GEOSPATIAL ANALYSIS OF CATEGORY III ANIMAL BITES AND TO STUDY THE CARE SEEKING PATHWAYS OF THOSE AVAILED POST-EXPOSURE PROPHYLAXIS (PEP) WITH EQUINE RABIES IMMUNOGLOBULIN (ERIG) IN THIRUVANANTHAPURAM DISTRICT, KERALA

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DECLARATION

I hereby certify that this dissertation titled *"Geospatial Analysis of Category III Animal bites and to study the care seeking pathways of those availed post-exposure prophylaxis (PEP) with Equine Rabies Immunoglobulin (ERIG) in Thiruvananthapuram District, Kerala*" is the bonafide record of my original research. It has not been submitted to any university or institution for the award of anydegree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

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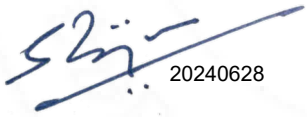
CERTIFICATE

Certified that the dissertation titled "*Geospatial Analysis of Category III Animal bites and to study the care seeking pathways of those availed post-exposure prophylaxis (PEP) with Equine Rabies Immunoglobulin (ERIG) in Thiruvananthapuram District, Kerala*" is a record of research work undertaken by Dr. Sarath Mohan, in partial fulfillment of the requirement for the award of the degree of "Master of Public Health" under my guidance and supervision.



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LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ABC	Animal Birth Control
ARS	Anti-Rabies Serum
ARV	Anti -Rabies Vaccine
CI	Confidence Interval
CDC	Centres for disease control and prevention
DH	District Hospital
DHS	Directorate of Health services
DMO	District Medical Officer
ERIG	Equine Rabies Immunoglobulin
GIS	Geographic Information System
HRIG	Human Rabies Immunoglobulin
IAH and VB	Institute of Animal Health and Veterinary Biologicals
LISA	Local Indicators of Spatial Association
OR	Odds Ratio
PEP	Post Exposure Prophylaxis
RIG	Rabies Immunoglobulin
WHO	World Health Organization

ABSTRACT

Background:

Rabies is a vaccine-preventable viral zoonotic disease that affects the brain and spinal cord in humans and livestock and occurs in more than 150 countries and territories. This study presents a comprehensive geospatial analysis of Category III animal bites and care-seeking pathways of those who availed post-exposure prophylaxis with Equine Rabies Immunoglobulin (PEP-ERIG) in Thiruvananthapuram District, Kerala.

Methodology:

This cross-sectional study is based on 933 victims of category III animal bites who availed of PEP-ERIG from the public sector from December 2023 to February 2024. Data was collected through telephonic interviews and captured using the Open Data Kit. The narratives were analysed to decipher care-seeking pathways. Thematic maps and spatial analyses for clustering were done in R software. OSM resources were used to estimate time and distance requirements.

Results:

Males constitute about half (53.6%) of the victims. The mean(SD) of the victims was 36.2(21.6) years, and almost two-thirds (62.7%) were from poor households. Most bites were caused by domestic animals (72.9%) and were unprovoked (79%), indicating higher risk. PEP-ERIG awareness is inadequate among the victims (48.7%), though wound washing was practised by most of them (97.3%). Government health facilities were preferred by most of the bite victims (97.5%), and in half the cases victims themselves decided to choose the facility (51.3%). Spatial analysis showed clustering of bite-prone areas within the district. The median(IQR) travel time to reach the nearby PEP-ERIG centre from bite locations was 11.2(7.8-16.0) minutes. This

could be an underestimate, as 42 percent of victims use public transportation.

Conclusion:

The PEP-ERIG facilities are not distributed as per the animal bite occurrences in the Thiruvananthapuram district. Geospatial analysis using openly available resources like R software and OSM utilities can add value to routine data and help identify the gaps in physical access and other logistics in PEP-ERIG delivery.

CHAPTER 1

INTRODUCTION AND REVIEW OF LITERATURE

1.1 INTRODUCTION

Rabies is a preventable viral disease that can be transmitted from animals to humans and livestock, affecting the brain and spinal cord. It is prevalent in over 150 countries and territories. Once the clinical symptoms of rabies manifest, it becomes a deadly disease with no cure. Every year, it results in tens of thousands of fatalities, predominantly in Asia and Africa. Dogs are the primary carriers of rabies to humans, accounting for up to 99 percent of all human rabies transmissions. The disease can be prevented by vaccinating dogs and avoiding dog bites.

In the event of potential exposure to a rabid animal, immediate medical care is crucial. This includes washing the wound thoroughly with soap and water for 15 minutes, a series of rabies vaccinations, and, if necessary, the administration of rabies immunoglobulin or monoclonal antibodies, which can be life-saving. This post-exposure prophylaxis (PEP) for animal bites, particularly dog bites classified as category II and III, places a significant financial strain on individuals and healthcare systems in rabies-endemic areas. There has been a noted increase in the incidence of animal bites in the Thiruvananthapuram district in recent years, highlighting the need for an extensive study into the geographical distribution of these incidents.

1.2 REVIEW OF LITERATURE

This review aims to outline the global incidence rate of animal bites, their epidemiology, and geographical spread. It seeks to identify the risk factors linked to animal bites, categorised under human and animal-related factors, as per the available literature on this topic. The literature review was conducted using English keywords like *dog bite epidemiology*, *dog bite incidence,* and *spatial distribution of dog bite incidences* on various internet search engines and databases such as Google Scholar, Science Direct, PubMed, and Research Gate.

1.2.1 ANIMAL BITES AND THEIR IMPACT ON PUBLIC HEALTH

Dogs are often found in large numbers without proper supervision, making humans susceptible to bites and severe consequences(Knobel et al., 2005). Animal bites can have medical, economic, legal, and psychological implications for individuals, families, and governments(World Health Organization 2018). Identifying animal bites in humans is an effective way of measuring the risk of infection in humans and predicting the disease burden in the community(Fèvre et al. 2005). Every year, tens of millions of people worldwide are bitten by dogs, with children being the most vulnerable age group(World Health Organization 2018). Dogs are responsible for 99 percent of human rabies transmission, making them the primary source of human rabies deaths(Rabies - India, WHO). Vaccination can prevent rabies, and timely post-exposure prophylaxis can save lives. The cost of rabies can be divided into direct costs, such as treatment expenses, transportation costs to treatment centres, and loss of wages during treatment, and indirect costs, such as livestock losses, surveillance, and dog control expenses(Knobel et al., 2005). Prompt treatment after

an animal bite is crucial in saving lives. However, many of the poorest individuals are unable to access essential treatment due to the high cost and insufficient transportation links, particularly in rural areas(Subramaniam (Mani) 2016).

1.2.1.1 INTERNATIONAL CONTEXT

It is estimated that approximately 60,000 deaths occur globally every year due to rabies, though this number may be an underestimate due to under-reporting. This could be due to insufficient surveillance mechanisms, lack of reporting, and inadequate health services(Fooks et al. 2014). Hampson et al., estimated the annual economic loss due to rabies is around 8.6 billion USD (95% CI: 2.9-21.5 billion), and over 3.7 million (95% CI: 1.6-10.4 million) disability-adjusted life years (DALYs) are lost. Premature death is the primary contributor to the economic burden, accounting for 55 percent of the total burden, followed by direct expenses related to post-exposure prophylaxis (PEP) at 20 percent, and lost income incurred during seeking PEP at 15.5 percent. The minimal cost to the veterinary sector due to dog vaccination is around 1.5 percent, and the supplementary costs from livestock losses are 6 percent of the total burden(Hampson et al. 2015). Countries with lower and middle-income populations have higher fatality rates associated with dog bites, likely due to a lack of access to healthcare and post-exposure treatment(Animal bites, WHO, 2024). As per the World Health Organization's (WHO) definition, a country is regarded as free of dog rabies if no cases of indigenously acquired dog-mediated rabies have been confirmed in humans, dogs, or any other animal species for a minimum of two years(World Health Organization 2018). According to this definition, Western Europe, Canada, the United States of America (USA), Japan,

and some Latin American countries have eliminated dog bite rabies(World Health Organization 2018). Although countries such as Australia and various Pacific island nations are historically unaffected by dog bite rabies, they may still report imported cases(World Health Organization 2018).

1.2.1.2 INDIAN CONTEXT

India is responsible for 59.9 percent of human rabies deaths and 2.2 Million DALYs loss per year in Asia(World Health Organization 2018). Thirty to sixty percent of reported cases and deaths in India due to rabies occur in children under 15 years old, although many unrecognised and unreported cases are found in this age group as well(Rabies - India, WHO). According to a multi-centric study sponsored by WHO, the incidence of animal bites in India was 17.4 per 1000 in 2003(Sudarshan et al. 2007a). In 2016, high rates of dog bites were recorded in Delhi slums and rural Tamil Nadu, with incidences of 25.2 and 31.1 per 1000 population per year, respectively(Sharma, Agarwal, AM Khan, et al. 2016). After the pandemic, an increase in aggression among stray dogs was observed, which may be due to a shortage of food, less human-dog interaction, and pet abandonment(Goel et al. 2023). The Ministry of Health and Family Welfare reported a 26.5 percent year-on-year increase in the incidents of dog bites in India, from 2.18 million incidents in 2022 to 2.75 million incidents in 2023. Kerala, Jharkhand, Delhi, Assam, and the union territory of Chandigarh experienced the highest year-on-year percentage rise in the incidents of stray dog bites this year*(Business Standard,* 2023).

1.2.1.3 KERALA CONTEXT

While there is a lack of published research on the frequency of dog bites in Kerala, numerous articles in newspapers and on the web have addressed this issue. Between 2013 and 2021, the number of dog bite cases in Kerala rose dramatically from 62,280 to 2.21 lakh, including a significant increase in cattle rabies(*The Times of India*, 2022). The rise in the street dog population can be attributed to several factors, including poor waste disposal practices, the abandonment of unwanted puppies by irresponsible pet owners, and a lack of public support for scientific birth control measures for street dogs. The Kerala government has set a goal to eradicate rabies within three years by implementing Animal Birth Control (ABC) in 170 identified hotspots, with the initiative being carried out by the Kudumbashree Mission(Kudumbashree | History & Evolution, 2024), the flagship poverty eradication initiative of the state government(*The Hindu, 2023*). The probability of interactions between humans and wild animals may increase due to population growth and the destruction of forests and wildlife habitats(Mani et al., 2016). In Kerala, pre-exposure prophylaxis was found to be a more cost-effective strategy for high-risk groups, costing approximately one-fifth of post-exposure prophylaxis (PEP). Currently, Kerala is planning to employ advanced cell culture technology to produce its own anti-rabies vaccine (ARV) for both humans and animals. Separate labs at the Institute of Animal Health and Veterinary Biologicals (IAH and VB) at Palode, Thiruvananthapuram will be used for this purpose, with an estimated cost of about ₹ 150 crores(*Business Standard, 2017*). By doing so, the Kerala state government would become the first in the country to directly produce ARV, addressing issues related to vaccine shortages, delivery delays, financial constraints,

and complex procurement processes.

1.2.2 CATEGORY III ANIMAL BITES

Severe exposure refers to a single or multiple transdermal bites or scratches, contamination of mucous membranes or broken skin with saliva from animal licks, and direct contact with animals(World Health Organization 2018). For Category III animal bite wounds, Rabies immunoglobulin (RIG) and the 2-site intradermal Thai Red Cross Society immunisation regimen (2-2-2-2) at 0-3-7-28 days are required. If the RIG vaccination is not available on the first visit, it can be administered up to seven days after the initial dosage. The World Health Organization recommends these vaccinations for the deltoid region on both sides. About 0.1 cc of ARV is being injected per intradermal location. 0.1 cc of ARV is being injected per intradermal location. The high cost of RIG remains one of the primary obstacles to PEP. As a substitute, equine RIG (ERIG), sourced from horses, is being used more frequently because human RIG (HRIG) is more expensive and harder to obtain(Lionel Harischandra et al. 2016).

The dosage for HRIG or ERIG is determined by multiplying the individual's body weight by 20 or 40 IU/kg, respectively. Judicious use of the costly RIGs will help to divert the money saved which could be utilised to strengthen the weaker aspects of the rabies-elimination program, such as mass dog vaccination campaigns and preventing rabies at the source(Lionel Harischandra et al. 2016). According to the WHO recommendations, the residual dose is injected parenterally and is determined based on body weight. Recent research indicates that systemic injection of the remaining dose cannot provide any further effect when administering RIG directly

into the wounds(Bharti, Madhusudana, and Wilde 2017). A follow-up study conducted in Gujarat, India shows that 34 percent of respondents did not receive their vaccinations, and 31.5 percent of respondents reported experiencing delayed compliance, especially during the final dosage of the intra-dermal regimen(Dhaduk et al. 2016). This implies that appropriate counselling and follow-up plans are necessary to complete the immunisation schedule(Dhaduk et al. 2016). In the Delhi slums, a community-based study found that 79.0 percent of category III bite victims did not receive RIG, and one-fifth of dog bite sufferers did not obtain vaccinations(Sharma, Agarwal, AM Khan, et al. 2016). In an anti-rabies clinic in Karnataka, India, the direct and indirect costs of rabies PEP were estimated(Haradanhalli, D Hanumanthaiah, and Varadappa 2019). According to Hardanahalli et al., the total median cost incurred by bite victims in government hospitals was Rs. 585, with Q1–Q3 of Rs. 444 –725 and the government spending Rs. 1031 per patient. In private hospitals, the total median cost incurred was Rs. 5200, with Q1–Q3 of Rs. 4900–5701(Haradanhalli, D Hanumanthaiah, et al. 2019).

1.2.3 WHO GUIDELINES 2018 ON RABIES POST-EXPOSURE PROPHYLAXIS

In 2018, the World Health Organization (WHO) updated its rabies vaccination guidelines, which were initially released in 2010. The updated guidelines suggest that Rabies Immunoglobulin (RIG) effectively provides passive immunity when the anticipated dose is maximally penetrated into the wound and its surrounding area. Any remaining RIG that is administered intramuscularly at a site distant from the wound does not seem to offer any significant advantage(Mani and Madhusudana

2013; Saesow et al. 2000; Wilde et al. 2016). However, if RIG is conserved for the next patient, it could be used effectively. Furthermore, over 99 percent of cases can be successfully managed with thorough wound cleaning, timely immunisation, and completion of the course(World Health Organization 2018). The 2018 WHO revisions suggest that when access to RIG is limited, this life-saving medication should be reserved for cases involving more than ten bites, deep wounds, bites to heavily innervated areas such as the head, neck, and hands, immunodeficient patients, victims bitten by animals suspected or confirmed to have rabies, and injuries related to bats. The most recent data supports the judicious and rational use of RIG. Consequently, the World Health Organization adopts a public health approach to rabies vaccination that saves money, time, and dosage while preserving clinical effectiveness and safety(World Health Organization 2018).

1.2.4 RISK FACTOR ASSOCIATED WITH POTENTIAL BITES IN HUMAN

1.2.4.1 Human Factors

Dog bite rates were consistently found to be higher in children in research conducted around the world, as per(Mulipukwa, Mudenda, and Mbewe 2017). According to Kumar and Sinha's study in a rural Tamil Nadu region, children were 1.86 times more likely than adults to be bitten by a dog(Kumar and Sinha 2016).

According to Davis et al. (2012), more than 400,000 American children receive treatment for dog bites every year, while Meints and de Keuster (2009), found that 70 percent of all fatal dog bites are inflicted upon children. Due to their small size, children are more likely to suffer injuries to their head, face, and upper body when

bitten by dogs(Davis et al. 2012). Disturbing an animal while it is eating or resting without adult supervision is often the reason for 86 percent of attacks at home caused by child-animal interactions(Meints and de Keuster 2009). In the study by Davis et al., found that a child's temperament is linked to the way they interact with a familiar dog, with children who behave differently being less likely to be bitten(Davis et al. (2012).

As per research carried out in India, men are more prone to dog bites as they spend more time outdoors(Agarwal and Reddajah 2004). Shah et al., found that dog bites usually occur in the lower limb, followed by the upper arm, trunk, and face(Shah et al. 2012). Studies have found that a low socioeconomic background, including rural residency, is a predictor of animal bites(Kumar and Sinha 2016; Mehndiratta 2012; Rosado et al. 2009; Shuler et al. 2008; Sudarshan et al. 2007a) as well as fatal outcomes(Aga, Hurisa, and Urga 2015), owing to limited accessibility and availability of preventive and control measures.

Research in poor countries has shown low rates of dog vaccination coverage(Mulipukwa et al. 2017), with higher vaccination rates observed in households with stable finances(Mulipukwa et al. 2017). According to reports, accessibility, cost, and lack of knowledge about the dog vaccination program were the three major obstacles(Mulipukwa et al. 2017).

According to CDC, 2003, schoolchildren are frequently the victims of dog bites, as found in most investigations worldwide. Delivery boys, those employed by animal clinics or shelters, and those performing installations or repairs in homes were at a higher risk than other age groups. The WHO recommends annual pre-exposure immunisation for high-risk workers. Holla et al. (2017), discovered that healthcare

professionals lacked sufficient understanding of how the World Health Organization categorises animal exposure and how to treat patients based on their exposure category.

1.2.4.2 Animal Factors

In a study examining the demographics of dog owners and their pets, it was found that when comparing equal numbers of dogs that bite and those that do not, the former group had a higher frequency of dogs that were unlicensed, not currently vaccinated, neutered (surgical removal of both testicles in male dogs as part of animal breeding control), male species, and left chained in the yard, as opposed to the latter group which consisted of licensed dogs, dogs with current vaccinations, neutered dogs, females, and dogs not left chained(Gershman, Sacks, and Wright 1994). In contrast, research carried out in wealthier nations has shown that pet dogs that are given the freedom to roam around are generally more aggressive than stray dogs, especially when they are close to their owner's residence(Overall and Love 2001).

1.2.5 STRATEGIES FOR RABIES PREVENTION AND MANAGEMENT

One of the Sustainable Development Goals (SDGs) aims to eradicate dog-mediated human rabies by 2030. As part of the 12th five-year plan, the Ministry of Health and Family Welfare of the Government of India has launched the National Rabies Control Programme, which includes both human and animal components. The intention is to stop the spread of canine rabies and avoid human fatalities. The five complementary strategies for preventing and controlling rabies are as follows:

strengthening infrastructure and manpower for rabies diagnostic and surveillance; increasing bite wound care for optimal PEP at a reasonable cost; mass vaccination of dogs; managing the dog population; and mandating the mandatory reporting of all cases of rabies.

1.2.5.1 ANIMAL VACCINATION

Vaccinating animals, especially against rabies, plays a vital role in managing this deadly disease, which is primarily spread to humans via dog bites. The World Health Organization (WHO) underscores the significance of dog vaccination as it halts the transmission of rabies to humans, aiding in the objective of eliminating human rabies transmitted by dogs by 2030(World Health Organization 2018).

The cornerstone of rabies prevention is the mass vaccination of dogs. Vaccinating at least 70 percent of the dog population creates herd immunity, significantly reducing the risk of rabies transmission to humans and other animals(Hampson et al. 2015). The WHO recommends annual vaccination campaigns to maintain this level of immunity(World Health Organization 2018). In conjunction with vaccination, timely administration of PEP to bite victims is crucial(Madhusudana and Mani 2014). PEP includes thorough wound washing, administration of rabies vaccine, and, in severe cases, rabies immunoglobulin (RIG)(Bharti et al. 2017). This comprehensive approach is highly effective in preventing rabies if administered promptly after exposure(Madhusudana and Mani 2014).

1.2.5.2 SURVEILLANCE

In order to assess trends, identify danger regions, and direct action toward the eradication of rabies, the animal and human domains must maintain ongoing surveillance(Lionel Harischandra et al. 2016).

1.2.5.3 EDUCATIONAL INTERVENTIONS

Long acknowledged as a cornerstone of continued rabies control efforts, educational interventions combining bite prevention and rabies awareness targeting vulnerable populations, particularly children, are implemented(Auplish et al. 2017). Cluster-based studies were conducted in Sikkim, India, to assess knowledge about responsible behavior around fearful dogs, potential sources of rabies, and appropriate organisation of preventative measures after a bite exposure(Auplish et al., 2017). These studies showed a positive intra-class correlation both before and after interventions were implemented. This illustrates why teaching rabies prevention in schools is essential.

1.2.5.4 ANIMAL BIRTH CONTROL PROGRAM (ABC)

Several Indian cities implemented ABC as a long-term solution to the issue of dogs wandering the streets. The goal of this program was to reduce dog bite injuries and rabies cases while also promoting the welfare of humans and animals. It was advised to conduct baseline and recurring stray dog censuses to calculate dog population density.

The Animal Welfare Board of India's suggested ethical standards and a Standard Operating Procedure (SOP) were followed in the capture, neutering, vaccination,

and return of the canines to their original site(Animal Birth Control – Anti Rabies Vaccination Programme, Kochi Corporation). The ABC program sought to minimise the prevalence of rabies in the area, decrease mating, maternal, and pack violence in stray dogs, and reduce the density of stray dogs in the area.

The country's huge stray dog population is thought to be caused by the abundance of food waste, water, and shelter that are readily available everywhere. In India, it is forbidden to kill stray dogs, as the Honourable Supreme Court has instructed in its many rulings. Furthermore, it has been discovered that poisoning and killing stray dogs without first managing food waste only temporarily lowers the population. As more young, active, and aggressive migrating packs repopulate the area, there will inevitably be a fast population explosion(Animal Birth Control – Anti Rabies Vaccination Programme, Kochi Corporation).

Stated differently, the life expectancy of the surviving rises when some canines are killed because they have better access to resources and face less competition for them(ABC report, 2014). It might also lead to an increase in other pests, such as rats. This could lead to an increase in other severe public health issues including leptospirosis and the plague. Additionally, it has been discovered that the use of diclofenac in livestock has led to residues in butcher wastes, which has caused a progressive decline in the number of vultures and other scavengers. Free-ranging dogs have since taken their place.

Territorial conflicts over food and breeding opportunities can lead to alterations in behaviour and the odd attack on humans, particularly young children. The ability to vaccinate and sterilise 70 percent of stray dogs in a particular area before the start of the next reproductive cycle is crucial to the ABC program's success. India is

facing significant challenges due to a large number of stray dogs and a lack of funding for widespread dog vaccination and sterilising programs(Animal Birth Control – Anti Rabies Vaccination Programme, Kochi Corporation).

1.2.6 GEOGRAPHIC INFORMATION SYSTEM (GIS)

1.2.6.1 Utilisation of GIS in Rabies

A Geographic Information System (GIS) is a specialised computer database for managing data linked to specific geographic locations(Chen 2022). It processes two types of information: geographical information (such as the locations of features like boundaries or districts) and attribute data (which includes details about a place, like the number of animals, population size, or disease prevalence). Application of GIS is useful in research and managing diseases and conditions that are linked with the environment and habitat(Blanton et al. 2006).

Mapping the locations of animal bite incidents provides a comprehensive understanding of the spatial distribution of these cases(Department of Community Medicine, MKCG Medical College, Berhampur, Odisha, India. and Mandal, 2022). This technique aids in pinpointing and explaining the pattern of disease occurrence, identifying areas that should be prioritised for interventions, and assist in creating models to depict the disease process(Singh and Choudhary 2005). Advances in computing power and graphics, as well as the development of GIS-based location analysis models and methods, have stimulated innovative healthcare applications. Epidemiologists have started to make use of geocoded health data to identify areas with higher or lower than expected disease burden, transmission rates, or health service usage(Shrestha et al. 2022; Singh and Soman 2021). This data allows for the

mapping and visualising of disease patterns and is also crucial for statistically analysing these patterns(Cromley 2019). Geographic information systems have contributed to bringing research and public health aspects closer together(Asheel 2009).

1.3 RATIONALE OF THE STUDY

Rabies is a deadly zoonotic disease that affects humans and animals, causing significant morbidity and mortality worldwide. In India, it remains a major public health concern, with Kerala being one of the states reporting a high number of cases. Category III animal bites, which involve deep wounds and potential exposure to the rabies virus, require immediate medical attention and post-exposure prophylaxis (PEP) to prevent the onset of the disease.

This study aims to conduct a geospatial analysis of category III animal bites in Thiruvananthapuram District, Kerala, to identify high-risk areas and assess the care-seeking pathways of individuals who availed PEP with Equine Rabies Immunoglobulin (ERIG). Geospatial analysis will enable us to map and visualise the spatial distribution of animal bites, allowing for targeted interventions and resource allocation.

By analysing the care-seeking pathways, we aim to understand the factors influencing the decision-making process of individuals seeking PEP with ERIG. This will help to identify any barriers and also challenges faced by the community, healthcare providers, and the local health system in providing timely and appropriate care. The findings will contribute to the development of strategies to improve the accessibility and availability of PEP services in high-risk areas. This study approach

will provide a holistic understanding of the dynamics surrounding category III animal bites and PEP utilisation in Thiruvananthapuram District.

The study findings will have implications for public health policy and practice. They will inform the development of evidence-based interventions to control and prevent rabies, reduce the burden on healthcare facilities, and ultimately improve the health outcomes of individuals at risk of rabies in Thiruvananthapuram District, Kerala.

1.4 OBJECTIVES

- Spatiotemporal analysis of reported Category III animal bites during January to March 2024 in the district of Thiruvananthapuram.
- Studying the care-seeking pathways of those availed post-exposure vaccination with equine rabies immunoglobulin for animal bites in Thiruvananthapuram from January to March 2024.

CHAPTER 2

METHODOLOGY

2.1 Study design

A hospital-based cross-sectional survey was conducted among category III animal bite victims in Thiruvananthapuram district who took ERIG from government health facilities from December 2023 to February 2024 (three-month period).

2.2 Study setting

The study was conducted in Thiruvananthapuram district, also referred to as Trivandrum; It is the capital city of the Indian state of Kerala. The district area is 2192 sq. km, and the city has a population of 33,07,284 (Census, 2011). Thiruvananthapuram district is situated between north latitudes 8º 17′ and 8º 54′ and east longitudes 76º 41′ and 77º 17′. Under the two revenue divisions, the district has six Taluqs and 124 Villages. Under the Local Self Government System, the District has one corporation, four municipalities, 11 Blocks and 73 Panchayats.

2.3 Sample selection

WHO categorisation of animal bite wounds

The animal bite wounds are categorised into three based on the type of contact according to WHO guidelines.

Types of contact are:

- Category I – touching or feeding animals, licks on the skin

- Category II - nibbling of uncovered skin, minor scratches or abrasions without bleeding, licks on broken skin
- Category III – single or multiple transdermal bites or scratches, contamination of mucous membrane with saliva from licks; exposure to bat bites or scratches

Inclusion criteria: All reported category III animal bite victims who took anti-rabies immunoglobulin treatment from the government health facilities mentioned below during the data collection period.

Exclusion criteria: Those animal bite victims whose contact details were unavailable in the registry.

In the proposed study, only the Category III bite cases were considered, as rabies immunoglobulin is administered only for severe animal bite cases as per guidelines. Data on the locations and dates of reported Category III animal bites in Thiruvananthapuram district was collected from government records, hospital records, and other relevant sources. Information on PEP facilities, including location, services offered, and operating hours, can also be obtained from the healthcare institutions. Based on initial data from the Rabies preventive clinic at Government Medical College Trivandrum, which is the tertiary health care centre that sees the maximum cases, it was estimated that each month the district had around 300 to 400 Category III bite cases that required post-exposure prophylaxis (PEP). However, these figures can fluctuate depending on the season. The other healthcare institutions that provided Equine Rabies Immunoglobulin (ERIG) as post-exposure prophylaxis in Thiruvananthapuram district are:

- Government General Hospital, Thiruvananthapuram
- Government General Hospital, Neyyatinkara
- Government Taluq Headquarters Hospital, Chirayinkeezh
- Government Taluq Hospital, Attingal

2.4 Data collection

ARV register data from the above-mentioned hospitals from December 2023 to February 2024 was accessed after obtaining permissions from the State Director of Medical Education (DME), the Directorate of Health Services (DHS), and the District Medical Officer (DMO). From the ARV registers telephone numbers of the animal bite victims who took Anti-Rabies Immunoglobulin were obtained. The health system personnel first contacted the animal bite victim based on the ARV registry and sought consent to be contacted by the principal investigator (PI). After obtaining their consent the PI and his research assistants conducted the telephone survey.

2.4.1 Data collection tool

A telephonic script for obtaining consent for participation followed by a structured interview schedule for those who consented was utilised to conduct the survey. Apart from the telephone numbers, the register records details regarding patient residence, age, sex, type of animal, type of serum, and dose received. The telephone interview schedule was mainly intended to collect information about the location of the animal bite event as that information was not present in the

registers.

2.4.2 Data entry and analysis

Open Data Kit (ODK), a free, open-source toolkit that has been used for data entry using Android and iOS devices, was saved in the institute's online secure server. The entries were then cleaned using Microsoft Excel version 2013 (Microsoft Office Professional Plus 2013). The participants were assigned a unique ID for maintaining confidentiality. The location of the bite events was manually identified from Google Maps and the geocodes were obtained by scrolling Google map view to a certain extent and right-clicking on the identified location from the map. Descriptive analysis was done to study the distribution of risk factors. Differences in proportion were tested by Pearson's chi-square using IBM SPSS statistics software version 20. A p-value of less than 0.05 was considered significant. Odds ratios were estimated by logistic regression. All tests were two-sided. The geospatial analysis and mapping were done using free and open-source software R version 4.3.1.

Predictor variables used:

Human related factors

Gender and age of bite victims
Religion and socioeconomic status
Education and occupation of the victims
Area of residence
Nature of the bite
Previous history of bite

Animal related factors

Type of animal

Context of the bite event

Vaccination status of the animal

Availability of the animal for observation

Severity of injury

Environment related factors

Geographic location of bite and bite with respect to residence

Day and time of bite

Knowledge, attitude and practices

Knowledge on anti-rabies vaccination

Bite wound washing

Previous history of vaccination

Care seeking factors

Decision-making about treatment

Distance to nearest health care facility

Type of health care facility first went for treatment

Mode of conveyance for seeking care

Outcome variables used:

The study participants were all those who received anti-rabies immunoglobulin following an animal bite. Thus, the outcome variable considered for analysis were

Decision Making (Self or Others)
Type of Animal Biting (Domestic or Stray)
Type of the Animal Bite (Provoked or Unprovoked)

2.4.3 Population data

The population density of Thiruvananthapuram district and its various sub-administrative divisions was collected from the Census of India 2011(http://www.censusindia.gov.in).

2.4.4 Spatial data

Geo-referenced administrative map (polygon shapefile) of Thiruvananthapuram district was obtained from the geospatial data resources at AMCHSS.

2.4.5 Geospatial mapping

The locations of the reported category III animal bite cases were geo-coded case by case using Google Maps. Latitude and longitude coordinates were obtained for each case and were incorporated into the primary dataset.

The shape file of Thiruvananthapuram district was obtained from the geospatial resources at AMCHSS.The coordinate reference system (CRS) of the shape file was EPSG 32643, which was transformed into EPSG 4326 using the

st_transform() function of the *sf* package in R. The animal bite locations and the locations of hospitals providing the anti-rabies immunoglobulin obtained from Google Maps were also converted to the EPSG 4326 format for spatial analysis in R software. Thematic maps were created using *ggplot2()* and *geom_sf()* packages in R software.

The population density per square kilometre was determined using the area and the population data from the 2011 census available in the shape file. The number of bites in each polygon was counted using the *lengths()* function, and the incident bite rate per 100,000 population was calculated for each polygon. An autocorrelation analysis was performed on the animal bite rates, adjusting for differences in population density. A choropleth map of the population density was created to investigate potential clustering. Similar choropleth maps were generated for bite rates to assess autocorrelation.

Neighbourhood Weights Matrix

Neighbourhood Weights matrix were created using the Queen's neighbour method using the *poly2nb()* function in the SPDEP package in R.

Subsequently the spatial weighted neighbour lists were created using the *nb2listw()* function of SPDEP package in R. The weighted means were estimated to evaluate if any global clustering/autocorrelation exists or not.

GLOBAL MORAN'S INDEX and LISA statistics

Global clustering techniques are employed to evaluate if clustering is evident across the entire study area, but they do not pinpoint the location of clusters. The null hypothesis for global clustering techniques is that 'there is no clustering, or in other words, there is complete spatial randomness (CSR) or random spatial distribution throughout the study area. Local spatial clustering measures are used to determine if there are any specific locations for the clusters.

The validity of the spatial clustering was explored using the Global Moran's Index using the *moran.test()* function and autocorrelation at a more local level were explored using the local indicator for spatial association (LISA) statistic using the *local.moran()* function of the SPDEP package in R. Moran's I is similar to Pearson's correlation coefficient and its value generally lies between +1 and -1. A positive value indicates positive spatial autocorrelation, while a negative value indicates no spatial clustering. Significance of Moran's I was tested using Monte Carlo randomisation using the function *moran.mc()* of the SPDEP package. Choropleth maps were created using the LISA scores to locate the areas of spatial clustering.

Estimating the Travel Distances

The OSRM (Open-Source Routing Machine) package in R is a utility that leverages data from OpenStreetMap data to determine the shortest routes or

distances between locations. It's especially beneficial for tasks that require routing, including logistics, transportation planning, and geographical analysis. In the R software, using the function osrmTable() from the OSRM package, a chart showing the travel distances and time taken from each bite event location to the hospitals is created using freely available Open Street Map (OSM) resources. Then, for each bite event, the nearest hospital was found by finding the smallest value in the corresponding row of this distance chart. Furthermore, the average travel distances from the various bite event locations were estimated, assuming an average speed of 35 km/hr (the average speed assumed within in the district roads).

2.5 ETHICAL CONSIDERATIONS

Data collection was started after obtaining clearance from the Institutional Ethical Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. Required permissions were also obtained from the hospitals selected for the interview. Telephonic verbal consent obtained from the participants was recorded and securely stored after encryption. The individual contact details collected were saved in a separate file, and the attribute data file was linked by a non-identifiable code (participant identification number) to ensure the privacy and confidentiality of the study participants.

The geospatial analysis was done at the district level. The maps thus generated were small-scale maps without any in-depth details to pinpoint individual households or villages. Participation was voluntary, and they were allowed to withdraw from the interview at any time.

CHAPTER 3

RESULTS

3.1 Introduction

The results of the hospital-based cross-sectional survey and the geospatial mapping are described.

Of the total 1200 category III animal bite patients whose contact details were obtained from the ARV registry, 982 participants could be successfully contacted. This resulted in a response rate of approximately 81.83 percent. The remaining 218 patients could not be contacted due to reasons such as ineligible telephone details entered in the ARV registry and calls that could not be completed either due to the number being busy or wrong numbers. This accounted for a non-response rate of approximately 18.17 percent. Among the 982 participants who were contacted, the animal bite locations of 943 could be traced and geo-coded, indicating the geo-coding success rate among the respondents was approximately 96.03 percent. After data cleaning and plotting the locations in the map, it was found that ten of the bite event locations were outside the Thiruvananthapuram district boundaries, and thus, they were excluded, and the final sample size of the analysis was 933 participants.

3.2 Human-related factors

Sociodemographic characteristics

The female-to-male sex ratio of animal bite victims was 0.86 compared to 1.09 in the general population. The mean (SD) age of animal bite victims was 33.4 (21.51) years for males and 39.2 (21.4) years for females (Table 3.1). A higher proportion of bites was observed in children and the 46-69 age group. (Fig 3.1)

Table 3.1 Gender-age distribution of animal bite victims (N = 933)						
Gender	Count	Mean	Median	SD	Minimum	Maximum
Female	433	39.27	41	21.49	2	94
Male	500	33.47	31	21.51	1	87

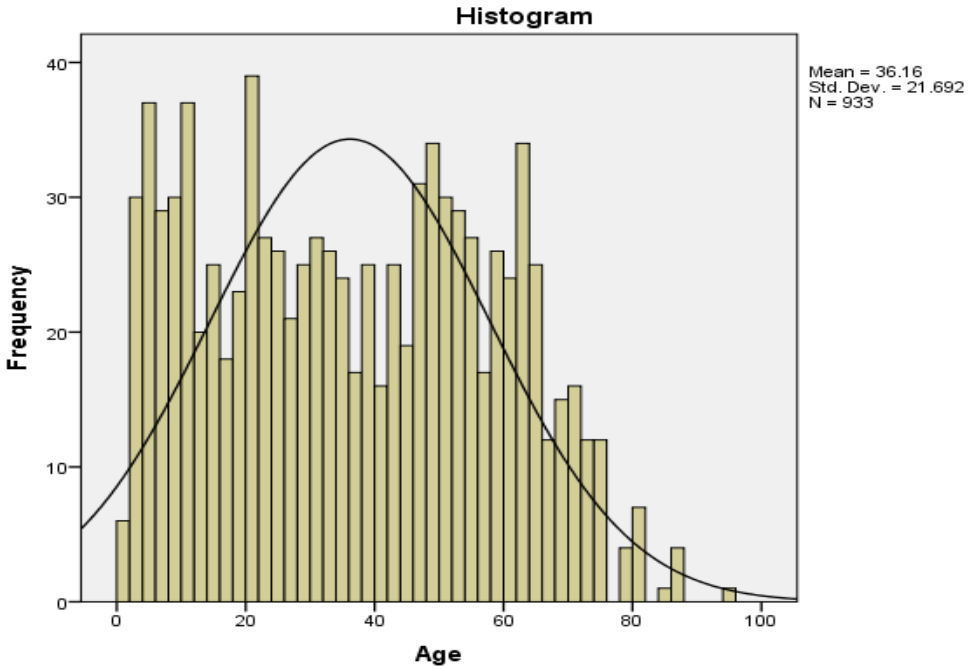

Fig 3.1 Distribution of Age of the Participants

Table 3.2 Sociodemographic characteristics of the study population(N= 933)	
Variable	**Frequency (%)**
Gender	
Male	500 (53.6)
Female	433 (46.4)
Religion	
Hindu	713 (76.5)
Christian	113 (12.1)
Muslim	106 (11.4)
Socioeconomic status	
APL	348 (37.3)
BPL	585 (62.7)
Age group (based on median age of participants)	
<35 years	470(50.4)
>= 35 years	463(49.6)
Educational level	
Up to Higher secondary	518(55.5)
More than Higher secondary	415(44.5)
Employment status of the animal bite victims	
Employed	535(57.3)
Unemployed	398(42.7)
Area of Residence	
Rural	639 (68.5)
Urban	294 (31.5)

The sociodemographic characteristics of the study population are detailed in Table 3.2. Three-fourths (76.5%) of the victims were Hindus, followed by Christians (12.1%) and Muslims(11.4%). About two-third (62.7%) of the population classified as living below the poverty line (BPL) in terms of their socioeconomic status. The distribution of ages is almost even, with 50.4 percent of the population being under the age of 35 years (median age) and 49.6 percent being above the age of 35 years. The percentage of people who have completed their education up to the Higher Secondary level is 55.5 percent, while 44.5 percent have completed their education beyond this level. More than half of the victims are employed (57.3%). Rural areas are home to the majority of people (68.5%), while urban areas are home to the remaining 31.5 percent of the population.

3.3 Animal-related factors

As detailed in Table 3.3, out of the total 933 animals that were bitten, 27.1 percent were classified as stray animals, while the remaining 72.9 percent were categorised as domestic animals. Among the 680 domesticated animals, pet dogs (67.2%) constituted the majority of category III bites. Stray dogs and cats together accounted for 24.4 percent. The other wild animals (2.8%) that caused serious bites were rats, mongooses, monkeys, bandicoots, civets or toddy cats. Out of all the bites, 79 percent were unprovoked, whereas just 21 percent were provoked. Regarding the severity, 72 percent of the injuries resulted from both single and multiple bites, whereas 28 percent were caused by scratches and licks. When it came to vaccination status, 40.7 percent of the animals were given vaccines, which could have reduced the likelihood of disease transmission, while 59.3 percent had not.

Table 3.3 Animal related factors (N=933)	
Variable	**Frequency (%)**
Type of animal	
Domestic	680(72.9)
Stray	253(27.1)
Type of animal bite	
Provoked	196 (21.0)
Un-provoked	737 (79.0)
Severity of bite	
Scratch and lick	261(28.00)
Single and multiple bite injuries	672(72.00)
Observation status after bite	
Observable	734 (78.7)
Not observable	199 (21.3)
Vaccination status of animal	
Vaccinated	380 (40.7)
Un-vaccinated	553 (59.3)

3.4 Environment related aspects

The Table 3.4 details the timing of animal bite and the bites with respect to home. The frequency of biting is highest during the day at 32.5 percent (303 occurrences), while it is lowest in the morning at four percent (37 incidents). The afternoon (27.9%, or 260 incidents) and night (21.3%, or 199 events) are when biting activity is most active. Of all known incidents, 14.4 percent (134 events) occur during the night. Biting incidents

have been observed to occur in three distinct locations: at home, in close proximity to home, and away from home. Seventy one percent of all attacks occurred within the confines of one's residence (69 cases). Although 18.9 percent (176 events) occurred in close proximity to ones homes, a mere 10.5 percent (98 occurrences) happened away from the residence. The most frequent locations for biting incidents appear to be within their place of residence which is corroborating to the frequencies of domestic animal bites, according to these findings.

Table 3.4 Environment related aspects (N=933)	
Variable	**Frequency (%)**
Time of bite event	
Early morning (12am - 6 am)	37 (4.0)
Day time (6am - 12 noon)	303 (32.5)
Afternoon (12pm - 4pm)	260 (27.9)
Evening (4pm - 7pm)	199 (21.3)
Night (7pm - 12am)	134 (14.4)
Bite event with respect to home	
At home	659 (70.6)
Near to home	176 (18.9)
Away from home	98 (10.5)

3.5 Knowledge, attitude, and practices

The survey's findings shed light on the beliefs, behaviours, and knowledge of the 933 people that made up the sample as detailed in Table 3.5. As per the study around 48.7

percent of the participants (454 participants) knew about Post-Exposure Prophylaxis (PEP), while 51.3 percent (479 participants) did not. Regarding first aid measures, a minimal of 2.7 percent (25 participants) did not follow this practice, whereas a significant majority of 97.3 percent (908 participants) reacted positively to washing the wound as an instant response. These results demonstrate the wide range of PEP and first aid behaviours and awareness among the population studied.

Table 3.5 Knowledge, attitude, and practices (N=933)	
Variable	**Frequency (%)**
Awareness about PEP	
Aware	454 (48.7)
Not aware	479 (51.3)
First aid status	
Washed	908 (97.3)
Not washed	25 (2.7)

3.6 Care seeking factors

In the study with 933 participants, 51.3 percent decided by themselves to seek treatment following the animal bite, whereas 48.7 percent depended on other people to make the decision. More than half (58.0%) of the participants used their own vehicles to reach the health centre, while 42 percent utilised public transit. The majority of the participants (97.5%) favoured government health facilities for seeking care. Among the 910 participants who went to government health facilities, about 27.69 percent said they went first to a primary health centre following the bite event;

10.99 percent went to community health centres; 54.83 percent went to either general hospital or taluq hospitals; and 6.49 percent said they went directly to the medical college for seeking treatment.

Table 3.6 Care seeking factors (N=933)	
Variable	**Frequency (%)**
Decision maker regarding treatment	
Self	479 (51.3)
Others	454(48.7)
Means of travel to health centre	
Personal vehicle	541 (58.0)
Public transportation (Bus/train)	392 (42.0)
Health facility preference among victims (n=933)	
Public facility	910(97.5)
Others	23(2.5)
Facility preferred immediately after the bite among Govt hospitals (n=910)	
Primary Health Centre	252 (27.69)
Community Health Centre	100 (10.99)
General Hospital/Taluq Hospital	499 (54.83)
Medical College	59 (6.49)

Table 3.7 Association of Sociodemographic factors with type of animal bite event (N = 933)				
Variable	**Type of animal bite**		**P value Chi square test**	**OR (95%CI)**
	Unprovoked	**Provoked**		
Gender				
Female	349(80.6)	84(19.4)	0.298	Reference
Male	388(77.6)	112(22.4)		1.199 (0.873 – 1.648)
Age group (years)				
>=35	373 (80.6)	90 (19.4)	0.277	Reference
<35	364 (77.4)	106 (22.6)		0.829 (0.604 – 1.136)
Socioeconomic status				
BPL	466 (79.7)	119 (20.3)	0.573	Reference
APL	271 (77.9)	77 (22.1)		1.113 (0.805 – 1.537)
Educational status				
More than higher secondary	334 (80.5)	81 (19.5)	0.358	Reference
Up to higher secondary	403 (77.8)	115 (22.2)		0.850 (0.618 – 1.169)
Place of residence				
Urban	231 (78.6)	63 (21.4)	0.898	Reference
Rural	506 (79.2)	133 (20.8)		1.038 (0.740 – 1.454)
Employment status				
Unemployed	302 (75.9)	96 (24.1)	**0.053**	**Reference**
Employed	435 (81.3)	100 (18.7)		**1.383 (1.008 – 1.897)**

3.7 Association of Sociodemographic factors with type of animal bite

Bivariate analysis was performed using cross-tabulation, chi-square tests, and binary logistic regression to assess the relationship between sociodemographic variables and the type of animal bites classified as provoked or unprovoked is presented in Table 3.7. The table shows that those under the age of 35 years are less likely when compared to those people 35 and older to be bitten by an animal without provocation (OR=0.829). This finding is also of no statistical significance (p=0.277). People belonging to APL socioeconomic status are somewhat more likely to have an unprovoked animal bite than people who are in BPL (p=0.573) and this difference is not statistically significant.

Participants who have completed education up to higher secondary level are less likely than those who have completed above higher secondary education (the reference group) to suffer an unprovoked animal bite (p=0.358) which is not statistically significant. The probability of suffering an unprovoked animal bite is somewhat higher for rural residents than for urban ones (p-value = 0.898) indicating this difference is not statistically significant. According to the study, those who are employed show a higher risk of suffering from an unprovoked animal bite than people who are unemployed with a p-value of 0.053 which is slightly above the cutoff and thus not statistically significant as this could be due to a chance event.

3.8. Association of Sociodemographic factors with type of animal

The relationship between sociodemographic variables and the type of animal based on ownership classified as stray or domestic is presented in Table 3.8. The odds ratio of 1.368 (95% CI: 1.017 – 1.839) indicates that people in employment are roughly 1.368

times more likely than people in unemployment to experience a domestic animal bite. This odds result is statistically significant as 1 is not included in the confidence interval. The odds ratio of 1.369 (95% CI: 1.025 – 1.830) indicates that, on average, people over the age of 35 are approximately 1.369 times more likely to have a domestic animal bite than people under the age of 35 which was found to be statistically significant.

Table 3.8 Sociodemographic factors associated with type of biting animal (N = 933)				
Variable	**Type of animal biting**		**P value Chi square test**	**OR (95%CI)**
	Stray	**Domestic**		
Gender				
Male	147 (29.4)	353 (70.6)	0.107	Reference
Female	106 (24.5)	327 (75.5)		1.285 (0.960 – 1.720)
Age group (years)				
>=35	140 (30.2)	323 (69.8)	**0.04**	**Reference**
<35	113 (24.0)	357 (76.0)		**1.369 (1.025 – 1.830)**
SES				
APL	95 (27.3)	253 (72.7)	0.984	Reference
BPL	158 (27.0)	427 (73.0)		1.015 (0.753 – 1.367)
Educational status				
Up to higher secondary	152 (29.3)	366 (70.7)	0.102	Reference
More than higher secondary	101 (24.3)	314 (75.7)		1.291 (0.963 – 1.731)
Place of residence				
Urban	84 (28.6)	210 (71.4)	0.549	Reference
Rural	169 (26.4)	470 (73.6)		1.112 (0.817 – 1.514)
Occupation				
Unemployed	94 (23.6)	304 (76.4)	**0.046**	Reference
Employed	159 (29.7)	376 (70.3)		**1.368 (1.017 – 1.839)**

Table 3.9 Sociodemographic factors associated with Care seeking decision making (N = 933)				
Variable	**Care seeking decision made**		**P value Chi square test**	**OR (95%CI)**
	Self	**Others**		
Gender				
Male	285(57.00)	215(43.00)	**<0.001**	**Reference**
Female	194(44.8)	239(55.2)		**1.633 (1.260 to 2.116)**
Socioeconomic status				
APL	178 (51.1)	170 (48.9)	0.982	Reference
BPL	301 (51.5)	284 (48.5)		1.012 (0.776 – 1.320)
Educational status				
More than higher secondary	266 (64.1)	149 (35.9)	**<0.001**	**Reference**
Up to higher secondary	213 (41.1)	305 (58.9)		**2.556 (1.959 – 3.336)**
Age group				
>=35	296(63.9)	167(36.1)	**<0.001**	**Reference**
<35	183(38.9)	287(61.1)		**2.780 (2.132 to 3.624)**
Place of residence				
Urban	149 (50.7)	145 (49.3)	0.839	Reference
Rural	330 (51.6)	309 (48.4)		1.039 (0.788 – 1.370)
Employment status				
Unemployed	118 (29.6)	280 (70.4)	**<0.001**	**Reference**
Employed	361 (67.5)	174 (32.5)		**4.923 (3.717 – 6.521)**

3.9 Association of Sociodemographic factors with Care seeking decision making

Bivariate analysis to assess the relationships between the decision on seeking care and other sociodemographic characteristics is described in Table 3.9. The independent variables were the place of residence, employment status, educational level, gender, and age group category. The odds ratio for females is 1.633 (95% CI: 1.260 - 2.116). This indicates that rather than making their own decisions for seeking treatment, women are 63.3 percent more likely than men to have those decisions done for them. The odds ratio for those with only a higher secondary education is 2.556(95% CI: 1.959 - 3.336). This indicates that, in comparison to those with more education than higher secondary, people with up to higher secondary education are around 2.556 times more likely to have their care decisions decided by others rather than by themselves. The odds ratio for people under 35 years is 2.780 (95% CI: 2.132 - 3.624). According to this, people under the age of 35 years are approximately 2.780 times more likely than people older than 35 years to have decisions regarding their treatment made for them by others than by themselves. It was discovered that those who were employed or working were around 4.923 times more likely than those without jobs to make their own decisions about obtaining care (95% CI: 3.717 - 6.521). All the above associations were statistically significant as the p-value was less than 0.001.

3.10 SPATIAL ANALYSIS OF CATEGORY III ANIMAL BITE CASES

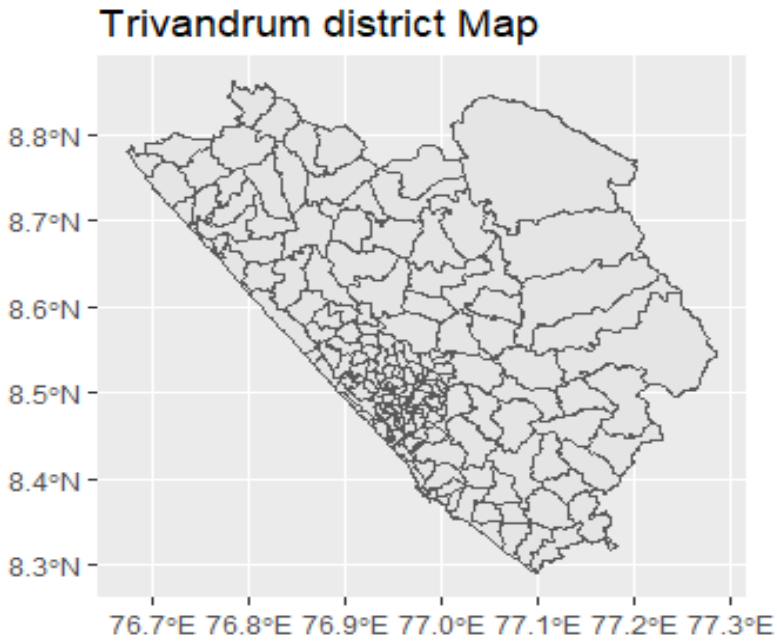

Fig 3.2 Map of Trivandrum district with boundaries

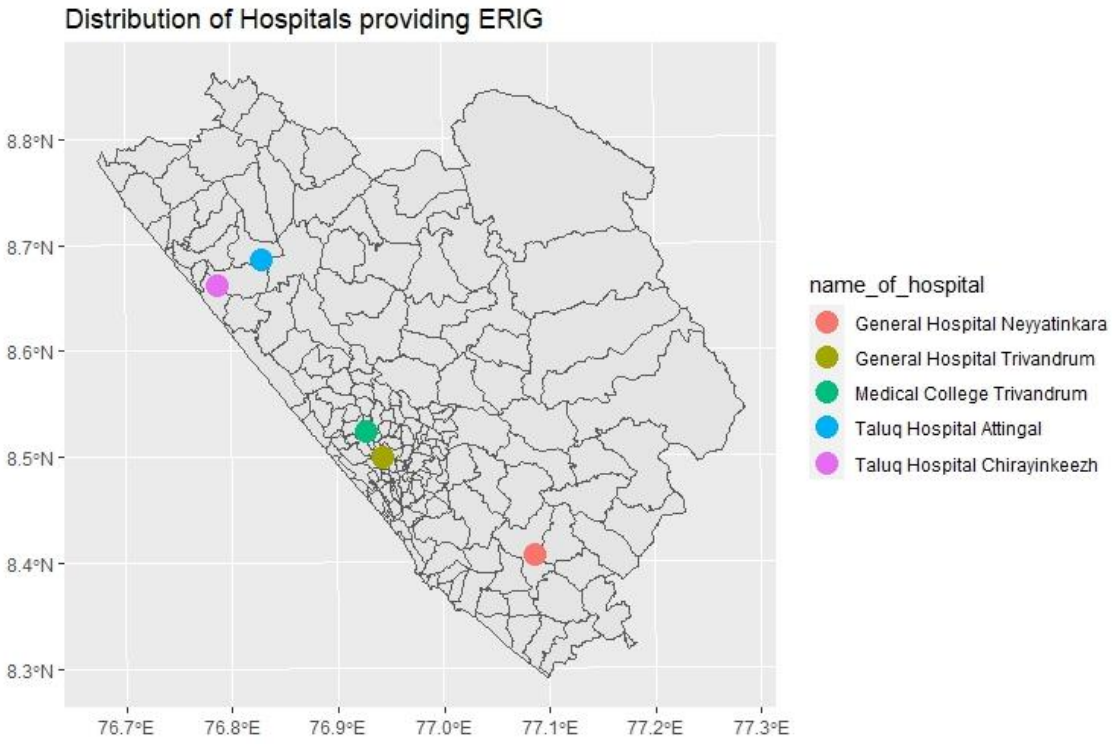

Fig 3.3 Location of Hospitals providing ERIG in the district

The distribution of Government Hospitals that provides ERIG in Trivandrum district is shown in map (Fig 3.3) We could see from the map that the locations of the centres are more or less situated along a vertical manner with Taluq Hospital Chirayinkeezh and Taluq Hospital Attingal in the north; General Hospital and Trivandrum Medical College in the middle; and General Hospital Neyyatinkara in the south of the district.

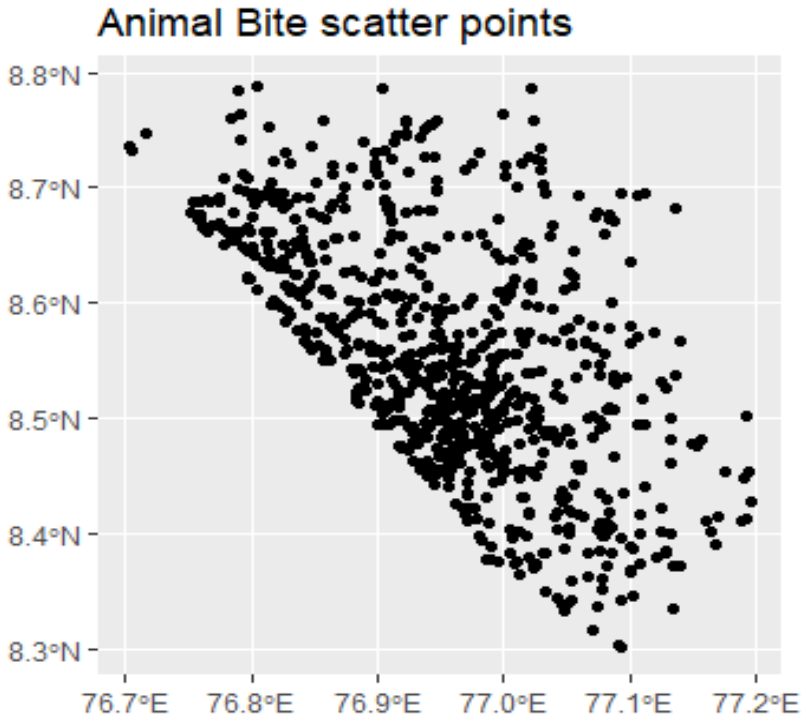

Fig. 3.4 Scatter plot of animal bite incidents

The shape file for the Thiruvananthapuram district was sourced from AMCHSS's geospatial resources. The shape file's Coordinate Reference System (CRS) was converted to EPSG 4326 using the st_transform() function from the sf package in R. Locations of animal bites and hospitals offering anti-rabies immunoglobulin, which

were obtained from Google Maps, were also transformed to the EPSG 4326 format for spatial analysis in R. Thematic maps were generated using the ggplot2() and geom_sf() packages in R.

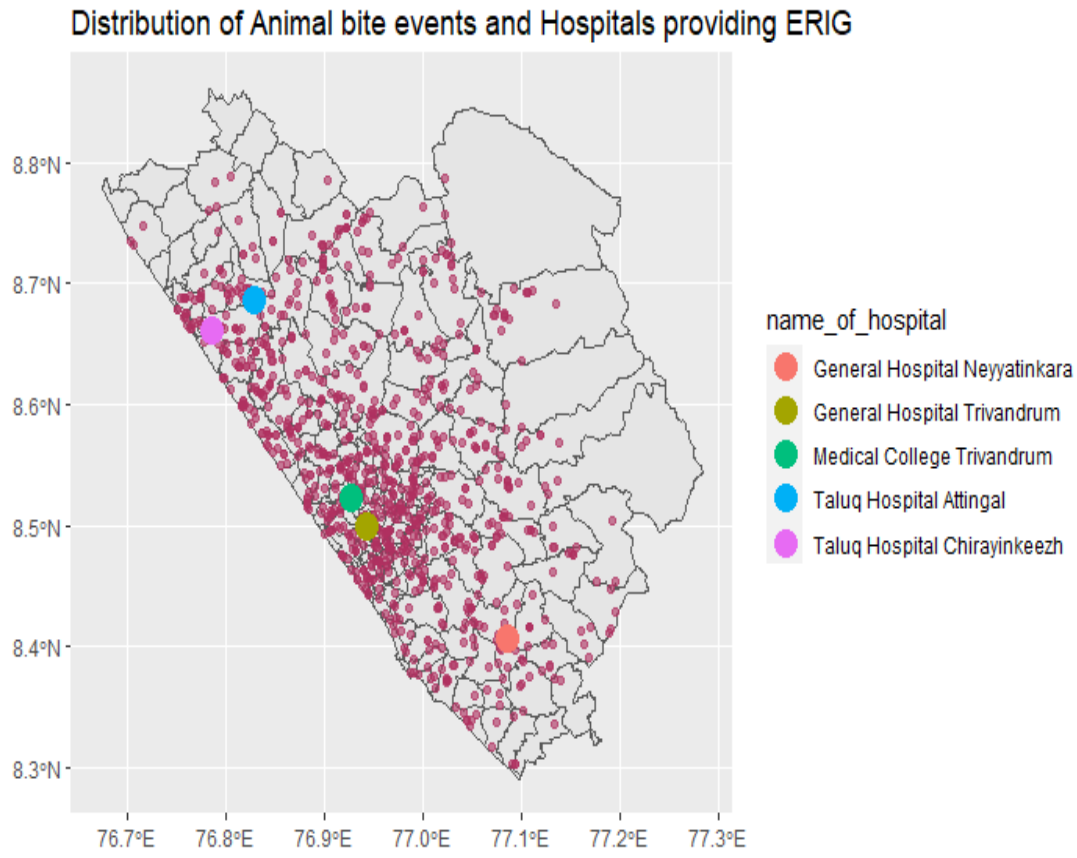

Fig. 3.5 Geospatial Map showing animal bite events and locations of the hospitals

The population density per square kilometre was calculated using the area and population data from the 2011 census, which was available in the shape file. The lengths() function was used to count the number of bites in each polygon, and the incident bite rate per 100,000 population was computed for each polygon. An autocorrelation analysis was conducted on the animal bite rates, taking into account variations in population density. A choropleth map was created to examine the

population density and identify potential clusters. To evaluate autocorrelation, choropleth maps were also created for bite counts (Fig. 3.6) and bite incidence rates (Fig 3.7)

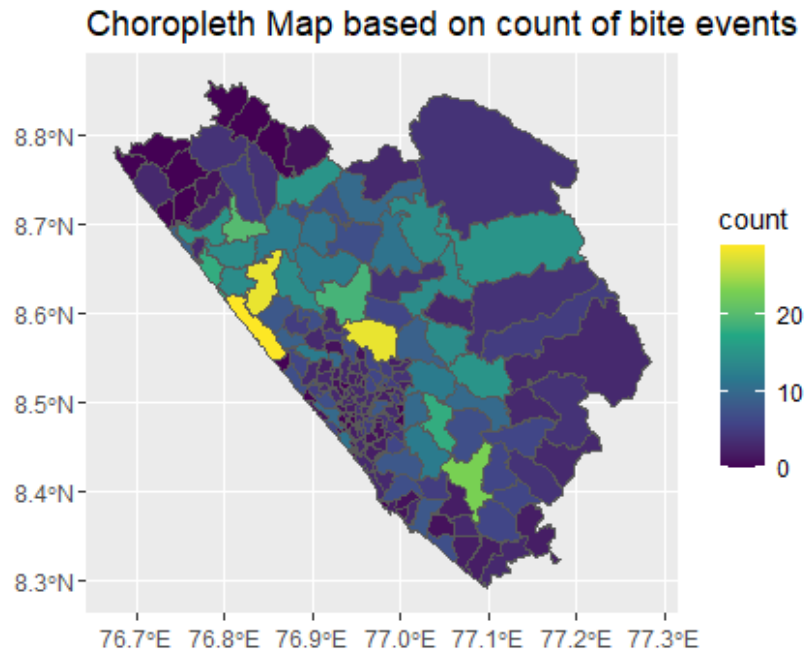

Fig. 3.6 Choropleth Map showing the counts of animal bite events

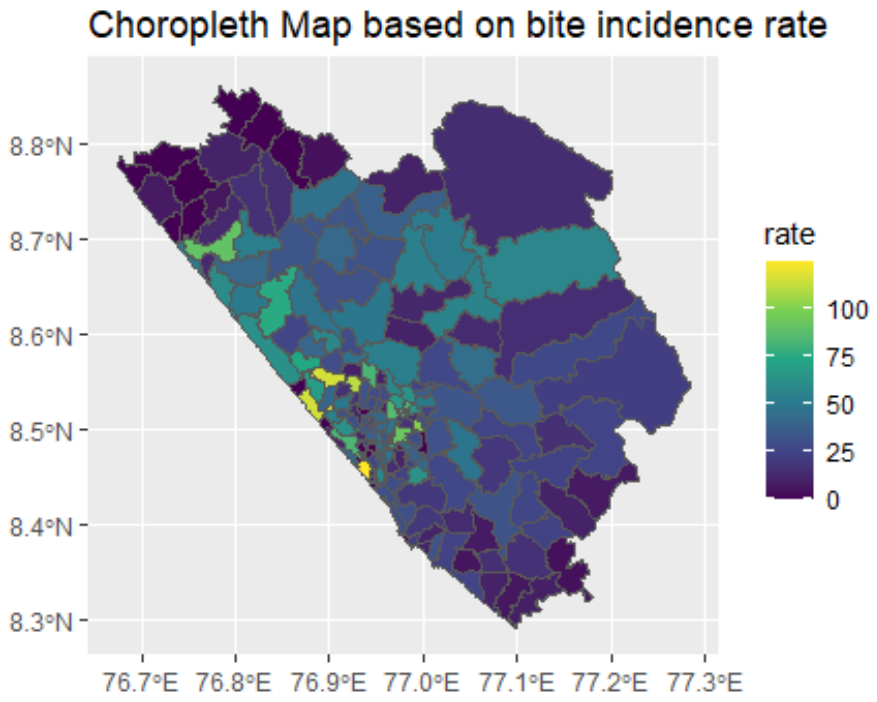

Fig. 3.7 Choropleth Map showing animal bite incidence rate

Neighbourhood Weights Matrix

Neighbourhood Weights matrix was created using the Queen's neighbour method using the *poly2nb()* function in the SPDEP package in R (Fig 3.8). Subsequently, the spatially weighted neighbour lists were created using the nb2listw() function of the SPDEP package in R. The weighted means were estimated to evaluate whether any global clustering/autocorrelation exists.

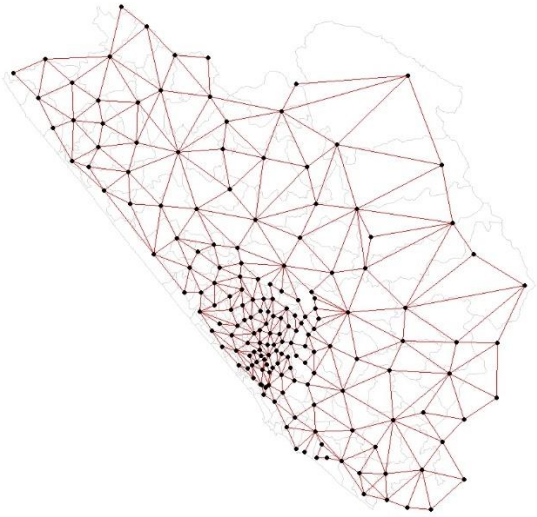

Fig. 3.8 Queens Neighbourhood Weights Matrix

LISA Map

Local Indicators of Spatial Association (LISA) map is a tool commonly used in geospatial analysis to identify clusters or hotspots to analyse category III animal bite incidents.

After doing the Moran's I calculation using *moran.test()* function in SPDEP package of R, the p value obtained for Moran's I is <0.05 (Moran I statistic standard deviate = 2.7385, p-value =0.003086) and is positive, so there exists spatial autocorrelation in the occurrence of animal bites in the district. To test its significance, 999 Monte Carlo simulations were performed to establish a range of potential values representing the distribution of the sample's complete spatial randomness. Monte-Carlo simulation of Moran I (statistic = 0.12787, observed rank = 998, p-value = 0.002). These simulated values were then compared with the observed LISA values to verify the presence of spatial clustering and the choropleth map created (Fig 3.9).

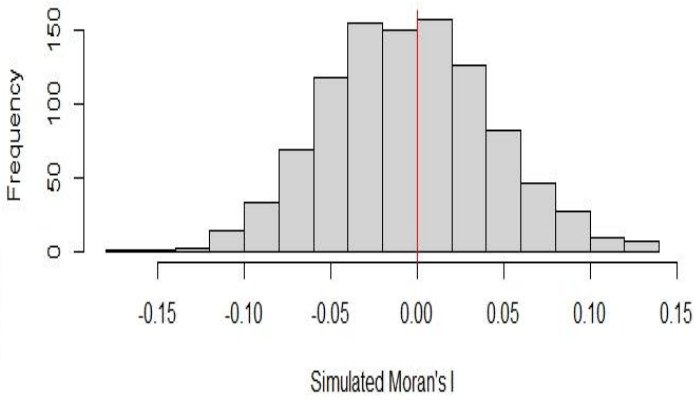

Fig 3.9 Histogram of Simulated Moran's I

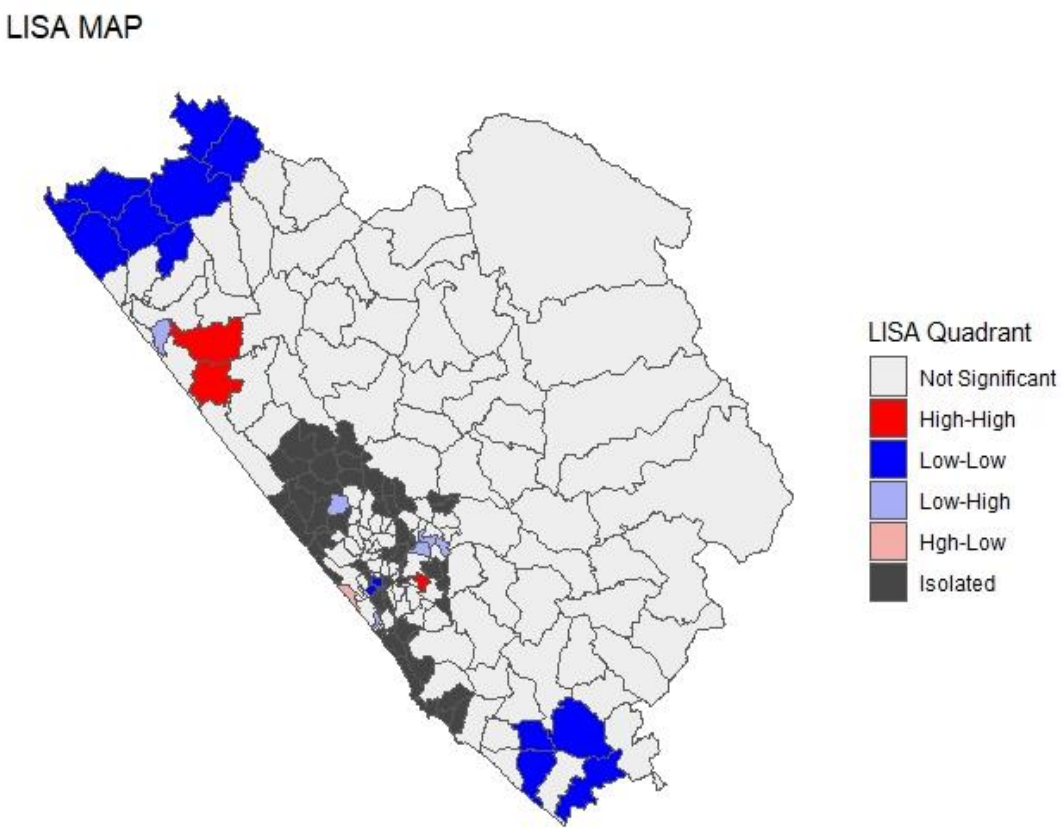

Fig. 3.10 LISA Map showing hotspots and coldspots

The map was color-coded to depict varying levels of animal bite incidence rates:

High-High (Red): These are areas with high incidence rates surrounded by regions with similarly high rates, indicating hotspots.

Low-Low (Blue): These are areas with low incidence rates surrounded by regions with similarly low rates, indicating cold spots.

High-Low (Pink): These are areas with high incidence rates surrounded by regions with low rates, indicating spatial outliers.

Not Significant (White): These are areas where the incidence rate does not significantly differ from the average rate.

Isolated (Grey): This category, as mentioned in the legend, is coded with grey colour.

It typically refers to areas that do not form part of any significant cluster, but exist as isolated areas with higher rates. We can see that many of the populated urban areas within the Thiruvananthapuram city, especially its coastal locations, have many isolated areas with high rates.

The map provides a visual representation of where category III animal bites are most and least prevalent, and where the incidence rate significantly deviates from the rates in surrounding areas. This information can be instrumental in directing interventions aimed at reducing animal bites.

Using the function *osrmTable()* from the OSRM package in R, the mean travel time from the bite events to the different hospitals could be estimated by initially calculating the travel distances from a data matrix of geocoded locations of bite events and hospitals and utilising the ambulance network data from the same OSRM package. Since only 75 data entries could be estimated at a time using this, the travel time estimations were repeated several times. Using the available OSRM road network data, the top two ambulance locations that has the minimum travel time to the bite event locations were also estimated. Finally, the average travel time was found to be 12.95 minutes and the maximum time taken to be 57.10 minutes, showing that some incidents occurred quite far. However, this estimate is calculated from the assumption that a vehicle was ready at the time of incident. From this information, the travel distances from the bite event location to the nearest hospitals were estimated (using the general formula distance = speed x time; when average speed of the ambulance was set to 35 km/hr). Finally the average travel distance was calculated to be 6.53 kilometres and maximum travel distance to be 33.30 kilometres.

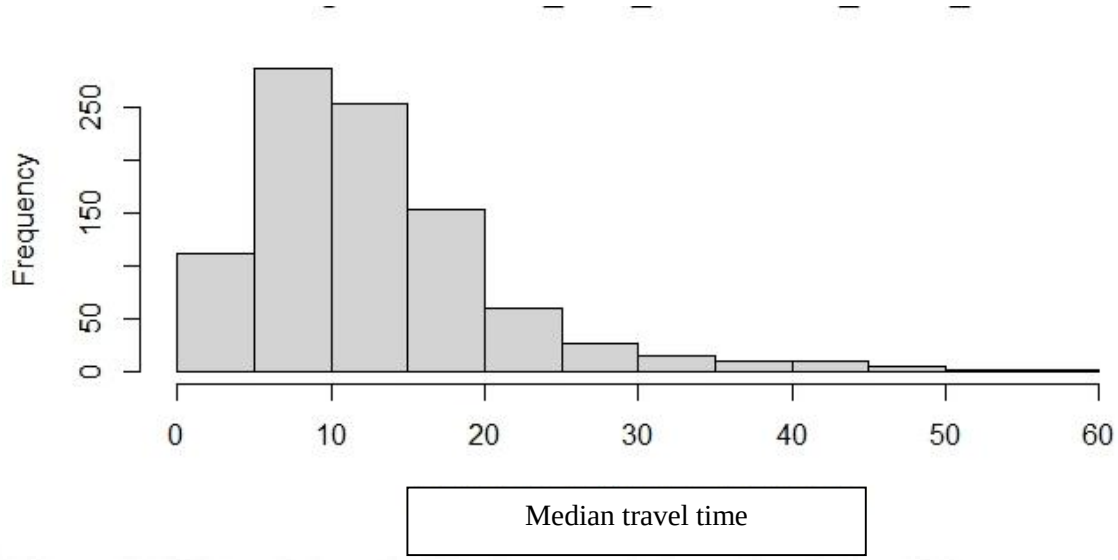

Fig. 3.11 Histogram of median travel time

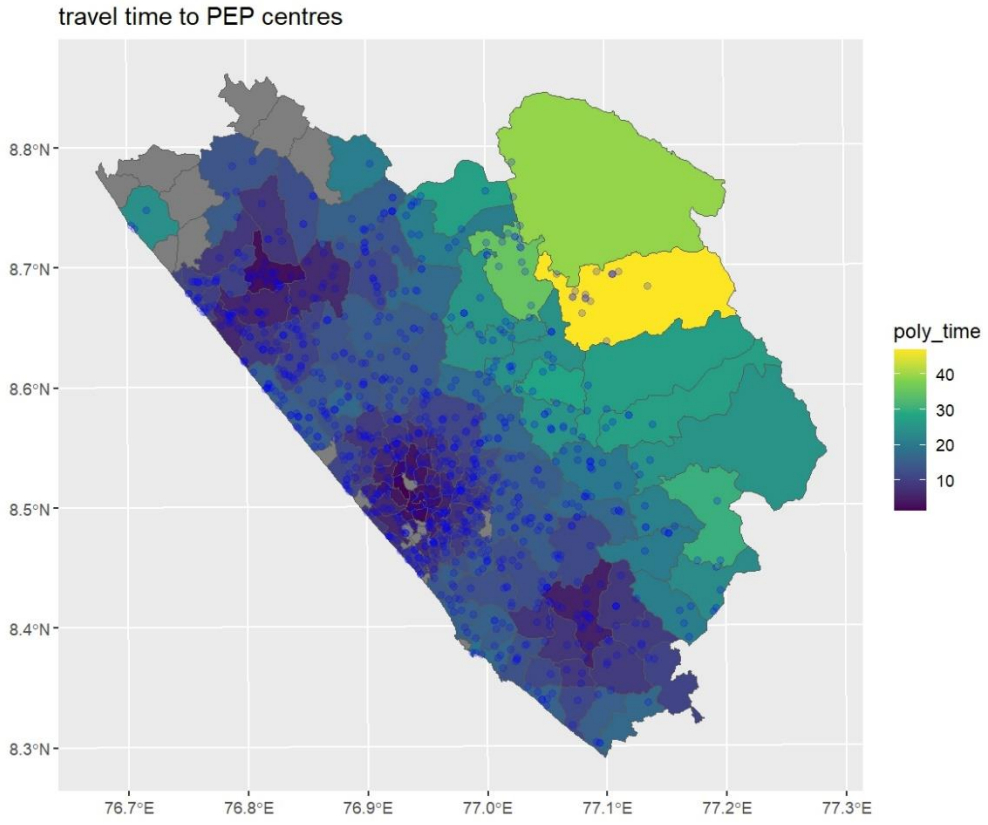

Fig. 3.12 Choropleth Map showing median travel time

The map (Fig 3.12) shows the bite event locations and the median time taken from those locations to reach the closest hospital facilities that offer Equine Rabies Immunoglobulin (ERIG), provided there was a vehicle ready. The map uses a colour gradient ranging from light yellow to dark blue. Light yellow signifies longer travel times, while dark blue represents shorter travel times. We can deduct from the map that regions coloured in dark blue have a shorter median travel time to reach ERIG-providing hospital facilities, indicating better access to medical care. Conversely, regions coloured in light yellow have longer travel times, suggesting that these areas might have less access to immediate medical care following an animal bite. The grey areas in the map are those areas without any animal bites.

CHAPTER 4

DISCUSSION AND CONCLUSION

4.1 Discussion

This cross-sectional study, conducted in a hospital setting, to identify the trends and patterns of category III animal bites and the associated risk factors in the Thiruvananthapuram district of Kerala. Additionally, the study aimed to comprehend the geographical distribution of category III animal bites within the district. The findings regarding the risk factors and distribution patterns are examined in the following discussion.

4.1.1 Human related factors

4.1.1.1 Socio-demographic factors

Males (53.6%) were slightly more affected than females (46.4%), with a mean age of 33.4 (SD 21.5) and 39.2 (SD21.4) among males and females, respectively. In one of similar studies among 307 participants done in Palakkad in 2018, the mean (SD) age of animal bite victims was 37.7 (20.4) years and males accounted for 55 percent of the bites compared to females(Deepa K M, 2018). Kerala is one of the states with high sex ratio, but the male gender accounting for higher bite rates could be due to more human animal interactions among them than among females. This may be also because the primary caretaking practices of the pet/domestic animals like giving a bath, feeding, putting the animal inside the kennel or removing the collar leash could be done by the males. Higher risk of males for animal bites, probably due to higher outdoor activities and risk-taking behaviour, have been consistently reported in both community-based and hospital-based studies within and outside India(Tondare et al., 2016 and Sharma

et al., 2016). In our study among both males and females alike, serious bites from domesticated animals were more common compared to stray animals.

In the present study, the majority (68.5%) of animal bite incidents were from rural areas which is contrary to a study by which showed that about 89.4 percent of animal bites were reported from urban areas(Kinge and Supe 2016). The urbanisation and unsafe waste disposal practices should have been attributed to the high animal bites in the latter.

4.1.1.2 Human interactions with animals

In our study it was found that the nature of interaction which lead to the injury was mostly unprovoked bites (79%) which is similar to the findings in a study done by Venkatesan et al. (Venkatesan, Dongre, and Ganapathy 2017) in Tamil Nadu (78%) but these findings was higher when compared with studies by Satapathy et al. (Satapathy et al., 2023) and Ichhpujani et al. (Ichhpujani et al. 2008) in which unprovoked bites accounted for 56.6 percent and 64.3 percent, respectively. In a study done in Mumbai city (Saurabha and Kembhavi 2022) it was observed that in most cases the bite event occurred in or near the residence of the victim (58.3%) while in our study this was found to be higher (89.5%). This may be because in our study the majority of the bites were from domestic animals which are more confined to within the home premises.

4.1.2 Animal related factors

In agreement with other studies, dog is the biting animal in most of the cases (61.1%) followed by cats (36.1%) and other animals (2.8%)(Ichhpujani et al. 2008; Jethani et

al. 2022; Sudarshan et al. 2007b). In the present study, 680 bite incidents were from domestic animals, out of which pet dogs constituted the majority (67.2%). This is similar (59%) with findings from a study in the state of Tamil Nadu(Sangeetha, K, and William 2016).

In the study by Satapathy et al., 2023 in Behrampur district of Odisha, only 17.4 percent bites were from domestic animals and 82.6 percent from stray animals which is in contrast to our study where around 72.9 percent of bites from domestic animals and 27.1 percent due to stray animal bites. Similarly in a study done in Karimnagar district in state of Telengana and in Ganjam district of Odisha, cases of monkey bites accounted for 6.4 percent and 15.2 percent respectively(Department of Community Medicine, MKCG Medical College, Berhampur, Odisha,India. and Mandal 2022; Gaddala and Matli 2020). This may be due to the higher human-animal conflicts along the forest belt areas in these districts while in our study setting in Thiruvananthapuram there is better awareness on the harmful effects human wild animal conflicts which also could attribute to the literacy rate of the state.

4.1.3 Care seeking factors

In the current study out of 933 participants who had received PEP-ERIG, 97.5 percent first went to public health facilities following the animal bite. In one of the similar studies conducted from May 2017 to January 2018, 83.6 percent sought post-exposure prophylaxis coming directly to health facility while others visited non-allopathic/traditional healers/veterinarians/auxiliary nursing midwifery before coming to health facility(Haradanhalli, Anwith, et al. 2019). In our study, out of the 910 respondents who sought care from public health care facilities, a majority (54.8%) first visited General Hospital/Taluq hospital. This was in contrast to a study done by

Venkatesan et al., 2017 in Tamil Nadu where PHC was the primary source of treatment (65%). This may be due to the general norm in our district of referral to a higher centre when a patient visits a primary or secondary health facility following a serious animal bite injury. The high level of health literacy and awareness among public regarding appropriate health seeking characteristics can also be attributed the dependency of the animal bite victims primarily to the higher health facilities in our study.

4.1.4 Knowledge, attitude and practices

In the present study, nearly 97.3 percent of the participants carried out the first aid procedure of cleaning the wound by washing under running water and soap. This shows a marked improvement (73.9%) compared to other states such as Tamil Nadu(Sangeetha et al. 2016). This significant increase can be attributed to the high literacy rate in Kerala and the prevalent fear due to the endemic nature of rabies.

In the present study, one of the results indicates that awareness about Post-Exposure Prophylaxis (PEP) for category III animal bites is relatively low, with only 48.7 percent of the participants being aware of the importance of PEP to prevent rabies following an animal bite.

4.1.5 GIS Mapping and optimal utilisation of anti-rabies immunoglobulin

The aim of this study was to present techniques that assist in understanding the spatial distribution of animal bite events, thereby facilitating targeted and informed actions in areas of high risk. It was hypothesised that most category III bites would be attributed to stray animals, given the increased harm and risk associated with their bites. However, contrary to the initial hypothesis, the study revealed that the majority of category III bites were inflicted by domesticated animals.

In the present study, even though the duration of the study was short, it was able to geographically visualise the animal bite incident locations in the district and also identify potential hotspots. These could be further analysed and give projections or predictions regarding the trend in animal bite incidents if continuous spatial monitoring is done. This may be regarded as one of the applications of GIS in the field of public health as mentioned in the study by Nayak et al., 2021.

4.2 STRENGTHS

The study provides a comprehensive geospatial analysis of Category III animal bites, covering various factors such as sociodemographic factors, animal factors, and treatment decision-making.

With 933 participants, the study had a comparatively large sample size, which increased the reliability of the findings.

In addition to the study, the investigator's interactions with the heads of institutes have helped to identify and rectify many logistic issues in operationalising the PEP-ERIG in the district.

4.3 LIMITATIONS

The data was collected for a short duration, and therefore, the seasonal variations and other temporal factors that might have affected the outcome of interest could not be studied.

Some participants were uncomfortable sharing details regarding their location and socio-economic status and might not have given the correct details. However, the researcher was able to convince most of the participants to provide the correct details.

The non-response rate for the study was 18.17 percent, as the study excluded animal

bite victims whose contact details were unavailable/mistakenly recorded and those who didn't consent to the survey. However, the researcher has undertaken all possible measures, including seeking help from the hospital administrators, to increase the study participation.

4.4 CONCLUSION

The present study is a comprehensive analysis of Category III animal bites in Thiruvananthapuram District, with a focus on the socioeconomic factors, care-seeking pathways of victims, and the Geospatial mapping of the Government Health facilities currently providing PEP using ERIG. The study revealed that males and individuals from the Below Poverty Line (BPL) category were more likely to experience animal bites. The age group most affected were children and old adults (46 to 69 years). Domestic dogs and cats were identified as the primary sources of bites, with most bites being unprovoked and single bites being more common than multiple bites. In contrast to other studies, adults constitute a good proportion of those who seek PEP-ERIG in this study.

The study also examined the decision-making process for seeking treatment and found that decisions were made by the victims themselves or their relatives. About half the victims depended on public transport to reach the health centres, and the first aid given was mostly washing the wounds.

The limited number of Government facilities offering PEP using ERIG in Trivandrum was found to be a hurdle, as, in some instances, one may need to travel about an hour (57 minutes) by vehicle to reach the hospitals, as revealed by our GIS analysis.

4.5 RECOMMENDATIONS

- Domestic animals are found to cause the maximum number of category III bites; efforts should be taken to strengthen pet animal management, including vaccination of pet animals.
- We should increase awareness among the public regarding PEP and the facilities where the ERIG-PEP is available so as to avoid confusion in opting for the care-seeking institutions following animal bites. This will further improve the outcome of the PEP.
- GIS analysis of the routine data using open source resources like R software and OSM utilities will help in better planning and logistics of PEP-ERIG in the district.
- The number of government health facilities providing PEP-ERIG for category III animal bites has to be increased in line with the density of animal bites so as to ensure the PEP-ERIG is as early as possible.

References

Aga A, Hurisa B and Urga K (2015) Current Situation of Rabies Prevention and Control in Developing Countries: Ethiopia Perspective. *journal of ancient disease preventive remedies* 4.

Agarwal N and Reddajah VP (2004) Epidemiology of dog bites: a community-based study in India. *Tropical Doctor* 34(2): 76–78.

Animal Birth Control – Anti Rabies Vaccination Programme | C-Hed (n.d.). Available at: https://c-hed.org/animal-birth-control-anti-rabies-vaccination-programme/ (accessed 20 June 2024).

Animal bites (n.d.). Available at: https://www.who.int/news-room/fact-sheets/detail/animal-bites (accessed 17 April 2024).

Asheel M (2009) Sree Chitra Tirunal Institute for Medical Sciences and Technology. Epub ahead of print October 2009.

Auplish A, Clarke AS, Van Zanten T, et al. (2017) Estimating the intra-cluster correlation coefficient for evaluating an educational intervention program to improve rabies awareness and dog bite prevention among children in Sikkim, India: A pilot study. *Acta Tropica* 169: 62–68.

Bharti OK, Madhusudana SN and Wilde H (2017) Injecting rabies immunoglobulin (RIG) into wounds only: A significant saving of lives and costly RIG. *Human Vaccines & Immunotherapeutics* 13(4). Taylor & Francis: 762.

Blanton JD, Manangan A, Manangan J, et al. (2006) Development of a GIS-based, real-time Internet mapping tool for rabies surveillance. *International Journal of Health Geographics* 5(1): 47.

Bureau TH (2023) Government plans to make Kerala rabies-free in three years, says Minister. *The Hindu*, 13 July. Available at: https://www.thehindu.com/news/cities/Kochi/government-plans-to-make-state-rabies-free-in-three-years-says-minister/article67075434.ece (accessed 17 April 2024).

Business Standard (2023) Dog bite cases in India rise by 26.5% YoY to 2.75 million incidents in 2023. 19 December. Available at: https://www.business-standard.com/india-news/dog-bite-cases-in-india-rise-by-26-5-yoy-to-2-75-million-incidents-in-2023-123121900863_1.html (accessed 21 April 2024).

Business Standard 2017 (2017) Kerala to come out with own anti-rabies vaccine. 16 October. Available at: https://www.business-standard.com/article/pti-stories/kerala-to-come-out-with-own-anti-rabies-vaccine-117101600487_1.html (accessed 21 April 2024).

Chen S (2022) Spatial and temporal dynamic analysis of rabies: A review of current methodologies. *Geospatial Health* 17(2).

Cromley EK (2019) Using GIS to Address Epidemiologic Research Questions. *Current Epidemiology Reports* 6(2): 162–173.

Davis AL, Schwebel DC, Morrongiello BA, et al. (2012) Dog bite risk: an assessment of child temperament and child-dog interactions. *International Journal of Environmental Research and Public Health* 9(8): 3002–3013.

Deepa K M (2018) Spatial distribution of category III dog bite in Palakkad district and its associated factors. Available at: https://dspace.sctimst.ac.in/handle/123456789/11075.

Department of Community Medicine, MKCG Medical College, Berhampur, Odisha,India. and Mandal K (2022) Geospatial Distribution and SociodemographicProfile of Animal Bite Cases attending Anti-rabies Clinic of a Tertiary Care Hospital in Southern Odisha. *APCRI Journal* 24(2): 1–6.

Dhaduk KM, Unadkat SV, Katharotiya PR, et al. (2016) Case profile, volume analysis, and dropout rate of antirabies vaccination regimens among animal bite victims in Gujarat. *Indian Journal of Public Health* 60(4): 268–272.

Fèvre EM, Kaboyo RW, Persson V, et al. (2005) The epidemiology of animal bite injuries in Uganda and projections of the burden of rabies. *Tropical Medicine & International Health* 10(8): 790–798.

Fooks AR, Banyard AC, Horton DL, et al. (2014) Current status of rabies and prospects for elimination. *Lancet (London, England)* 384(9951): 1389–1399.

Gaddala A and Matli P (2020) A Cross-Sectional Study of Animal Bites reported to District Hospital, Karimnagar. 20(2).

Gershman KA, Sacks JJ and Wright JC (1994) Which dogs bite? A case-control study of risk factors. *Pediatrics* 93(6 Pt 1): 913–917.

Goel K, Sen A, Satapathy P, et al. (2023) Emergence of rabies among vaccinated humans in India: a public health concern. *The Lancet Regional Health - Southeast Asia* 9: 100109.

Hampson K, Coudeville L, Lembo T, et al. (2015) Estimating the Global Burden of Endemic Canine Rabies. *PLOS Neglected Tropical Diseases* Carvalho MS (ed.) 9(4): e0003709.

Haradanhalli RS, D Hanumanthaiah AN and Varadappa ST (2019) Cost of rabies post exposure prophylaxis in different healthcare settings in six states of India. *Indian Journal of Public Health* 63(Supplement): S44–S47.

Holla R, Darshan B, Guliani A, et al. (2017) How familiar are our doctors towards Rabies prophylaxis- A study from coastal south India. *PLoS Neglected Tropical Diseases* 11(10): e0006032.

Ichhpujani RL, Mala C, Veena M, et al. (2008) Epidemiology of animal bites and rabies cases in India. A multicentric study. The Journal of Communicable Diseases 40(1): 27–36.

Jethani S, Singh SK, Anshumali, et al. (2022) Epidemiological Pattern and Trend Analysis of Animal Bite Cases of Anti-Rabies Clinic of Tertiary Care Hospital of Delhi. Journal of Family Medicine and Primary Care 11(2): 728.

Kinge K and Supe A (2016) Epidemiology of animal bite cases reported to anti-rabies vaccination OPD at a tertiary-care hospital, Nagpur. International Journal of Medical Science and Public Health 5(8): 1579.

Knobel, François-Xavier Meslin7 and Sarah Cleaveland, (n.d.) Re-evaluating the burden of rabies in Africa and Asia.

Kumar R and Sinha S (2016) Rapid evaluation of rabies control program: 30-cluster survey in rural area of Perambalur district, Tamilnadu, India. *International Journal of Community Medicine and Public Health*: 2627–2632.

Lionel Harischandra PA, Gunesekera A, Janakan N, et al. (2016) Sri Lanka takes action towards a target of zero rabies death by 2020. *WHO South-East Asia journal of public health* 5(2): 113–116.

Madhusudana SN and Mani RS (2014) Intradermal vaccination for rabies prophylaxis: conceptualization, evolution, present status and future. *Expert Review of Vaccines* 13(5): 641–655.

Mani RS and Madhusudana SN (2013) Laboratory diagnosis of human rabies: recent advances. *TheScientificWorldJournal* 2013: 569712.

Mehndiratta S (2012) Animal bites in children: burden in urban Delhi. *Tropical Doctor* 42(2): 114–115.

Meints K and de Keuster T (2009) Brief Report: Don't Kiss a Sleeping Dog: The First Assessment of "The Blue Dog" Bite Prevention Program. *Journal of Pediatric Psychology* 34(10): 1084–1090.

Mulipukwa CP, Mudenda B and Mbewe AR (2017) Insights and efforts to control rabies in Zambia: Evaluation of determinants and barriers to dog vaccination in Nyimba district. *PLoS Neglected Tropical Diseases* 11(10): e0005946.

Nayak PP, Pai JB, Singla N, et al. (2021) Geographic Information Systems in Spatial Epidemiology: Unveiling New Horizons in Dental Public Health. Journal of International Society of Preventive & Community Dentistry 11(2): 125–131.

Nonfatal Dog Bite--Related Injuries Treated in Hospital Emergency Departments --- United States, 2001 (n.d.). Available at: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5226a1.htm (accessed 19 April 2024).

Overall KL and Love M (2001) Dog bites to humans--demography, epidemiology, injury, and risk. *Journal of the American Veterinary Medical Association* 218(12): 1923–1934.

Perceptions and treatment seeking behaviour of dog bite patients attending regional tertiary care hospital of central Gujarat, India (n.d.). Available at: https://www.researchgate.net/publication/277631579_Perceptions_and_treatment_seeking_behaviour_of_dog_bite_patients_attending_regional_tertiary_care_hospital_of_central_Gujarat_India (accessed 19 April 2024).

Rabies (n.d.). Available at: https://www.who.int/news-room/fact-sheets/detail/rabies (accessed 16 April 2024).

Rabies - India (n.d.). Available at: https://www.who.int/india/health-topics/rabies (accessed 12 September 2023).

Rosado B, García-Belenguer S, León M, et al. (2009) A comprehensive study of dog bites in Spain, 1995-2004. *Veterinary Journal (London, England: 1997)* 179(3): 383–391.

Saesow N, Chaiwatanarat T, Mitmoonpitak C, et al. (2000) Diffusion and fate of intramuscularly injected human rabies immune globulin. *Acta Tropica* 76(3): 289–292.

Sangeetha, K S and William RF (2016) An epidemiological study of animal bites among rural population in Tamil Nadu, India. International Journal Of Community Medicine And Public Health 3(6): 1413–1418.

Shrestha S, Bauer CXC, Hendricks B, et al. (2022) Spatial epidemiology: An empirical framework for syndemics research. Social Science & Medicine 295. Rethinking syndemics through time, space, and method.: 113352.

Singh G and Soman B (2021) Spatiotemporal epidemiology and forecasting of dengue in the state of Punjab, India: Study protocol. Spatial and Spatio-temporal Epidemiology 39: 100444.

Singh U and Choudhary S (2005) Knowledge, Attitude, Behavior and Practice Study on Dog-Bites and Its Management in the Context of Prevention of Rabies in a Rural Community of Gujarat. Indian Journal of Community Medicine 30(3): 81.

Satapathy D, Behera TR, Sahu A, et al. (2023) Profile of animal bite cases attending the ARC of MKCG Medical College Hospital, Berhampur (Orissa). Epub

ahead of print 6 September 2023.

Saurabha U and Kembhavi RS (2022) Epidemiological Mapping of Dog Bite Cases Reporting To Anti-Rabies Vaccination Out-Patient Unit of A Tertiary Care Hospital. National Journal of Community Medicine 11(12): 440–444.

Shah V, Bala D, Thakker J, et al. (2012a) Epidemiological determinants of animal bite cases attending the anti- rabies clinic at V S General Hospital, Ahmedabad. *Healthline, Journal of Indian Association of Preventive and Social Medicine*. Epub ahead of print 2012.

Shah V, Bala D, Thakker J, et al. (2012b) Epidemiological determinants of animal bite cases attending the anti- rabies clinic at V S General Hospital, Ahmedabad. *Healthline, Journal of Indian Association of Preventive and Social Medicine*. Epub ahead of print 2012.

Sharma S, Agarwal A, Khan A, et al. (2016) Prevalence of Dog Bites in Rural and Urban Slums of Delhi: A Community-based Study. *Annals of Medical and Health Sciences Research* 6(2): 115–119.

Shuler CM, DeBess EE, Lapidus JA, et al. (2008) Canine and human factors related to dog bite injuries. *Journal of the American Veterinary Medical Association* 232(4): 542–546.

Singh U and Choudhary S (2005) Knowledge, Attitude, Behavior and Practice Study on Dog-Bites and Its Management in the Context of Prevention of Rabies in a Rural Community of Gujarat. *Indian Journal of Community Medicine* 30(3): 81.

Subramaniam (Mani) R (2016) Human Rabies Survivors in India: An Emerging Paradox? *PLOS Neglected Tropical Diseases* 10(7). Public Library of Science: e0004774.

Sudarshan MK, Madhusudana SN, Mahendra BJ, et al. (2007) Assessing the burden of human rabies in India: results of a national multi-center epidemiological survey. *International Journal of Infectious Diseases* 11(1): 29–35.

The Times of India (2022) Dog bite cases in the Kerala increase by 200% in 8 years. Epub ahead of print August 2022.

Venkatesan M, Dongre A and Ganapathy K (2017) A Community based cross sectional study of dog bites in children in a rural district of Tamil Nadu. International Journal of Medical Science and Public Health 6(1): 109.

Wilde H, Lumlertdacha B, Meslin FX, et al. (2016) Worldwide rabies deaths prevention--A focus on the current inadequacies in postexposure prophylaxis of animal bite victims. *Vaccine* 34(2): 187–189.

World Health Organization (2018) *WHO Expert Consultation on Rabies: Third Report*. WHO technical report series;1012. Geneva: World Health Organization. Available at: https://iris.who.int/handle/10665/272364 (accessed 20 January 2024).

Annexure I

Research information sheet (English)

Achutha Menon Centre for Health Science Studies (AMCHSS)
Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)Trivandrum, Kerala 695011

Title: Geospatial Analysis of Category III Animal bites and to study the care seeking pathways of those availed post-exposure prophylaxis (PEP) with Equine Rabies Immunoglobulin (ERIG) in Thiruvananthapuram District, Kerala

PARTICIPANT INFORMATION SHEET

Hello, I am Dr. Sarath Mohan, currently enrolled in the Master of Public Health programme at the Achutha Menon Centre for Health Sciences Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram. As part of my course requirement, I am now conducting this study entitled **"Geospatial Analysis of Category III Animal bites and to study the care seeking pathways of those availed post-exposure prophylaxis (PEP) with Equine Rabies Immunoglobulin (ERIG) in Thiruvananthapuram District, Kerala."**

Rabies is a deadly viral disease that affects both animals and humans worldwide. It is transmitted primarily through the bite or scratch of an infected animal, most commonly dogs. Once symptoms appear, the disease is almost always fatal. Rabies poses a significant public health concern due to its high mortality rate which could be prevented if adequate preventive measures involving both pre and post-exposure prophylaxis methods are followed.

I would like to extend an invitation for you to participate in this telephone survey. It's important that you feel comfortable with your decision to participate or not, and you're encouraged to discuss it with anyone you trust. This consent form might contain words or inquiries that are unfamiliar to you. Please feel free to interrupt me at any point during our discussion if you need clarification on any matter. If any questions arise later, you're welcome to direct them to me or reach out to the Member Secretary of the Institution Ethics Committee.

Please remember that your participation in this telephone interview is entirely voluntary, and you may choose to withdraw at any time without providing a reason. Your decision to participate or withdraw will not impact your current or future medical care or services. Rest assured that all information provided during the interview will be treated with strict confidentiality. Your personal information will be kept anonymous, and data will be securely stored. Only authorized researchers will have access to the data. The study findings will be reported in aggregate form, ensuring individual participants cannot be identified.

Risks

There is no risk anticipated in the study. However, there may be minimal risks associated with providing personal information, such as a breach of confidentiality. I assure you that all necessary measures to safeguard your privacy will be implemented.

Benefits

By participating in this telephone interview, you will be providing valuable

information that can enhance strategies for rabies prevention and improve the accessibility of PEP facilities. While you may not directly benefit, your contribution will be instrumental in prioritizing initiatives to prevent dog bites and in optimizing the distribution of the anti-rabies vaccine.

Confidentiality

All information collected about you during the course of the research will be kept strictly confidential. Any information about you that leaves the hospital will have your name and address removed so that you cannot be recognized.

Contact information

If you need further information about the study, feel free to reach out to me. For any inquiries regarding the legitimacy of this study, you're welcome to contact the Member Secretary of the Institutional Ethics Committee (IEC) at SCTIMST.

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Annexure II

Research information sheet (Malayalam)

അച്യുതമേനോൻ സെന്ററർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ് (AMCHSS) ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി (SCTIMST) തിരുവനന്തപുരം- 11

വിവരഷീറ്റ്

ഞാൻ ഡോ ശരത് മോഹൻ, നിലവിൽ കേരളത്തിലെ തിരുവനന്തപുരം ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജിയിലെ അച്യുതമേനോൻ സെന്ററർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസിൽ മാസ്റ്റർ ഓഫ് പബ്ലിക് ഹെൽത്ത് (എംപിഎച്ച്) പഠിക്കുന്നു. AMCHSS, SCTIMST, പ്രൊഫസർ & ഹെഡ് ഓഫ് ഡിപ്പാർട്മെന്റ് ഡോ. ബിജു സോമന്റെ മേൽനോട്ടത്തിൽ, ഞാൻ ഇപ്പോൾ നടത്തുന്ന ബിരുദാനന്തര ബിരുദ പഠനത്തിനുള്ള കോഴ്സ് ആവശ്യകതയുടെ ഭാഗമായാണ് ഈപഠനം നടത്തുന്നത്.
ഈ സമ്മത ഫോമിൽ നിങ്ങൾക്ക്മനസ്സിലാകാത്ത വാക്കുകൾ അടങ്ങിയിരിക്കാം. ഏതെങ്കിലും വാക്കുകളോ വിവരങ്ങളോ നിങ്ങൾക്ക് വ്യക്തമായി മനസ്സിലായില്ലെങ്കിൽ ദയവായി എന്നോട് ചോദിക്കുക. പഠനത്തിന്റെ ഉദ്ദേശം മൃഗങ്ങളുടെ കാറ്റഗറി III കടിയേറ്റതിന്റെ ജിയോസ്പേഷ്യൽ വിശകലനവും, കേരളത്തിലെ തിരുവനന്തപുരം ജില്ലയിൽ എകിൻ റാബിസ് ഇമ്മ്യൂണോഗ്ലോബുലിൻ (ERIG) പേ വിഷ പ്രതിരോധ കുത്തിവയ്പ്പ് നേടിയവരുടെ പാതകൾ വിലയിരുത്തുകയും എന്നതാണ്.

ലോകമെമ്പാടുമുള്ള മൃഗങ്ങളെയും മനുഷ്യരെയും ബാധിക്കുന്ന ഒരു മാരകമായ വൈറൽ രോഗമാണ് റാബിസ്. രോഗം ബാധിച്ച മൃഗത്തിന്റെ കടിയിലോ പോറലിലൂടെയോ ആണ് ഇത് പ്രധാനമായും പകരുന്നത്, കൂടുതലും നായ്ക്കളുടെ. രോഗലക്ഷണങ്ങൾ പ്രത്യക്ഷപ്പെടുമ്പോൾ, രോഗം എല്ലായ്പ്പോഴും മാരകമാണ്. ഉയർന്ന മരണനിരക്ക് കാരണം റാബിസ് പൊതുജനാരോഗ്യത്തിൽ കാര്യമായ ആശങ്ക ഉയർത്തുന്നു, എക്സ്പോഷറിന് മുമ്പും ശേഷവും പ്രതിരോധ മാർഗ്ഗങ്ങൾ ഉൾപ്പെടുന്ന മതിയായ പ്രതിരോധ നടപടികൾ പിന്തുടരുകയാണെങ്കിൽ ഇത് തടയാനാകും.
ഈ ടെലിഫോൺ സർവേയിൽ പങ്കെടുക്കാൻ നിങ്ങളെ ക്ഷണിക്കാൻ ഞാൻ ആഗ്രഹിക്കുന്നു. പങ്കെടുക്കണോ വേണ്ടയോ എന്ന നിങ്ങളുടെ തീരുമാനത്തിൽ നിങ്ങൾ സംതൃപ്തരായിരിക്കണം, നിങ്ങൾ വിശ്വസിക്കുന്ന ആരുമായും ഇത് ചർച്ച ചെയ്യാൻ നിങ്ങളെ പ്രോത്സാഹിപ്പിക്കുന്നു. ഈ സമ്മത ഫോമിൽ നിങ്ങൾക്ക് പരിചിതമല്ലാത്ത വാക്കുകളോ അന്വേഷണങ്ങളോ അടങ്ങിയിരിക്കാം.

ഏതെങ്കിലും വിഷയത്തിൽ നിങ്ങൾക്ക് വ്യക്തത ആവശ്യമുണ്ടെങ്കിൽ, ഞങ്ങളുടെ ചർച്ചയിൽ ഏത് സമയത്തും എന്നെ തടസ്സപ്പെടുത്താൻ മടിക്കേണ്ടതില്ല. എന്തെങ്കിലും ചോദ്യങ്ങൾ പിന്നീട് ഉയർന്നുവരുകയാണെങ്കിൽ, അവ എന്നിലേക്ക് നയിക്കാനോ ഇൻസ്റ്റിറ്റ്യൂഷൻ എത്തിക്സ് കമ്മിറ്റിയുടെ മെമ്പർ സെക്രട്ടറിയെ സമീപിക്കാനോ നിങ്ങൾക്ക് സ്വാഗതം.
ഈ ടെലിഫോൺ അഭിമുഖത്തിൽ നിങ്ങളുടെ പങ്കാളിത്തം പൂർണ്ണമായും സ്വമേധയാ ഉള്ളതാണെന്നും കാരണം നൽകാതെ എപ്പോൾ വേണമെങ്കിലും പിൻവലിക്കാൻ നിങ്ങൾക്ക് തീരുമാനിക്കാമെന്നും ദയവായി ഓർക്കുക. പങ്കെടുക്കുന്നതിനോ പിൻവലിക്കുന്നതിനോ ഉള്ള നിങ്ങളുടെ തീരുമാനം നിങ്ങളുടെ നിലവിലുള്ള അല്ലെങ്കിൽ ഭാവിയിലെ വൈദ്യ പരിചരണത്തെയോ സേവനങ്ങളെയോ ബാധിക്കില്ല. ഇന്റർവ്യൂ സമയത്ത് നൽകിയ എല്ലാ വിവരങ്ങളും കർശനമായ രഹസ്യാത്മകതയോടെ പരിഗണിക്കുമെന്ന് ഉറപ്പുനൽകുന്നു. നിങ്ങളുടെ സ്വകാര്യ വിവരങ്ങൾ അജ്ഞാതമായി സൂക്ഷിക്കുകയും ഡാറ്റ സുരക്ഷിതമായി സൂക്ഷിക്കുകയും ചെയ്യും. അംഗീകൃത ഗവേഷകർക്ക് മാത്രമേ ഡാറ്റയിലേക്ക് പ്രവേശനം ഉണ്ടാകൂ. വ്യക്തിഗത പങ്കാളികളെ തിരിച്ചറിയാൻ കഴിയില്ലെന്ന് ഉറപ്പാക്കിക്കൊണ്ട് പഠന കണ്ടെത്തലുകൾ മൊത്തത്തിലുള്ള രൂപത്തിൽ റിപ്പോർട്ട് ചെയ്യും.

അപകടസാധ്യതകൾ

പഠനത്തിൽ പ്രതീക്ഷിക്കുന്ന അപകടസാധ്യതകളൊന്നുമില്ല. എന്നിരുന്നാലും, രഹസ്യസ്വഭാവ ലംഘനം പോലെയുള്ള വ്യക്തിഗത വിവരങ്ങൾ നൽകുന്നതിൽ കുറഞ്ഞ അപകടസാധ്യതകൾ ഉണ്ടാകാം. നിങ്ങളുടെ സ്വകാര്യത സംരക്ഷിക്കുന്നതിന് ആവശ്യമായ എല്ലാ നടപടികളും നടപ്പിലാക്കുമെന്ന് ഞാൻ നിങ്ങൾക്ക് ഉറപ്പ് നൽകുന്നു.

ആനുകൂല്യങ്ങൾ

ഈ ടെലിഫോൺ അഭിമുഖത്തിൽ പങ്കെടുക്കുന്നതിലൂടെ, പേവിഷബാധ തടയുന്നതിനുള്ള തന്ത്രങ്ങൾ മെച്ചപ്പെടുത്താനും PEP സൗകര്യങ്ങളുടെ പ്രവേശനക്ഷമത മെച്ചപ്പെടുത്താനും കഴിയുന്ന വിലപ്പെട്ട വിവരങ്ങൾ നിങ്ങൾ നൽകും. നിങ്ങൾക്ക് നേരിട്ട് പ്രയോജനം ലഭിക്കില്ലെങ്കിലും, നായ്ക്കളുടെ കടിയേൽക്കുന്നത് തടയുന്നതിനുള്ള മുൻഗണന നൽകുന്നതിനും പേവിഷബാധ പ്രതിരോധ വാക്സിൻ വിതരണം ഉത്തമീകരിക്കാൻ ചെയ്യുന്നതിനും നിങ്ങളുടെ സംഭാവന സഹായകമാകും.

രഹസ്യാത്മകത

ഗവേഷണ വേളയിൽ നിങ്ങളെ കുറിച്ച് ശേഖരിക്കുന്ന എല്ലാ വിവരങ്ങളും കർശനമായി രഹസ്യമായി സൂക്ഷിക്കും. ആശുപത്രിയിൽ

നിന്ന് പുറത്തുപോകുന്ന നിങ്ങളെക്കുറിച്ചുള്ള ഏത് വിവരവും നിങ്ങളുടെ പേരും വിലാസവും നീക്കം ചെയ്യുന്നതിനാൽ നിങ്ങളെ തിരിച്ചറിയാൻ കഴിയില്ല.

ബന്ധപ്പെടാനുള്ളവിവരങ്ങൾ

പഠനത്തെക്കുറിച്ച് നിങ്ങൾക്ക് കൂടുതൽ വിവരങ്ങൾ ആവശ്യമുണ്ടെങ്കിൽ, എന്നെ ബന്ധപ്പെടാൻ മടിക്കേണ്ടതില്ല. ഈ പഠനത്തിന്റെ നിയമസാധുത സംബന്ധിച്ച ഏത് അന്വേഷണങ്ങൾക്കും, SCTIMST-ലെ ഇൻസ്റ്റിറ്റ്യൂഷണൽ എത്തിക്സ് കമ്മിറ്റിയുടെ (IEC) മെമ്പർ സെക്രട്ടറിയുമായി ബന്ധപ്പെടാൻ നിങ്ങൾക്ക് സ്വാഗതം.

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Annexure III

Telephonic Survey Script (English)

Principal Investigator: “Hello, I am Dr. Sarath Mohan and pursuing MPH from AMCHSS, SCTIMST, and I am calling with the permission of the state health department to conduct a survey as part of my research. The study is based on Geospatial Analysis of Category III Animal bites and study the care seeking pathways of those availed post-exposure prophylaxis (PEP) with Equine Rabies Immunoglobulin (ERIG) in Thiruvananthapuram District. For this I would like to seek some information related to anti-rabies vaccination which you took from the government health facility. Would you be able to spare around 10 to 15 minutes for this telephone survey? If you feel any discomfort regarding the conduct of the survey or if at any instance you feel like not proceeding further with the interview you are free to leave the call at any point. Your decision to participate or withdraw will not impact your current or future medical care or services. While you may not directly benefit, your contribution will be instrumental in prioritizing initiatives to prevent dog bites and in optimizing the distribution of the anti-rabies vaccine. Your personal information will be kept anonymous, and data will be securely stored. So, if there are no further questions and with your consent shall I proceed with the interview? ”

Participant: “Yes, I agree to take part in this telephone survey”

This response will be recorded as consent to start the survey

Annexure IV

Telephonic Survey Script (Malayalam)

പ്രിൻസിപ്പൽ ഇൻവെസ്റ്റിഗേറ്റർ: “ഹലോ, ഞാൻ ഡോ. ശരത് മോഹൻ നിലവിൽ തിരുവനന്തപുരം ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജിയിലെ അച്യുതമേനോൻ സെന്റർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസിൽ മാസ്റ്റർ ഓഫ് പബ്ലിക് ഹെൽത്ത് (എംപിഎച്ച്) പഠിക്കുന്നു. സംസ്ഥാന ആരോഗ്യ വകുപ്പിന്റെ അനുമതിയോടെ എന്റെ ഗവേഷണത്തിന്റെ ഭാഗമായിട്ടാണ് ഞാൻ വിളിക്കുന്നത്. നിങ്ങൾ സർക്കാർ ആരോഗ്യ സ്ഥാപനത്തിൽ നിന്ന് എടുത്ത ആന്റി റാബിസ് വാക്സിനേഷനുമായി ബന്ധപ്പെട്ട ചില വിവരങ്ങൾ തേടാൻ ഞാൻ ആഗ്രഹിക്കുന്നു. പഠനത്തിന്റെ ഉദ്ദേശം മൃഗങ്ങളുടെ കാറ്റഗറി III കടിയേറ്റതിന്റെ ജിയോസ്പേഷ്യൽ വിശകലനവും, കേരളത്തിലെ തിരുവനന്തപുരം ജില്ലയിൽ എകിൻ റാബിസ് ഇമ്മ്യൂണോഗ്ലോബുലിൻ (ERIG) പേ വിഷ പ്രതിരോധ കുത്തിവയ്പ്പ് നേടിയവരുടെ പാതകൾ വിലയിരുത്തുകയും എന്നതാണ്. ഈ ടെലിഫോൺ സർവേയ്ക്കായി നിങ്ങൾക്ക് ഏകദേശം 10 മുതൽ 15 മിനിറ്റ് വരെ ചെലവഴിക്കാനാകുമോ? സർവേയുടെ നടത്തിപ്പുമായി ബന്ധപ്പെട്ട് നിങ്ങൾക്ക് എന്തെങ്കിലും അസ്വസ്ഥത അനുഭവപ്പെടുന്നുണ്ടെങ്കിൽ അല്ലെങ്കിൽ ഏതെങ്കിലും സാഹചര്യത്തിൽ അഭിമുഖവുമായി മുന്നോട്ട് പോകേണ്ടതില്ലെന്ന് തോന്നുകയാണെങ്കിൽ ഏത് സമയത്തും കോൾ ഉപേക്ഷിക്കാൻ നിങ്ങൾക്ക് സ്വാതന്ത്ര്യമുണ്ട്. പങ്കെടുക്കുന്നതിനോ പിൻവലിക്കുന്നതിനോ ഉള്ള നിങ്ങളുടെ തീരുമാനം നിങ്ങളുടെ നിലവിലുള്ള അല്ലെങ്കിൽ ഭാവിയിലെ വൈദ്യ പരിചരണത്തെയോ സേവനങ്ങളെയോ ബാധിക്കില്ല. ഈ ടെലിഫോൺ അഭിമുഖത്തിൽ പങ്കെടുക്കുന്നതിലൂടെ, നിങ്ങൾക്ക് നേരിട്ട് പ്രയോജനം ലഭിക്കില്ലെങ്കിലും, നായ്ക്കളുടെ കടിയേൽക്കുന്നത് തടയുന്നതിനുള്ള മുൻഗണന നൽകുന്നതിനും പേവിഷബാധ പ്രതിരോധ വാക്സിൻ വിതരണം കൂടുതൽ മെച്ചപ്പെടുത്തുന്നതിനും നിങ്ങളുടെ പ്രതികരണങ്ങൾ സഹായകമാകും. നിങ്ങളുടെ സ്വകാര്യ വിവരങ്ങൾ അജ്ഞാതമായി സൂക്ഷിക്കുകയും ഡാറ്റ സുരക്ഷിതമായി സൂക്ഷിക്കുകയും ചെയ്യും. മറ്റു ചോദ്യങ്ങളോ സംശയങ്ങളോ ഇല്ലെങ്കിൽ നിങ്ങളുടെ സമ്മതത്തോടെ ഞാൻ ഈ ടെലിഫോൺ സർവ്വേ തുടങ്ങട്ടെ?”

പങ്കാളി: "അതെ, ഈ ടെലിഫോൺ സർവേയിൽ പങ്കെടുക്കാൻ ഞാൻ സമ്മതിക്കുന്നു"

ഈ പ്രതികരണം സർവേ ആരംഭിക്കുന്നതിനുള്ള സമ്മതമായി രേഖപ്പെടുത്തും.

Annexure V

INFORMED CONSENT FORM (English)

I have been invited to participate in the study titled "**Geospatial Analysis of Category III Animal bites and to study the care seeking pathways of those availed post-exposure prophylaxis (PEP) with Equine Rabies Immunoglobulin (ERIG) in Thiruvananthapuram District, Kerala."**

I, ……, declare that I have fully heard the information in the study information sheet over phone. I hereby willingly give my consent to participate in the study. I have had the chance to ask questions, and all my queries have been satisfactorily answered.

I certify that:

1. I am aware that participating in this study poses minimal risk and also I understand that there is no immediate direct benefit from this study.
2. I am aware that there will be no incentives for my participation.
3. I understand that my personal information will be kept confidential.
4. I am aware that I can withdraw my consent at any stage of the study.
5. I have voluntarily agreed to participate in this study.

Participant ID : **Name of the participant :**

Mobile Number : **Signature :**

Name of the Witness :

Place : **Signature :**

Date :

I affirm that the participant was given the opportunity to ask questions about the study, and all their questions have been answered accurately and to the best of my knowledge. I assure that the individual was not forced into giving consent and that the consent has been provided freely and willingly.

Name of the Researcher :

Date:

Signature of the Researcher:

Annexure VI

സമ്മതപത്രം

വിവരഷീറ്റിൽ നൽകിയിരിക്കുന്ന പഠനവുമായി ബന്ധപ്പെട്ട വിവരങ്ങൾ ഞാൻ വായിച്ചുവെന്നും/ കേട്ടുവെന്നും മനസ്സിലാക്കിയെന്നും ഞാൻസ്ഥിരീകരിക്കുന്നു. ഈ പഠനവുമായി ബന്ധപ്പെട്ട എന്റെ എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം ലഭിച്ചിട്ടുണ്ട്, കൂടാതെ ഈ പഠനത്തിന്റെ സാധ്യമായ എല്ലാദോഷങ്ങളും അസ്വാരസ്യങ്ങളും നേട്ടങ്ങളും (എന്തെങ്കിലും ഉണ്ടെങ്കിൽ) എനിക്ക് വിശദീകരിച്ചു തന്നിട്ടുണ്ട്. എന്റെ ഐഡന്റിറ്റിയും വ്യക്തിഗതവിവരങ്ങളും രഹസ്യമായി സൂക്ഷിക്കുമെന്നും ഞാൻ മനസ്സിലാക്കുന്നു. എന്റെ പങ്കാളിത്തം സ്വമേധയാ ഉള്ളതാണെന്നും, കാരണം പറയാതെയും അനന്തരഫലങ്ങളില്ലാതെയും എപ്പോൾ വേണമെങ്കിലും പിൻവലിക്കാൻ എനിക്ക്സ്വാതന്ത്ര്യമുണ്ടെന്നും ഞാൻ മനസ്സിലാക്കുന്നു.
ഈ ഫോമിൽ ഒപ്പിടുന്നതിലൂടെ, ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ ഞാൻ സമ്മതിക്കുന്നു. ഈഫോമിന്റെ ഒരുപകർപ്പ് എനിക്ക്തന്നിട്ടുണ്ട്.

തീയതി:
സ്ഥലം:

_____
പങ്കെടുക്കുന്നയാളുടെ പേര്ഒപ്പ്/വിരളടയാളം

_____
പ്രധാനഅന്വേഷകന്റെഒപ്പ്

Annexure VII

Interview schedule (English)

Item	
Participant ID	
Name of the hospital	
Date of interview	

Sl. no.	Item	Response	Remarks
1.	What is your completed age?		
2.	What is your gender?	1.Male 2.Female 3. Transgender 4. Don't want to specify	
3.	What is your religious affinity?	1. Hindu 2. Christian 3. Muslim 4. Aethist 5. Others(specify).....	
4.	What caste do you belong to?	1. General 2. OBC 3. SC 4. ST 5. Others(specify).....	

5.	What is your level of education?	1. Illiterate 2. Literate but no formal education 3. Primary school level (1-7th STD) 4. High school level (8-10th STD) 5. Higher secondary level (11-12th STD) 6. Graduate level 7. Post-graduate level and above 8. Others (Specify) ……	

6.	What is your working status atpresent?	1. Homemaker 2. Regular employee unrelated to animal interaction (Government/private) 3. Clinical veterinary staff 4. Salesperson 5. Self-employed 6. Farmer (agriculture/animal farming/breeder) 7. Daily wage worker 8. Student 9. Unemployed 10. Others (specify)……...			
7.	Area of residence	In general	If Urban specify	If rural specify	
		1. Urban 2. Rural	1. City 2. Others	1. Tribal 2. Others	
8. What animal has bitten you?		1. Own dog 2. Stray dog 3. Own cat 4. Stray cat 5. Other animal (Please specify .....)			Go to Q11 if answer is 2/4/5

9.	In which part of the body were you bitten?	1. Head 2. Face 3. Hand/arm 4. Leg/foot 5. Thigh 6. Buttock 7. Other parts (Please specify)			
10.	Were there any interactions that could have triggered the situation, such as physical contact, playing, invasion of territory, mishandling, or disturbance?	1. Yes [ ] 2. No [ ]			
11.	What was the severity of the animal bite?	1. Single transdermal bite wound 2. Multiple transdermal bite wound 3. Contact with mucous membrane 4. Scratches only 5. Others ----------			
12.	Were you bitten by animals in the past?	1. Yes 2. No			
13.	Have you taken the anti-rabies vaccine within the past one year?	1. Yes 2. No 3. Others(specify)----------			If No go to Q15
14.	Have you been able to complete the full course of vaccine as prescribed last time?	1. Yes 2. No 3. Others			
15.	When (day/date) did the bite occur?		Date of reporting for the first dose ofvaccine.		
16.	At what time of the day were you bitten?	1. Early morning (12am -< 6am) 2. Daytime (6am- <12pm) 3. Afternoon (12 pm-<4pm) 4. Evening (4pm-<7pm) 5. Night(7pm-<12am) 6. Don't remember the exact time			

17.	Where did the bite occur? (with respect to home)	1. At home 2. Near home 3. Away from home 4. Others(specify)----------	
18.	What is the exact location of the bite in your body?		
19.	What is the name of the place and distance from your residence where you got the bite (km)?		Mention the important nearby landmark
20.	Does the bite location have any of the following structures (multiple options possible)?	1. High dog density 2. High population density 3. Vacant building 4. Bus stop 5. School 6. Park 7. Unused pathways 8. Slums 9. Waste dumps 10. Rivers 11. Forest 12. Market 13. Slaughterhouses 14. Poultry farms/chicken stalls 15. Other relevant ----------	
21.	Was the biting animal available for observation?	1. Yes [ ] 2. No [ ] 3. Not sure [ ]	
22.	What was the status of the biting animals (rabid or normal)?	1. Rabid(confirmed by clinical signs /lab examination) 2. Suspected to be rabid 3. Normal dog 4. Unknown	
23.	What was the first aid done immediately after you were bitten?	1. Wash the wound with soap and water 2. Didn't do any first aid 3. Others (specify)	

24.	Did you apply any local medicine to the wound?	1.Yes [ ](specify)---------- 2. No [ ]	
25.	Did you notice or heard about any other humans or animals bitten in that area by the same animal?	1. Yes [ ] 2. No [ ] 3. Not sure [ ]	
26.	Can vaccination in dogs help in preventing rabies in human?	1. Yes [ ] 2. No [ ] 3. Not sure [ ]	
27.	Who suggested or told you to visit the hospital for treatment?	1. Friends 2. Public present at the location of the bite event 3. Parents/children/relatives 4. Nobody suggested/I have come alone 5. Others	
28.	How far do you need to travel for routine medical care?	1. < 1km 2. 1 – 5km 3. 6 – 10km 4. > 10km 5. Don't know	
29.	What is the primary mode of transportation you would use to go to a health facility	1. Walking 2. Private auto/taxi 3. Public transportation 4. Personal vehicle 5. Others (specify)----------	
30.	Which health facility did you visit after getting the bite	1. Government Hospital 2. Private Hospital 3. Others (specify)----------	

31.	Which government hospital did you first visit for treatment	1. PHC 2. CHC 3. Taluq Hospital 4. District Hospital 5. General Hospital 6. Medical College	
32.	What are the costs incurred by you for the treatment of your animal bite wound (Rs)?	1. Amount spent in different hospitals (if any) for treatment-seeking 2. Medicine cost ---------- 3. Travel cost in total ---------- 4. Food cost in total ---------- 5. Lost wages /earnings ---------- 6. Repeat visits ---------- 7. Others ----------	
33.	Where will you complete your remaining doses of vaccine?	1. In the same hospital 2. In the taluk /CHC near by 3. Others(specify)----------	
34.	What were the obstacles faced by you for getting medical treatment following animal bite incident?	1. Lack of nearby health facilities to provide treatment 2. Lack of trained personnel at health facilities 3. Lack of vaccines at health facility leading to referral to higher centre 4. No means of transportation 5. Financial difficulties in seeking treatment 6. Others (specify) ----------	

Annexure VIII
ഇന്റർവ്യൂ ഷെഡ്യൂൾ

ഇനം	പ്രതികരണം
പങ്കാളി ഐഡി	
ആശുപത്രിയുടെ പേര്	
ഇന്റർവ്യൂ തീയതി	

ക്രമ നമ്പർ	ഇനം	പ്രതികരണം	
1.	നിങ്ങളുടെ പ്രായം എന്താണ്? (പൂർത്തിയായത് വർഷത്തിൽ)		
2.	നിങ്ങളുടെ ലിംഗഭേദം എന്താണ്?	1. പുരുഷൻ 2. സ്ത്രീ 3. ട്രാൻസ്ജെൻഡർ 4. വ്യക്തമാക്കാൻ ആഗ്രഹിക്കുന്നില്ല	
3.	നിങ്ങളുടെ മതപരമായ ബന്ധം എന്താണ്?	1. ഹിന്ദു 2. ക്രിസ്ത്യൻ 3. മുസ്ലീം 4. നിരീശ്വരവാദി 5. മറ്റുള്ളവ (വ്യക്തമാക്കുക)	

4.	നിങ്ങളുടെ ജാതി എന്താണ്?	1.ജനറൽ 2.ഒ.ബി.സി 3.എസ്.സി 4.എസ്.റ്റീ 5.മറ്റുള്ളവ (വ്യക്തമാക്കുക)			
5.	നിങ്ങളുടെ വിദ്യാഭ്യാസനിലവാരം എന്താണ്?	1.നിരക്ഷരൻ 2.സാക്ഷരതയുണ്ടെങ്കിലും ഔപചാരികവിദ്യാഭ്യാസമില്ല 3. പ്രൈമറി സ്കൂൾ തലം (1-7 STD) 4. ഹൈസ്കൂൾ തലം (8-10th STD) 5. ഹയർ സെക്കൻഡറി ലെവൽ (11-12 STD) 6. ബിരുദതലം 7.ബിരുദാനന്തര തലവും അതിനുമുകളിലും 8.മറ്റുള്ളവ (വ്യക്തമാക്കുക).....			
6.	ഇപ്പോൾ നിങ്ങളുടെ പ്രവർത്തന നില എന്താണ്?	1. വീട്ടമ്മ 2.മൃഗങ്ങളുടെ ഇടപെടലുമായി ബന്ധമില്ലാത്ത സാധാരണ ജീവനക്കാരൻ (സർക്കാർ/സ്വകാര്യം) 3. ക്ലിനിക്കൽ വെറ്റിനറി സ്റ്റാഫ് 4. വിൽപ്പനക്കാർ 5. സ്വയം തൊഴിൽചെയ്യുന്നവർ 6. കർഷകൻ (കൃഷി/മൃഗകൃഷി/ബ്രീഡർ) 7. ദിവസ വേതനക്കാരൻ 8. വിദ്യാർത്ഥി 9. തൊഴിൽരഹിതർ 10.മറ്റുള്ളവ (വ്യക്തമാക്കുക).....			
7.	താമസിക്കുന്ന പ്രദേശം	പൊതുവായി	അർബൻവ്യക്തമാക്കുകയാണെങ്കിൽ	ഗ്രാമം വ്യക്തമാക്കുകയാണെങ്കിൽ	
		1.അർബൻ 2.ഗ്രാമം	1.നഗരം 2.മറ്റുള്ളവ	1.വനപ്രദേശം 2.മറ്റുള്ളവ	
8.	ഏത് മൃഗമാണ് നിങ്ങളെ കടിച്ചത്	1. സ്വന്തം നായ 2.			ഉത്തരം 2/4/5 ആണെങ്കിൽ Q11-ലേക്ക് പോകുക

		തെരു വ് നായ 3. തെരു വ് പൂച്ച 4. തെരുവ് പൂച്ച 5. മറ്റൊരു മൃഗം (ദയവായി വ്യക്തമാക്കുക)	

9.	ശരീരത്തിന്റെ ഏത് ഭാഗത്താണ് കടിയേറ്റത്?	1. തല 2. മുഖം 3. കൈ/കൈ 4. ലെഗ് / കാൽ 5. തുട 6. നിതംബം 7.മറ്റുള്ളവ ഭാഗങ്ങൾ (ദയവായി വ്യക്തമാക് കുക)	
10.	ശാരീരിക സമ്പർക്കം, കളികൾ, പ്രദേശത്തേക്കുള്ള അധിനിവേശം, തെറ്റായി കൈകാര്യം ചെയ്യൽ, അല്ലെങ്കിൽശല്യപ്പെടുത്തൽ എന്നിങ്ങനെയുള്ള എന്തെങ്കിലും ഇടപെടലുകൾ/ സാഹചര്യങ്ങൾക്ക് കാരണമായിട്ടുണ്ടോ	1.അതെ [ ] 2. ഇല്ല [ ]	

11.	മൃഗങ്ങളുടെ കടിയേറ്റത്തിൻറെ തീവ്രതഎന്തായിരുന്നു?	1. ഒരൊറ്റ ട്രാൻസ്-ഡെർമൽ കടിയേറ്റ മുറിവ് 2. ഒന്നിലധികം ട്രാൻസ്-ഡെർമൽ കടിയേറ്റ മുറിവ് 3. ശ്ലേഷ്മപടലം ബന്ധപ്പെടുക 4. പോറലുകൾ മാത്രം 5. മറ്റുള്ളവ ----------	
12.	പണ്ട്മൃഗങ്ങൾ നിങ്ങളെ കടിച്ചിട്ടുണ്ടോ?	1.അതെ 2.ഇല്ല	
13.	നിങ്ങൾ കഴിഞ്ഞ ഒരു വർഷത്തിനുള്ളിൽ മുമ്പ് ആന്റി റാബിസ് വാക്സിൻ എടുത്തിട്ടുണ്ടോ?	1.അതെ 2.ഇല്ല 3.മറ്റുള്ളവ (വ്യക്തമാക്കുക) ----------	ഇല്ലെങ്കിൽ Q15-ലേക്ക് പോകുക
14.	നിങ്ങൾക്ക് മുഴുവൻ പൂർത്തിയാക്കാൻ കഴിഞ്ഞോ കഴിഞ്ഞ തവണ നിർദ്ദേശിച്ച വാക്സിൻ കോഴ്സ്?	1.അതെ 2.ഇല്ല 3.മറ്റുള്ളവ (വ്യക്തമാക്കുക) ----------	
15.	എപ്പോഴാണ് (ദിവസം/തീയതി) കടിയേറ്റത്?	വാക്സിന്റെ ആദ്യ ഡോസിനുവേണ്ടി റിപ്പോർട്ട് ചെയ്ത തീയതി	
16.	ദിവസത്തിലെ ഏത് സമയത്താണ് നിങ്ങളെകടിച്ചത്?	1. അതിരാവിലെ (12am <6am) 2. പകൽ സമയം (6am <12pm) 3. ഉച്ചതിരിഞ്ഞ് (12pm - <4pm) 4. വൈകുന്നേരം (4pm -<7pm) 5. രാത്രി (7pm -<12am) 6. കൃത്യമായസമയം ഓർക്കുന്നില്ല	
17.	എവിടെയാണ് കടിയേറ്റത്? (വീടുമായി ബന്ധപ്പെട്ട്)	1. വീട്ടിൽ 2. സമീപത്തെ വീട്ടിൽ 3. വീട്ടിൽ നിന്ന് അകലെ 4. മറ്റുള്ളവ (വ്യക്തമാക്കുക) ----------	
18.	നിങ്ങളുടെ ശരീരത്തിൽ കടിയേറ്റതിന്റെക		

	ൃത്യമായ സ്ഥാനം എവിടെയാണ്?		
19.	നിങ്ങൾക്ക് കടിയേറ്റ സ്ഥലത്തിന്റെ പേരും നിങ്ങളുടെ വസതിയിൽ നിന്നുള്ള ദൂരവും (കിലോമീറ്റർ)എന്ത ാണ്?		അടുത്തുള്ള പ്രധാനപ്പെട്ട ലാൻഡ്മാർക്ക് സൂചിപ്പിക്കുക
20.	കടിയേറ്റ സ്ഥലത്തിന് ഇനിപ്പറയുന്ന ഏതെങ്കിലുംഘടനയു ണ്ടോ (ഒന്നിലധികം ഓപ്ഷനുകൾ സാധ്യമാണ്)?	1. ഉയർന്ന നായ സാന്ദ്രത 2. ഉയർന്ന ജനസാന്ദ്രത 3. ഒഴിഞ്ഞ കെട്ടിടം 4. ബസ് സ്റ്റോപ്പ് 5. സ്കൂൾ 6. പാർക്ക് 7. ഉപയോഗിക്കാത്ത വഴികൾ 8. ചേരികൾ 9. മാലിന്യ കൂമ്പാരങ്ങൾ 10. നദികൾ 11. വനം 12. ചന്തസ്ഥലം 13. അറവുശാലകൾ 14. കോഴി ഫാമുകൾ / ചിക്കൻസ്റ്റാളുകൾ 15. മറ്റ് പ്രസക്തമായ ----------	
21.	കടിച്ച മൃഗം നിരീക്ഷിക്കാൻ ലഭ്യമായിരുന്നോ	1.അതെ [ ] 2.ഇല്ല [ ] 3.തീർച്ചയില്ല [ ]	
22.	കടിക്കുന്ന മൃഗങ്ങളുടെ അവസ്ഥഎന്തായിര ുന്നു (പേവിഷ ബാധിച്ചത് അതോ സാധാരണ നായ)?	1. പേവിഷ ബാധിച്ചത് (ക്ലിനിക്കൽ അടയാളങ്ങൾ / ലാബ് പരിശോധനയിലൂടെ സ്ഥിരീകരിച്ചത്) 2. പേവിഷ സംശയിക്കുന്നത് 3. സാധാരണ നായ 4. അജ്ഞാതം	
23.	കടിയേറ്റ ഉടൻ എന്ത് പ്രഥമശുശ്രൂഷയാ ണ് ചെയ്തത്?	1. മുറിവ് സോപ്പും വെള്ളവും ഉപയോഗിച്ച് കഴുകുക 2.പ്രഥമശുശ്രൂഷയൊന്നും ചെയ്തില്ല 3.മറ്റുള്ളവ (വ്യക്തമാക്കുക) ----------	
24.	നിങ്ങൾ ഏതെങ്കിലും പരമ്പരാഗത മരുന്ന് മുറിവിൽ ഉപയോഗിച്ചോ?	1.അതെ [ ] (വ്യക്തമാക്കുക)---------- 2.ഇല്ല [ ]	

25.	അതേ മൃഗം ആ പ്രദേശത്ത് മറ്റേതെങ്കിലും മനുഷ്യരെയോ മൃഗങ്ങളെയോ കടിച്ചതായി നിങ്ങൾ ശ്രദ്ധയിൽ പെട്ടോ / കേട്ടോ?	1.അതെ [ ] 2.ഇല്ല [ ] 3.തീർച്ചയില്ല [ ]	
26.	മനുഷ്യരിൽ പേവിഷബാധ തടയാൻ നായ്ക്കളിൽ വാക്സിനേഷൻ സഹായിക്കുമോ?	1.അതെ [ ] 2.ഇല്ല [ ] 3.തീർച്ചയില്ല [ ]	
27.	ചികിത്സയ്ക്കായി ആശുപത്രി സന്ദർശിക്കാൻ നിങ്ങളോട് ആരാണ് നിർദേശിച്ചത് / പറഞ്ഞത്?	1.സുഹൃത്തുക്കൾ 2.കടിയേറ്റ സംഭവസ്ഥലത്ത പൊതുജനങ്ങൾ 3.മാതാപിതാക്കൾ/കുട്ടികൾ/ബന്ധുക്കൾ 4.ആരും നിർദ്ദേശിച്ചില്ല / ഞാൻ തനിച്ചാണ് വന്നത് 5.മറ്റുള്ളവ	
28.	പതിവ് വൈദ്യ പരിചരണത്തിനായി നിങ്ങൾ എത്ര ദൂരം സഞ്ചരിക്കണം?	1. < 1കി.മീ 2. 1 - 5കി.മീ 3. 6 - 10കി.മീ 4. > 10കി.മീ 5. അറിയില്ല	
29.	ഒരു ആരോഗ്യ കേന്ദ്രത്തിലേക്ക് പോകാൻ നിങ്ങൾ ഉപയോഗിക്കുന്ന പ്രാഥമിക ഗതാഗത മാർഗ്ഗം ഏതാണ്	1. നടത്തം 2. സ്വകാര്യ ഓട്ടോ/ടാക്സി 3. പൊതുഗതാഗതം 4. സ്വന്തം വാഹനം 5. മറ്റുള്ളവ (വ്യക്തമാക്കുക) ---------	

30.	കടിയേറ്റതിന് ശേഷം ഏത് ആരോഗ്യ കേന്ദ്രമാണ് നിങ്ങൾ സന്ദർശിച്ചത്?	1. സർക്കാർ ആശുപത്രി 2. സ്വകാര്യ ആശുപത്രി 3. മറ്റുള്ളവ (വ്യക്തമാക്കുക)----------	
31.	ഏത് സർക്കാർ ആശുപത്രിയിലാണ് ചികിത്സയ്ക്കായി പോയത്?	1. പി.എച്ച്.സി 2. സി.എച്ച്.സി 3. താലൂക്ക് ആശുപത്രി 4. ജില്ലാ ആശുപത്രി 5. ജനറൽ ആശുപത്രി 6. മെഡിക്കൽ കോളേജ്	
32.	നിങ്ങളുടെ കടിയേറ്റ മുറിവിന്റെ ചികിത്സയ്ക്കായി എത്ര രൂപയാണ് ചെലവാക്കിയത്?	1. ചികിത്സ തേടുന്നതിനായി വിവിധ ആശുപത്രികളിൽ (എന്തെങ്കിലും ഉണ്ടെങ്കിൽ) ചെലവഴിച്ച തുക 2. ഔഷധച്ചെലവ് ---------- 3. മൊത്തം യാത്രാ ചെലവ് ---------- 4. മൊത്തം ഭക്ഷണ ച്ചെലവ് ---------- 5. നഷ്ടപ്പെട്ട വേതനം/വരുമാനം ---------- 6. ആവർത്തിച്ചുള്ള സന്ദർശനങ്ങൾ ---------- 7. മറ്റുള്ളവ	
33.	നിങ്ങളുടെ ശേഷിക്കുന്ന വാക്സിൻ ഡോസുകൾ എവിടെ പൂർത്തിയാക്കും ?	1. അതേ ആശുപത്രിയിൽ 2. താലൂക്കിൽ / സി.എച്ച്.സി 3. മറ്റുള്ളവ (വ്യക്തമാക്കുക) ----------	
34.	മൃഗങ്ങളുടെ കടിയേറ്റതിനെത്തുടർന്ന് വൈദ്യചികിത്സ ലഭിക്കുന്നതിന് നിങ്ങൾ നേരിട്ട തടസ്സങ്ങൾ എന്തൊക്കെയാണ്?	1. ചികിത്സ നൽകുന്നതിന് സമീപത്തുള്ള ആരോഗ്യ കേന്ദ്രങ്ങളുടെ അഭാവം 2. ആരോഗ്യ കേന്ദ്രങ്ങളിൽ പരിശീലനം ലഭിച്ച ആളുകളുടെ അഭാവം 3. ആരോഗ്യ കേന്ദ്രത്തിൽ വാക്സിനുകളുടെ അഭാവം ഉയർന്ന കേന്ദ്രത്തിലേക്ക് റഫർ ചെയ്യുന്നതിലേക്ക് നയിക്കുന്നു 4. ഗതാഗത മാർഗ്ഗങ്ങളില്ല 5. ചികിത്സ തേടുന്നതിനുള്ള സാമ്പത്തിക ബുദ്ധിമുട്ടുകൾ 6. മറ്റുള്ളവ (വ്യക്തമാക്കുക) ----------	

Annexure IX

IEC APPROVAL LETTER

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
CDSCO Registration No: ECR/189/Inst/KL/2013/RR-21
DHR Registration No:EC/NEW/INST/2022/2775

SCT/IEC/2169/DECEMBER/2023 12.01.2024

Dr. Sarath Mohan
MPH Student, AMCHSS
SCTIMST, Thiruvananathapuram

Dear Dr. Sarath Mohan,

The Institutional Ethics Committee held on 30th December, 2023, reviewed and discussed your application to conduct the study titled "**GEOSPATIAL ANALYSIS OF CATEGORY III ANIMAL BITES AND TO STUDY THE CARE SEEKING PATHWAYS OF THOSE AVAILED POST-EXPOSURE PROPHYLAXIS (PEP) WITH EQUINE RABIES IMMUNOGLOBULIN (ERIG) IN THIRUVANANTHAPURAM DISTRICT, KERALA" (IEC /2169).**

Principal Investigator	Dr. Sarath Mohan, MPH Student, AMCHSS, SCTIMST
Co-Principal Investigator(s)	Dr. Biju Soman, Professor & Head, AMCHSS, SCTIMST
Duration of the study	6 months

The following members of the Ethics Committee were present at the meeting held on 30th December, 2023

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. Kala Kesavan P	MBBS,MD	Female	Basic Medical Scientist	No
3.	Adv. Priya Kaimal	LLM, MBL	Female	Legal Expert	No
4.	Dr. P. Manickam	BSMS, MSc (Epid).,PhD	Male	Health Science Expert/ Social Scientist	No
5.	Dr. Christina George	MD Psychiatry	Female	Clinician	No
6.	Dr. Narayanan Namboodiri. K K	MBBS,MD,DM	Male	Clinician	Yes
7.	Dr. Biju Soman	MBBS,MD, DPH, MSc, DLSHTM	Male	Basic Medical Scientist	Yes

1

The following documents were reviewed:

Original submission

1. *Checklist Form*
2. *Covering letter addressed to the Chairman, IEC, SCTIMST dated 01.12.2023*
3. *Responses/Amendments made based on the Reviewer's comments*
4. *IEC Application Form*
5. *Declaration Form*
6. *Research Proposal*
7. *Interview schedule in English and Malayalam*
8. *Participant Information Sheet and Informed Consent Form in English and Malayalam*
9. *Interview schedule 2 Oral Health Impact Profile (OHIP) in English and Malayalam*
10. *CV of Principal Investigator and Co-PI*
11. *SRC Recommendation Letter*

Revised submission

1. *Checklist Form*
2. *Covering letter addressed to the Chairman, IEC, SCTIMST dated 11.01.2024*
3. *Responses/Amendments made based on the Reviewer's comments*
4. *Copy of IEC Recommendation letter dated 09.01.2024*
5. *Responses/Amendments made based on the Reviewer's comments*
6. *IEC Application Form*
7. *Declaration Form*
8. *Research Proposal*
9. *Telephonic Script in English and Malayalam*
10. *Interview schedule in English and Malayalam*
11. *Participant Information Sheet and Informed Consent Form in English and Malayalam*
12. *CV of Principal Investigator and Co-PI*
13. *Permission letters from DME, DHS and DMO offices*

IEC Decision
The IEC approved the conduct of the study in the present form.

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

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST, THIRUVANANTHAPURAM

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

Annexure X

PERMISSION LETTERS

DME 6041/2023-K3

91295/2023

PROCEEDINGS OF THE DIRECTOR OF MEDICAL EDUCATION, KERALA, THIRUVANANTHAPURAM
(Present: Dr.Thomas Mathew)

DME- General- Conduct study on the Anti Rabies Vaccine Registry maintained at Govt Medical College Thiruvananthapuram- -Permission granted-Orders issued

Read: Letter dtd:30/10/2023 from Dr.Biju Soman,Professor & Head Achutha Menon Centre for Health Science Thiruvananthapuram

Order No. K3/6041/2023/DME Dated: 13-11-2023

As per the letter read above, Dr.Biju Soman, Professor & Head Achutha Menon Centre for Health Science Studies, Thiruvananthapuram has requested to permit Dr. Sarath Mohan to conduct study on the Anti Rabies Vaccine Registry maintained at Govt Medical College Thiruvananthapuram. Dr. Biju Soman has intimated that the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology Thiruvananthapuram (SCTIMST) will ensure that the research work undertaken by Dr. Sarath Mohan during his studentship will adhere to the laws and society's moral ethos.

In the circumstances, permission is granted to Dr. Sarath Mohan for conducting study on the Anti Rabies Vaccine Registry maintained at Govt Medical College Thiruvananthapuram subject to the condition that the Head of the Department of Community Medicine, Govt Medical College Thiruvananthapuram will have to be opted into the study as co guide for maintaining the confidentiality of the study.

The Head of the Department of Community Medicine, Govt Medical College Thiruvananthapuram should ensure that the privacy of the details of patients and the data handled during the study shall not be misused and shall not be used against Government.

Signed by
Thomas Mathew
Date: 13-11-2023 06:42:10

THOMAS MATHEW
DIRECTOR

To

1.Dr. Biju Soman, Professor & Head

DME/6041/2023-K3

/191295/2023

Achutha Menon Centre for Health Sciences Studies
Thiruvananthapuram

2.The Head of the Department
Department of community Medicine
Govt Medical College Thiruvananthapuram

Copy to:

1. The Principal Govt Medical College Thiruvananthapuram
2. Stock File

DHS/21575/2023-MC4

I/105621/2023

ആരോഗ്യവകുപ്പ് ഡയറക്ടറുടെ കാര്യാലയം
വഞ്ചിയൂർ.പി.ഒ, തിരുവനന്തപുരം, പിൻ -695035
ഫോൺ: 04712302490 ഫാക്സ്:0471230325/20303080
ഇ-മെയിൽ :dhskerala.hlth@kerala.gov.in
വെബ്സൈറ്റ്: www.dhs.kerala.gov.in

നം.MC4-21575/2023/DHS. തീയതി: 10-11-2023

സ്വീകർത്താവ്

ഡോക്ടർ.ബിജുസോമൻ
പ്രൊഫസർ & ഹെഡ്, ശ്രീ ചിത്രതിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് മെഡിക്കൽ സയൻസസ് & ടെക്നോളജി, അച്യുതമേനോൻ സെന്റർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ് , തിരുവനന്തപുരം

വിഷയം: ആ.വ.ഡ - റിസെർച്ചിന്റെ ഭാഗമായി സെക്കന്ററി കളക്ഷനുള്ള അനുമതി - സംബന്ധിച്ച്

പരാമർശം: താങ്കളുടെ 30/10/2023 ലെ കത്ത്

സൂചന കത്തിലേക്ക് താങ്കളുടെ ശ്രദ്ധ ക്ഷണിക്കുന്നു. താങ്കളുടെ സ്ഥാപനത്തിലെ മാസ്റ്റർ ഓഫ് പബ്ലിക് ഹെൽത്ത് സ്കോളറായ (MPH) ഡോക്ടർ. ശരത് മോഹന് തിരുവനന്തപുരം ജില്ലയിൽ റിസെർച്ചിന്റെ ഭാഗമായി സെക്കന്ററി കളക്ഷനുള്ള അനുമതിക്കായി കത്ത് നല്കിയിരുന്നുവല്ലോ. ആയത് തിരുവനന്തപുരം ജില്ലയിൽ മാത്രമായതിനാൽ എത്തിക്കൽ കമ്മിറ്റി ക്ലിയറൻസ് ഉൾപ്പടെ അനുമതിക്കായി അപേക്ഷ ജില്ലാ മെഡിക്കൽ ഓഫീസർക്ക് സമർപ്പിക്കേണ്ടതാണെന്നുള്ള വിവരം അറിയിച്ചുകൊള്ളുന്നു.

വിശ്വസ്തതയോടെ

Signed by
Dr. Jayasree V
Date: 10-11-2023 15:48:52

DR. JAYASREE V
ADDITIONAL DIRECTOR OF HEALTH SERVICES

DMOH-TVM/3307/2023-C4

I/129830/2023

PROCEEDINGS OF THE DISTRICT MEDICAL OFFICER OF HEALTH, THIRUVANANTHPURAM

Sub: HSD – DMO(H) –Permission for conducting Research Study – Sanctioned –

Orders issued

Read: 1) Request from Dr Sarath Mohan

2) Human Ethics Committee and Other documents

3) Request from Sree Chitra Thirunal Institute For Medical Science and Technology Trivandrum

ORDER NO.I/129830/2023 DATED,30-12-2023

Dr Biju The Professor and Head of the Department, of Achutha Menon Center for Health Science Studies Thiruvananthapuram recommended the request of Dr.Sarath Mohan a scholar in Master of Public Health(MPH) at Achutha Menon Center for Health Science Studies Thiruvananthapuram and also a MBBS Graduate (TCMC 55594) requested permission for conducting research work titled "Geo spatial Analysis of Category III Animal bites and to study the care seeking pathways of those availed post-exposure prophylaxis (PEP) with Equine Rabies Immunoglobulin (ERIG) in Thiruvananthapuram District Kerala" and to study the Anti -Rabies Vaccine Register maintained in General Hospital Thiruvanathapuram General Hospital Neyyatinkara, Taluk Head quarters Hospital Chirayinkeezh, Taluk Hospital Attingal and also sanction issued for telephonic interviews of the animal bite victims enlisted in the registry.

Hence, sanction is hereby accorded to Dr.Sarath Mohan for data collection from January 2024 to March 2024 from the above-mentioned hospitals.

The study should be conducted without causing any interference to the day-to-day activities of the institution and should comply with the instructions of the head of the institution.

Dr.Bindu Mohan

District Medical Officer (Health)

DISTRICT MEDICAL OFFICER O/o DMO DMOHTVM

To

DMOH-TVM/3307/2023-C4

I/129830/2023

Achutha Menon Centre for Health Science Studies Thiruvananthapuram

Copy to :

Dr. Sarath Mohan

Signed by
Dr. Bindhu Mohan
Date: 30-12-2023 08:51:44

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Submission Information

Author Name	SARATH MOHAN (DR)
Title	GEOSPATIAL ANALYSIS OF CATEGORY III ANIMAL BITES AND TO STUDY THE CARE SEEKING PATHWAYS OF THOSE AVAILED POST-EXPOSURE PROPHYLAXIS (PEP) WITH EQUINE RABIES IMMUNOGLOBULIN (ERIG) IN THIRUVANANTHAPURAM DISTRICT, KERALA
Paper/Submission ID	1720161
Submitted by	bijusoman@sctimst.ac.in
Submission Date	2024-04-30 12:53:00
Total Pages	94
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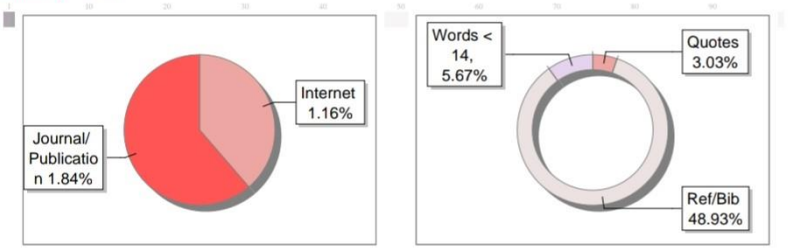

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