 2014)

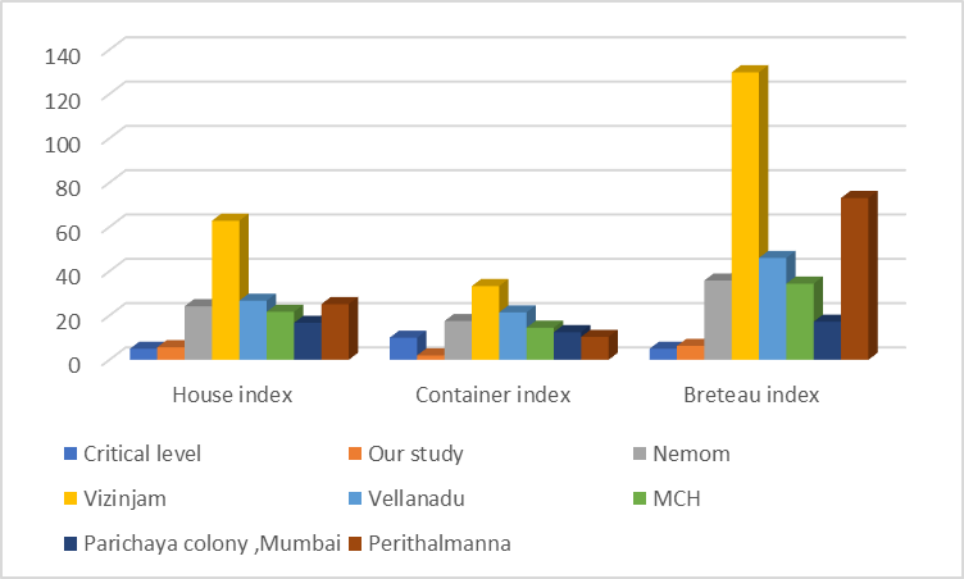


Fig 5.1: Comparison of larval indices in our study with critical level and other studies

In our study, house index was 5.7% which is slightly higher than normal value which assigns the panchayat the red colour code in terms of larval survey. As compared to other studies, indices values were low in our study. Approximately half of the population visited government hospital in case of fever over past 6 months. About 8% of the population chose self-care in case of fever. This tendency of self-care where high among 35 to 65 years of age group. This result was in line with another study done among slums of south India which had 8% people seeking self-care (Nagoor et al., 2017).Plastic containers were the most common source of breeding

Conclusions

This study explored prevalence of mosquito borne diseases, awareness and practices against mosquito bites and associated diseases, use of protective measures and their associated factors in a semi urban population using a cross-sectional survey. The reported

mosquito borne disease case prevalence was low in the panchayat. Almost one third of the study participants had good awareness. Also, the awareness about mosquito borne diseases was not related to the practices followed. The goal of anti-mosquito bite programs should be to increase local risk perception, with a focus on high-risk categories and persons with lower levels of education and socioeconomic status. The study showed that awareness was not effectively translated into preventive behaviour. Many programs have been introduced by the government but for proper implementation, community participation and intersectoral coordination are required.

Strengths of study

The response rate was high.

Maximum efforts were done to get the representative population.

Limitations of the study

The study was conducted in April and may months, which had a few irregular rainfalls. No follow up was done in the area during the following months (with regular rainfall) which is required to compare the indices. Hence, the results may not represent the actual values or indices.

The study was a cross sectional study. The temporal association between mosquito protection measures, the prevalence of mosquito bites, and the efficacy of those measures could not be clearly determined by the cross-sectional study.

The self-reported methodology used in this study raise concerns about the accuracy of calculating the prevalence of mosquito bites and the usage of preventative measures. Recollection bias may have occurred.

The study did not look into the reasons why those who had good awareness do not follow good practices and also why did not opt/get the right care if they have a fever. Additional qualitative research is necessary to find the reasons.

Recommendations

Fever clinic to diagnose the fever cases can be built.

Dengue transmission can vary according to the region and population. It is different within each state and district hence; small surveys with sufficient sample size are required which could capture the heterogenicity. This could help in the introduction of Dengvaxia or other vaccines.

Focusing on certain target populations, raising awareness of the importance of early diagnosis and treatment, and addressing common misconceptions regarding mosquito borne disease transmission are all necessary.

Introduction of vaccines

WHO recommends school based sampling in endemic areas but in India, school based sampling may face problems like drop off rates, lower participation of private schools. Whereas, community-based surveys help us incorporate all strata of the society.

Many interventions to reduce mosquitoes have been introduced by the government. Community participation and better intersectoral coordination to improve and implement various existing programs by the govt can help reduce mosquito borne diseases.

Health department should focus equally on source reduction as well as case prevention and identification as most of the cases remain undiagnosed

There is a need to take up periodic disease/vector surveillance which could throw light on the impending pandemic. This could help formulate measures well in advance.

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Annexure-1

Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences &Technology, Trivandrum, Kerala, India- 695011

Information sheet

Title of the study: Prevalence of mosquito borne diseases, awareness & use of personal protective measures against mosquito bites in a semiurban panchayat in Trivandrum district, Kerala

Namasthe, I am Swathi L B, studying for Master of Public Health (MPH) at Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. As a part of the course requirement, I have to conduct a research of public health importance.

Study purpose

My study is about Prevalence of mosquito borne diseases, awareness & use of personal protective measures against mosquito bites in a semiurban panchayat in Trivandrum district, Kerala. I am planning to conduct the study household members of Karakulam grama panchayat.

voluntary participation

As a part of my data collection procedures, I am requesting voluntary participation from you. This means you may choose to participate or not. You will be asked some questions for obtaining relevant information 37 regarding your nature of work for conducting the

study. I am also seeking your permission to make observation regarding environmental management actions for control of larval habitats.

Confidentiality of your data I hereby assure you that all information you provided will be kept confidential and will be only used for research purposes. Personal information will not be revealed to anyone under any circumstances. Though there may not be any direct benefit for you from the study the information you provided will be useful for understanding the magnitude of the problem you are facing which will help in making health policies to decrease the prevalence. For any clarification regarding the study, you can contact me and for any queries on the authentication of this study you can contact the Member Secretary, Institutional Ethics Committee (IEC) of SCTIMST.

Swathi L B MPH Scholar,

AMCHSS

Ph No: 8891399519

Dr.Srinivas G Institutional Ethics Committee Member Secretary

Sree Chitra Tirunal Institute for Medical Sciences and Technology,

Trivandrum Ph No: 0471 2524689

Mail id- iec.mem.sec@sctimst.ac.in

Annexure-2

Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences &Technology, Trivandrum, Kerala, India- 695011

Consent Form

I _____have read/heard and understood all the information provided in the Research information sheet. By signing/putting thumb impression I confirm my voluntary participation in this study. I understand that I can withdraw my participation at any time during the data collection process without any explanation and also, I understand that my identity and personal information will be kept confidential. I have been informed who should be contacted for further clarifications.

Signature /Thump impression of the participant:

Signature of witness (For verbal consent):

Place:

Date:

Annexure-3

TOOL

1	What is your age in completed years?	
2	Gender	□ Male □ Female □ Transgender
3	What is the highest level of education you have attained?	□ High school □ Higher secondary □ Graduate □ Unsure □ Refused
4	What is your current occupation?	□ Govt employee □ Private employee
		□ Self employed □ Farmer □ Laborer □ Homemaker □ Student □ Unemployed
5	Where does your job/daily routine require you to work mostly	□ Indoor □ Outdoors □ Both
6	Religion	□ Hindu □ Christian □ Muslim □ Others(specify) □ Refused to answer
7	Type of house	□ Kutcha house □ Semipucca house □ Pukka house
8	Number of household members	_____
9	Main material on the floor	☐ Natural floor mud/clay/earth ☐ Ceramic tiles ☐ Cement ☐ Polished stone/marble/ granite ☐ Other (specify)_____

10	Main material of the roof	☐ No roof ☐ Thatch/palm leaf/ reed/grass ☐ Raw wood planks/timber unburnt brick ☐ Finished roofing metal/ wood ☐ cement fiber asbestos sheets /cement/concrete roofing ☐ Tiles ☐ Other (specify)_____
		o (specify)
11	Main material of the exterior walls	☐ Natural walls ☐ No walls ☐ cane/palm/trunks/bamboo ☐ brick ☐ concrete ☐ Stone with lime/cement ☐ Cement blocks. ☐ wood planks/ asbestos sheets ☐ Other (specify)_____
12	what is the kind of water storage facility you have in your house?	☐ Water stored in tank ☐ Water stored in drum or bucket ☐ Use well water ☐ Other Specify_____
13	What type of drainage facility does	□ closed drainage
	your household have?	□ open drainage
		□ drain to soak pit
		□ no drainage
14	What kind of toilet facility do members of your household	□ Flush or pour flush toilet

	usually use?	□ Pit latrine □ Twin pit /composting toilet □ Dry toilet □ No facility/uses open space □ Other □ Specify
15	What is the main source of drinking water for members of your household?	☐ bottled water ☐ piped water in dwelling/premises/yard ☐ piped water outside ☐ tube-well/borewell (inside or outside premises)- ☐ protected well (inside or outside premises) ☐ tanker/truck/drum(supplied through container) ☐ protected spring/pond etc.for drinking purpose ☐ Community RO Plant ☐ others specify_____ all unprotected source (river/canal, spring, pond, well etc.)
16	Do you think mosquitos are a problem in this area where you live?	□ Yes □ No
17	How concerned are you about the presence of mosquitoes in the area where you live	□ Extremely □ Concerned □ Somewhat □ not at all
18	If yes, what do you think are the reasons for this problem?	_____
19	Can you name the diseases spread by mosquitoes	

20	What do you think are the diseases transmitted by mosquitoes	□ Dengue □ Chikunguniya □ Malaria □ Filariasis □ Nipah □ Mumps □ Chickenpox □ Corona □ Elephantiasis □ AIDS □ Zika □ leptospirosis
21	Where do you think mosquitoes breed?	
22	Which among the following, do you think is the most common breeding site?	□ Stagnant polluted water □ Storm water drain □ Water tank □ Stagnant clean water □ Wetlands

		□ Domestic containers □ Natural collections □ Others o Specify
23	At what time of the day do you think mosquito bite is more common in this area?	□ Early morning □ Afternoon □ Evening □ Night
24	At what time do you think mosquito bites spread diseases-at home?	□ Early morning □ Mid-morning □ Afternoon □ Evening □ Night □ Late night □ All of the above □ None
28	which location are you bitten by mosquitoes (the most)?	□ Home □ Work □ Recreation □ At transport waiting site □ Near grassy areas □ Others Specify
30	How often do you get bitten by mosquitoes inside your home?	□ Almost never □ Rarely □ Sometimes (around once a week) □ Often (almost every day or more than one bite

		per day)
35	Is there any time of the year that you notice there is an increase in mosquitoes in this area?	□ Yes □ No □ If yes, specify.....
36	What measures do you take to reduce the number of mosquitoes present in your house and the surrounding yard.	□ Residual spray □ Kill as noticed □ Prevent stagnant water □ Burning of incense, leaves, agarbattis □ Prevent water logging in- • Plastic container • broken vessels • rubber tire • coconut shell • flower vase or pot • tarpaulin sheet • water barrel • banana leaf • refrigerator tray • earthen pots
		• egg shell • others Specify
39	At what time of the day do you prefer to use such preventive measures	□ Night only □ Day only □ Both night and day □ None of the above
40	How much cost do you think you spent per month for buying personal protective items against mosquito bites?	_____

	Name of the household member	Relationship with respondent	Did the member have fever anytime over past 6 months	If yes, was the fever diagnosed as mosquito borne disease?	Diagnosis	Type of health care provided	Type of hospital visited- whether private /government

41	What is the distance from your house to nearest health care facility.	Private- _____ Government-_____
42	What are the sources of information regarding mosquito bites, related diseases and their prevention (multiple options)	□ Television □ Radio □ Newspapers □ Internet- Social media
		□ Corporation □ Health department □ ASHA workers □ All of the above □ Others Specify_____
43	Did LSGs take any preventive measures?	□ Yes □ No
	If yes, specify	_____
44	Did corporation/health authority take any preventive measures?	□ Yes □ No o If yes, specify_____
45	Does the ASHA worker observe dry day every month?	□ Yes □ No
46	Have you heard about dengue fever?	□ Yes □ No
47	How do you think is dengue fever transmitted from one person to another	□ Mosquito bite □ Airborne □ Don't know/others □ Blood transmission □ Waterborne

48	What is the type of mosquito that cause dengue fever?	□ Aedes □ Anopheles □ Culex □ Don't know/others
49	Can you identify dengue causing mosquito?	□ Yes □ No
50	If yes, how can you identify?	
51	When is usually aedes active to bite?	□ 6am-8am only □ 6am -8am and 7pm-9pm □ Other times/don't know
52	Was any household member diagnosed with dengue in the past 6 months?	□ Yes □ No
53	What are the symptoms of dengue fever?	□ High fever □ Chills □ Headache □ Eye pain □ Enlarged lymph nodes □ Deep muscle and joint pain □ Loss of appetite □ Nausea and vomiting □ Diarrhoea
		□ Extreme fatigue □ Others □ Specify_____
Where do you think aedes mosquito usually breed inside the house?		□ In the tray under the fridge □ In the water container □ In the flower pot trays □ In the opened water tanks □ Others □ Specify
Where do you think aedes mosquito usually breed outside the house?		□ In the flower leaves □ In the abandoned tires □ In the roof gutter □ In the garbage □ Others □ Specify
How often is water in the pots or vases changed?		_____
How often are the drains checked for blocks?		_____
Are the water containers inside and outside house kept tightly covered?		□ Yes □ No
Do you empty water from fridge tray every week?		□ Yes □ No

How often are the water collection inside and outside house change every week?	_____

OBSERVATION	CLEAN	COVER
DISTRIBUTIO N OF CONTAINERS POSITIVE FOR MOSQUITO BREEDING	○ Plastic container ○ broken vessels ○ rubber tire ○ coconut shell ○ potted plants with saucers ○ ornamental pool or fountain ○ roof gutter ○ water storage tank or cistern ○ septic tank outlet ○ toilet outlet ○ tarpaulin sheet ○ water barrel ○ banana leaf ○ refrigerator tray ○ earthen pots ○ egg shell ○ others ○ specify_____	
NUMBER OF CONTAINERS INSPECTED		

NUMBER OF CONTAINERS POSITIVE FOR LARVAE	
NUMBER OF CONTAINERS WITH WATER	

Annexure 4

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)
Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

Institutional Ethics Committee

(IEC Regn No. ECR/189/Inst/KL/2013/RR-21)

SCT/IEC/1812/JANUARY/ 2022 05.03.2022

Dr. Swathi LB
MPH Student, AMCHSS
SCTIMST, Thiruvananthapuram

Dear Dr. Swathi,

The Institutional Ethics Committee held on 5th February, 2022, reviewed and discussed your application to conduct the study titled "**PREVALENCE OF MOSQUITO BORNE DISEASES, AWARENESS & USE OF PERSONAL PROTECTIVE MEASURES AGAINST MOSQUITO BITES IN A SEMIURBAN PANCHAYAT IN TRIVANDRUM DISTRICT, KERALA** (IEC/1812)".

The following members of the Ethics Committee were present at the meeting held on 5th February, 2022.

SL. No.	Member Name	Highest Degree	Gender	Scientific /Non Scientific	Affiliation with Institution(s)
1.	Smt. Sathi Nair	MA (English Literature)	Female	Lay Person	No
2.	Dr. Pradeep S	MBBS, MD	Male	Basic Medical Scientist	No
3.	Adv. Priya Kaimal	LLM, MBL	Female	Legal Expert	No
4.	Dr. Manikandan.S	MBBS,MD,PDCC	Male	Clinician	Yes
5.	Dr. Narayanan Namboodiri. K K	MBBS,MD,DM	Male	Clinician	Yes
6.	Dr. Biju Soman	MBBS,MD, DPH, MSc, DLSHTM	Male	Basic Medical Scientist	Yes
7.	Dr. Srinivas G	PhD	Male	Basic Medical Scientist (Member Secretary)	Yes

SCT/IEC/1812/JANUARY-2022

The following documents were reviewed:

Original submission

1. *Covering letter addressed to the Chairperson, IEC, SCTIMST dated 26.12.2021*
2. *Covering letter addressed to the Chairman, IEC, SCTIMST dated 12.01.2022*
3. *Responses/Amendments made based on the Reviewer's comments*
4. *Checklist Form*
5. *Declaration Form*
6. *IEC Application Form*
7. *Research Proposal*
8. *Information Sheet and Consent Form in English and Malayalam*
9. *Research Tool in English and Malayalam*
10. *CV of Principal Investigator and Guide*
11. *SRC Recommendation*

Revised submission

1. *Covering letter addressed to the Chairperson, IEC, SCTIMST dated 26.12.2021*
2. *Responses/Amendments made based on the Reviewer's comments*
3. *Copy of IEC Recommendation letter dated 21.02.2022*
4. *Covering letter addressed to the Chairman, IEC, SCTIMST dated 25.02.2022*
5. *Reviewers comments and Response*
6. *Checklist Form*
7. *Declaration Form*
8. *IEC Application Form*
9. *Research Proposal*
10. *Information Sheet and Consent Form in English and Malayalam*
11. *Research Tool in English and Malayalam*
12. *CV of Principal Investigator and Guide*

IEC Decision

The IEC approved the conduct of the study in the present form.
A copy of the LSGD approval to be submitted to IEC before the initiation of the study.

Remarks:
The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and asks to be provided a copy of the final report.

There was no member of the study team / Guide who participated in voting / decision making process. The ethics committee is organized and operated according to the requirements of Good Clinical Practice and the requirements of the Indian Council of Medical Research (ICMR).

Sincerely,

Dr. G. Srinivas
Member Secretary, IEC

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY
INSTITUTIONAL ETHICS COMMITTEE (IEC) SCTIMST THIRUVANANTHAPURAM

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST, THIRUVANANTHAPURAM

KARAKULAM GRAMAPANCHAYATH
(ISO 9001 - 2015 Certified Panchayath
Karakulam.P.O,Thiruvananathapuram-695564 Ph. 0471-2372046

18/03/2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify the LSGD approval for the initiation of Household Study done by Dr.Swathi.L.B on "Prevalence of Mosquito borne diseases, awareness and use of personal protective measures against mosquito bites in a semi urban Panchayath in Kerala IEC/1812".

Secretary

Karakulam Gramapanchayath

Secretary
Karakulam Grama Panchayat
Karakulam P. O, Thiruvananthapuram
Pin: 695564, Ph: 9496040659