



Sveriges lantbruksuniversitet  
Swedish University of Agricultural Sciences

Faculty of Veterinary Medicine  
and Animal Science  
Department of Biomedical Sciences  
and Veterinary Public Health

# **Rabies, dogs and education**

## **A cross-sectional study on the Knowledge, Attitude and Practice in school children in Tamil Nadu**

*Sabine Osmar-Vitalich*



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# **Rabies, dogs and education**

A cross-sectional study on the Knowledge, Attitude and Practice in school children in Tamil Nadu

## **Rabies, hundar och utbildning**

En tvärsnittsstudie av Kunskap, Attityd och Praxis hos skolbarn i Tamil Nadu

*Sabine Osmar-Vitalich*

**Supervisor:** *Susanna Sternberg Lewerin, Department of Biomedical Science and Veterinary Public Health*

**Assistant Supervisor:** *Elisabeth Persson, Department of Anatomy, Physiology and Biochemistry*

**Assistant Supervisor:** *Johan Lindsjö, DVM*

**Examiner:** *Sofia Boqvist, Department of Biomedical Sciences and Veterinary Public Health*

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## **SUMMARY**

Although known and feared for thousands of years, rabies remains a real and present threat to thousands of people, especially in low- and middle income countries. In India, rabies is an endemic disease, causing human deaths every year. The primary mode of transmission is through the bite of an infected dog. Fighting the disease in the dog population through vaccinations remains the most efficient way to eradicate the disease. The knowledge of rabies in India is unsatisfactory, as a lot of people lack awareness about the severity of the disease and the importance of washing the bitten area and seeking medical attention for post exposure prophylaxis when bitten by a dog. Education programs have been seen to have an effect on the knowledge, attitude and practice towards dogs and dog bites, and also in reducing the number of dog bites in children.

The purpose of this study was to evaluate the knowledge, attitude and practice regarding rabies and dogs in school children, and to make a rough assessment of how it is affected by vaccination campaigns and education programs. The study was carried out in the areas of Madurai and Ooty/Coonoor in Tamil Nadu, India, in connection with a large rabies vaccination campaign conducted by the Worldwide Veterinary Service. Questionnaires were distributed in 13 different schools in the two areas, some before (pre-intervention) and some after (post-intervention) an educational speech on dog behaviour and rabies, and the distribution of written information material.

The results showed that the children that had partaken in the brief educational lecture had a better knowledge of the modes of transmission of rabies, how to treat a dog bite and how to respond to dogs in the street. The children in the post-intervention group were more aware of the seriousness of the rabies disease and that it is a problem in India. Neither post-intervention nor pre-intervention groups believed themselves or their families to be in danger of contracting rabies. The conclusions drawn from this study is that neither long term eradication efforts or larger vaccination campaigns are sufficient to influence knowledge, attitude and practice in children, and that education programs directed at children are of great importance in preventing dog bites and rabies infection.

## **SAMMANFATTNING**

Trots att sjukdomen varit känd och fruktad i tusentals år, förblir rabies ett verkligt och närvarande hot mot tusentals människor, framförallt i låg- och medelinkomstländer. I Indien är rabies en endemisk sjukdom som orsakar humana dödsfall varje år. Den huvudsakliga smittvägen är genom bitt från infekterade hundar. Bekämpning av sjukdomen i hundpopulationen genom vaccinationer är det mest effektiva sättet att utrota sjukdomen. Kunskapen om rabies i Indien är otillfredsställande, då många människor inte är medvetna om sjukdomens allvarlighetsgrad och vikten av att tvätta bittet och söka sjukvård för behandling med postexpositionsprofylax då man blivit biten av en hund. Utbildningsprogram har setts ha en effekt på kunskap, attityder och praxis rörande hundar och hundbett, samt i att minska antalet hundbett bland barn.

Syftet med denna studie var att utvärdera kunskap, attityd och praxis rörande rabies och hundar hos skolbarn, samt att göra en grov uppskattning av hur de påverkas av vaccinationskampanjer och utbildningsprogram. Studien utfördes i Madurai och Ooty/Coonoor i Tamil Nadu, Indien, i samband med en stor rabiesvaccinationskampanj genomförd av Worldwide Veterinary Service. Enkäter delades ut i 13 olika skolor i de två områdena, varav några före (pre-intervention) och några efter (post-intervention) en föreläsning om hundbeteende och rabies, och utdelning av skriftligt informationsmaterial.

Resultaten visade att barnen som närvarat vid en kort utbildningsföreläsning hade bättre kunskap om hur sjukdomen överförs, hur man behandlar hundbett och hur man ska bemöta hundar på gatan. Barnen i post-interventionsgruppen var mer medvetna om sjukdomens allvarlighetsgrad och att den är ett problem i Indien. Varken post- eller pre-interventionsgrupperna trodde att de själva eller deras familjer löper risk att smittas av rabies. Slutsatserna man kan dra från denna studie är att varken långsiktigt arbete med sjukdomsbekämpning eller stora vaccinationskampanjer är tillräckligt för att influera kunskap, attityder och praxis hos barn, och att utbildningsprogram riktade mot barn är mycket viktiga för att förebygga hundbett och rabiesinfektion.



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## **INTRODUCTION**

Rabies, one of the oldest and deadliest diseases known to man, is a zoonotic disease caused by a lyssa virus. All warm-blooded animals are susceptible to this virus and it is a common disease in land-living mammals throughout the world. The disease infects both domestic and wild animals and is spread through close contact with infected saliva or through bites and scratches. According to the World Health Organization (WHO), more than 60 000 people die from rabies every year, most of them in Asia and Africa. (WHO, 2013).

Some Asian countries such as Thailand and Sri Lanka have been able to greatly reduce the number of deaths caused by rabies (Sudarshan et al., 2007). In India however, the disease is endemic, causing 20 000 deaths each year, of which 97 % are caused by dog bites (Sudarshan et al., 2006). The majority of the dogs responsible for rabies infection are stray dogs, followed by pets and wild animals (Sudarshan et al., 2007).

According to the WHO, dog rabies potentially threatens over three billion people in Africa and Asia. People most at risk live in rural areas, where vaccines and immunoglobulin are not readily available (WHO, 2013). Furthermore, the dog populations in such areas are normally less controlled and kept more extensively than in Western societies. The level of restriction of the dogs varies greatly and rabid dogs are less likely to be detected and prevented from disease spreading since there is no one responsible for them (Jackman & Rowan, 2007). Poor people are at a higher risk, as the cost for full rabies post-exposure prophylaxis (PEP) of US\$100 is high with an average daily income of about US\$1-2 per person. Dog vaccination costs can be as little as US\$ 0.50 per dog (WHO, 2012.).

On average, 40% of PEP regimens are given to children aged 5-14 (WHO, 2013). The incidence of bites from animals has been found to be almost twice as high in children as it is in adults. All age groups are susceptible to the disease, but rabies is most common in children under the age of 15 since they tend to come into close contact with dogs more often (Chhabra et al., 2004; Knobel et al., 2005).

Education has been seen to be a tool in preventing dog bites in children (Chapman et al., 2000). A positive effect on the knowledge, attitude and practice regarding rabies and dogs has been observed after the distribution of information material. The main effect has been shown on knowledge of the mode of rabies transmission, how to deal with potentially rabid animals, vaccination for pets, and also in enhancing the awareness of the importance of wound management through washing after an animal bite. (Matibag et al., 2009).

### **Objective**

The objectives of this study were to assess the knowledge, attitude and practice (KAP) regarding rabies, dog interaction and dog bites in school children, and to make a rough assessment of the effect of the rabies vaccination campaign and educational lecture on the KAP of children.

## **LITERATURE REVIEW**

### **India**

People have been living and tending to the country around the river of Indus, which is now the area between India and Pakistan, for the past 9000 years. The first Indian civilization arose in the area around 2500 BC and remained for over a thousand years. India was controlled by Britain from the 1840s. The country reached independency in 1947, after the famous non-violent movement of Mahatma Gandhi. The country was then divided into India, West Pakistan and East Pakistan, that would later become the country of Bangladesh.

Since its independence, India has developed and maintained democratic governance and is often called the biggest democracy in the world. (Swedish embassy in New Delhi, 2013).

India today is a diverse country with a population of a multitude of religions, cultures and heritages. Hindus, Muslims, Christians, Sikhs and other religions coexist here. In 2012, its population was up to 1.22 billion people. Hindi is spoken by 41% of the population and is the most widespread language. English is the subsidiary official language but is the most important one for national and commercial communication (Central Intelligence Agency, 2013). Twenty-eight of the states have their own official languages, and in total the country hosts over 200 different languages (Swedish embassy in New Delhi, 2013).

India is one of the world's fastest growing economies, and is the third biggest economy of the world in terms of PPP (Purchasing Power Parity) (Index Mundi, 2013). However, around 450 million people, or about 40% of the population of India, live under the global poverty level of USD 1.25 per day. The economic growth is unevenly distributed over the country; many of the poorest people live in the northern and northeastern states. (Swedish International Development Cooperation Agency, 2009).

The citizens of India have statutory rights to health care and education. In reality however, the government has not been able to provide the people with these rights, and a large number of Indian citizens lack of working schools and hospitals. Tuberculosis and malaria remain a health hazard (Swedish International Development Cooperation Agency, 2009). Maternal mortality rate is 200 deaths/100 000 live births in 2010; infant mortality rate is 44.6 deaths/1000 live births. According to CIA, 43.5% of children under the age of 5 are underweight, which puts India as number two on the CIA list of countries with malnourished children (CIA, 2013). Women, children, people of minorities and lower casts are particularly vulnerable and may lack food, home, healthcare and clean water (Swedish Government, 2010).

India has not succeeded in controlling many of the occurring infectious diseases, as it lacks functional public health infrastructure for disease prevention. There is a widespread belief in India about the origins of diseases as something from imbalance of internal body forces, or caused by supernatural forces that cannot be treated. Open field defecation is wide spread in rural and poor communities. There is risk of zoonoses due to close contact with animals. A number of infectious, but neglected zoonotic diseases are prevalent in India, such as

leptospirosis, anthrax, typhus and rickettsiosis as well as Nipah virus, hantavirus and tick-transmitted flavivirus. (John et al., 2011).

### **Rabies - the disease**

Rabies infection occurs when the virus penetrates the skin barrier, and the most common mode of infection is through bites of an infected animal (Warrell, 2012). The incubation period for rabies varies depending on the site of infection, from one week up to a year, though typically between one to three months. Once rabies encephalitis develops there is no effective cure for the disease. For previously unvaccinated patients with rabies, the outcome of infection will inevitably be agonizing symptoms and death within weeks (Jackson et al., 2003).

The symptoms vary between species; cattle become somnolent or aggressive, and may develop paralysis in the jaw. Dogs develop either a furious or a paralytic form of rabies. Most noticeably, behavioural changes occur in the furious form, with high levels of aggression and increased tendencies to bite animals and humans. Rabid dogs can appear unnaturally strong, thus hard to keep restricted, can cover large distances and hence be at higher risk of spreading the disease. (Merck Veterinary Manual, 2011).

In humans, the initial symptoms of rabies are usually fever and often pain or an unusual burning sensation at the wound site (Mitrabhakdi et al., 2005). The virus is transported from the bite wound to the central nervous system (CNS) via retrograde axonal transport and transsynaptic transmission (Warrell, 2012). Once it has infected the CNS, the virus spreads further within the nervous system, causing progressive, fatal inflammation of the brain and spinal cord. Two forms of disease can follow; furious or paralytic form of rabies (Mitrabhakdi et al., 2005; WHO, 2013).

People with furious rabies exhibit signs of hyperactivity, excited behaviour, hydrophobia and sometimes aerophobia. Death occurs after a few days by cardio-respiratory arrest. Paralytic rabies is less dramatic. The muscles gradually become paralyzed, starting at the bite wound, coma slowly develops and eventually death occurs. This form of rabies is often misdiagnosed, contributing to the underreporting of the disease (Warrell and Warrell, 2004; WHO, 2013). Rabies is 100% preventable by correct vaccination, but once the symptoms develop the patient's life can almost never be saved (WHO, 2013).

### **Preventing rabies**

There are three ways of preventing rabies in humans; by preventing the transmission of the rabies virus within the host species population, by treating all people that have been bitten by dogs of unknown vaccination status with PEP, or by vaccinating people at risk of exposure (Otter, 2010). PEP, which is highly effective if given promptly after the bite, includes wound cleansing with soap and water, immunization with a modern cell culture vaccine, and administration of human rabies immunoglobulin (HRIG), depending on the type of exposure (Table 1). Immediate washing with concentrated soap and water has experimentally been seen to be 50% effective in preventing rabies (Warrell, 2012). Once rabies encephalitis develops, no therapy has proved to be effective, although there are reports of occasional survivors after aggressive therapy (Willoughby et al., 2005). The distribution of post-exposure prophylaxis in

cases where a bite from a potentially rabid dog has occurred is of vital importance within a short time frame (Jackson et al., 2003). In India, it has been estimated that 1.07 million people receive PEP annually (Knobel et al., 2005).

Table 1. *WHO classification of wounds and recommended course of action*

	Exposure	Treatment required
<b>WHO category I</b>	Touching animals, licks on intact skin	None
<b>WHO category II</b>	Nibbling (tooth contact) of uncovered skin, minor scratches or abrasions without bleeding	Immediate vaccination and wound management
<b>WHO category III –</b>	Single or multiple bites or scratches that break skin, licks on broken skin; contamination of mucous membrane with saliva from licks, bat contact	Immediate vaccination and wound management, and treatment with immunoglobulin

In many low- and middle income countries, there is a lack of awareness among the population, including medical practitioners and health authorities, about the widespread extent of the disease and the risk of transmission from dogs to human populations. Additionally, the infrastructure for the management of rabies exposure is scarce. Many people who are exposed to rabies do not seek PEP. This is because they are not aware of the risk of contracting the disease or because they live in rural areas, too far away from the rabies prevention centres that are generally located in big cities. In some cases, the world's poorest people simply cannot afford the cost of PEP. (Bourhy et al., 2010).

It has long been known that the most cost-effective strategy for preventing rabies in people is by controlling the disease in dogs through vaccination, and most experts agree that dog-vaccination campaigns are a more effective approach to rabies prevention than is post-exposure treatment alone (Bogel and Meslin, 1990; Tenzin et al., 2012). According to WHO (2012), rabies control in dogs remains the only long-term, cost-effective means of eliminating or preventing most human cases. Human public health preventive measures should be paralleled by programs for dog rabies control (WHO, 2013).

According to WHO (2013), preventing human rabies through control of domestic dogs is a realistic goal for large parts of Asia and Africa, and is justified financially by the future savings of the discontinuation of PEP for people (Gongal and Wright, 2011; WHO, 2013). However, such prevention efforts are often not prioritized by national governments even in the most endemic countries. Among the reasons for the low priority afforded to rabies are, as for many neglected tropical diseases, its predominance in remote rural areas and its disproportionate impact on people living in extreme poverty.

According to some estimates, every year approximately 500 000 people in India receive the post-exposure vaccination treatment consisting of five vaccine doses. According to Sudarshan et al., (2007), the full cost of post-exposure treatment of humans that have been bitten in India is US\$25 million. The annual incidence of animal bites has been found to be 17 per 1000 persons, in a study from 2006 (Sudarshan et al., 2006).

## **Results of vaccination campaigns**

Many Latin American countries have had success in controlling the spread of rabies through mass canine rabies vaccination campaigns and improved post-exposure treatment. In many areas, 80 percent vaccination coverage has been achieved quickly. As a result of these efforts, human rabies and dog rabies cases dropped by 80 percent between 1993 and 2002 (Belotto et al., 2005).

The mass vaccination campaigns, however, are not without difficulty. High population turnover for dogs as a result of dog removal and mortality undermines the success of mass vaccination programs. Subsequent migration of non-vaccinated dogs to areas from which dogs have been removed further reduces vaccination coverage. Other barriers to dog vaccination include lack of sustainable human and financial resources, inaccessibility of a large fraction of dogs, low-quality and high-cost vaccines, lack of public awareness or collaboration among agriculture and health departments, poor immune response, and movement of human and dog populations. To achieve and maintain adequate vaccination coverage, continuous vaccination campaigns are necessary. (Jackman & Rowan, 2007).

Compared to other low- and middle income countries, India has been reported to have the lowest proportion of dog owning households and a high proportion of ownerless dogs. It is, however, not clear if these stray dogs were truly stray or owned dogs allowed to roam free in the streets (Davlin and VonVille, 2012).

## **Rabies in India**

Studies have found that less than half of the bite victims in India performed basic wound management procedures such as washing the bitten area with soap and water (Herbert et al., 2012; Sudarshan et al., 2006). It has also been shown that most bite wound victims in Asia live far from rabies prevention centres, and that very few of them even come under medical attention within six hours of exposure (Dodet et al., 2008).

A study in Delhi concluded that people who ended up dying from rabies did not receive any post exposure treatment or were inadequately treated (Chhabra et al., 2004). According to Sudarshan et al. (2006) only 30-42% of bite victims were given tissue culture vaccines and only 2.1% were given immunoglobulines. The cost of medical care after an animal bite has been found to be US\$4 (Rs 252). Local applicants on wounds have been used in about 46% of the bite cases, such as application of chili powder or herbs. It has been concluded that extensive awareness campaigns are needed to educate the people of India on better protocols to treat dog bites and to avoid rabies infection (Chhabra et al., 2004; Sudarshan et al., 2006).

A national epidemiological survey found rabies to be endemic in India during the reviews period of 1992-2002, with the majority of human cases reported from rural areas (Sudarshan et al., 2007). In Asia, most of the bite victims seeking post exposure treatment are from groups of lower socioeconomic status (Dodet et al., 2008).

According to the WHO (2004), the estimated annual cost of rabies in Africa and Asia is USD 593.5 million. In India the patients themselves cover nearly half of the costs associated with rabies (WHO, 2004).

As the first state in India, Tamil Nadu has initiated a multisectoral initiative for rabies control. This includes availability of rabies vaccines in all public health facilities, waste management and Animal Birth Control (ABC) programs, dog licensing rules among others. In rural Tamil Nadu, however, rabies prevention is primarily focused on providing Post Exposure Prophylaxis (PEP) to dog bite victims. Dog vaccines are provided for pet dogs by the Directorate of Public Health & Preventive Medicine when requested and paid for by dog owners. (Abbas et al., 2011).

### **Dog bites in children**

Being bitten by a dog can be a traumatic experience for a child, even without the risk of contracting a dangerous disease. A study has found that children who had been bitten by dogs should be considered at risk for development of Post traumatic stress disorder (Peters et al., 2004). Many of the children that had been victims of dog bites showed signs of post traumatic stress disorder even months after the event. Late effects after being bitten by a dog include nightmares and fear of dogs (Schalamon et al., 2006). Consequences of dog bites can include pain, disfigurement, infection, fear and anxiety. Studies on children in other parts of the world have shown a lack of awareness of dog bite prevention, and that few children receive education on how to interact with dogs. Educational programs have been shown to increase children's ability to identify unsafe situations around dogs, an ability that may reduce dog bite statistics (Chapman et al., 2000; Wilson et al., 2003). Injury to children by animals is an unrecognized cause of morbidity and even death in Asian countries (Linnan et al., 2008).

### **Rabies awareness in India**

In Asia, there is a lack of awareness among people about rabies, and in India the knowledge, attitude and practice have been found inadequate (Prakash et al., 2013). A study in an animal bite clinic in India showed an inadequate knowledge of rabies prevention, especially regarding wound classification, types of animals transmitting rabies and pre-exposure prophylaxis (Shankaraiah, 2013). Of the general public, few people are aware of basic wound management practices. Many bite victims have never heard of rabies prior to being bitten by a dog (Dodet et al., 2008). A lot of people are unaware that rabies is a fatal disease and are unaware of the importance of washing bite wounds immediately (Herbert et al., 2012).

Only 15% of bite wound victims in India have reportedly learnt about rabies in school, despite the fact that many of the victims are school-aged children. Most of the information about rabies comes from friends or neighbours (Herbert et al., 2012). The major issues for which information campaigns can make a life saving difference, are the importance of wound management immediately after a dog bite, and the need to seek medical attention for post exposure treatment (Dodet et al., 2008; Matibag et al., 2009; Sudarshan et al., 2007).

### **Worldwide Veterinary Service**

The Worldwide Veterinary Service (WVS) was founded in 2002 with the intent of pooling veterinary resources to assist animal charities and NGOs worldwide. The WVS works with training and education of general public as well as local veterinary professionals, sends out volunteer teams to animal welfare charities, as well as veterinary aid parcels with donated

supplies. The WVS is also able to provide response in emergencies or disaster situations, and has been in place in various countries in times of disaster since 2008.

In 2010, a branch of the charity called WVS India was established to manage the International Training Centre of WVS on site in India. The centre is located in Ooty, Tamil Nadu and provides practical training to Indian veterinarians and charity workers, in surgery courses and animal handling courses, respectively. (WVS, 2013).

### **Mission Rabies in India**

Starting on World Rabies Day of 2013, the WVS launched the Mission Rabies vaccination campaign (Figure 1); a mass vaccination campaign aiming to vaccinate 70% of the dog populations in ten carefully selected check points around India, in 30 days. After a pre-vaccination survey on site, it was estimated that 50 000 dogs would need to be vaccinated to reach the goal. The mission was accomplished as 60 000 dogs were vaccinated. Volunteers, international as well as Indian, joined the vaccination campaign. The campaign was also accompanied by a mobile veterinary hospital built into a truck. The mobile hospital is going between the various check points, where it is intended to deliver training programs to Indian veterinarians and animal care workers. (WVS Mission Rabies, 2013).



Figure 1. *Dog being caught with net on Mission Rabies vaccination campaign. Author's photo*

## **MATERIALS AND METHODS**

### **Conduct of the study**

This cross-sectional study was carried out as a Minor Field Study funded by the Swedish International Development Cooperation Agency, in connection with the Mission Rabies campaign. In connection with the vaccination campaign in Madurai, a vast rabies awareness campaign was held by the WVS in the area, with advertisements and information in local newspapers, TV-stations and on billboards, and pep rallies on the streets to promote



awareness (A. Murugan, WVS, personal communication, 2013). The awareness program took place in September-October in 2013 in Tamil Nadu, India.

Prior to the vaccination campaign, a pre-vaccination survey was conducted. A number of wards of Madurai were chosen randomly from a map using colour coding, and the numbers of dogs in the streets were counted for each assigned ward, to estimate the size of the dog population (I. Otter, WVS, personal communication, 2013). Hospitals in the area were contacted by a WVS volunteer for existing data on the rabies prevalence in the area.

A KAP questionnaire was constructed (Médecins du Monde, 2011), which was divided into four different sections; background data, knowledge, attitude and practice (Appendix 1). The questionnaire was constructed in English and translated to Tamil, thereafter translated back to English by a Tamil native speaker to assess the accuracy of the translation. The target age group was defined as 10-15 year old children.

A pilot study of the survey was conducted in Coimbatore, Tamil Nadu in school A (Shri Raman Chettiar Memorial Matriculation Higher Secondary School), a mixed school of girls and boys. Twenty-four girls and 33 boys of ages 11-14 answered the questionnaire. Based on the results of the pilot study, the questionnaire was shortened from 48 to 41 questions. The age group was also widened to 10-18 years of age so as to include whole classes in the participating schools.

The schools of Ooty and Coonoor were given a shortened version of the questionnaire with 34 questions (Appendix 2), where questions that had a high number of blanks or where the question had clearly been misunderstood had been removed. Questions that had been removed were also discarded from the analysis in the Madurai schools. Careful instructions for the school staff were presented personally prior to each school visit.

The questionnaire included a background section with questions about age, sex, dog ownership and the number of people and children in the household. The knowledge section focused on the childrens knowledge of the disease, common routes of transmission, connections between animals and rabies, treatment and prevention and on their knowledge of dog behaviour, with open questions regarding what to do in encounters with dogs and the course of action if bitten by a dog.

The attitude section was constructed with a number of closed questions regarding whether the child felt at risk of contracting rabies and their attitude towards dogs and vaccination, and a number of statements to which the children were asked to mark on a scale whether the statement met their beliefs. The scale was graded 1-5, where 1 marked Strongly disagree, 5 marked Strongly agree and 3 represented a neutral feeling towards the statement.

The practice section was formed with questions about dog behaviour with four scenarios where a child encountered a strange dog in the street, in which the children were given alternatives on how best to act, and questions about previous exposure to dog bites and treatment of bites.

The questionnaire was preapproved by experts in the field and with good knowledge about Southindian culture and practice.

## Location

Two different locations were chosen for the survey, Madurai and Ooty/Coonoor (Figure 2). The city of Madurai in Tamil Nadu, India, which has a high incidence of rabies cases, was also a checkpoint for the vaccination campaign Mission Rabies. Prior to the vaccination campaign, the city had been subjected to a media campaign with information on local television and in newspapers about the upcoming project and rabies disease to promote rabies awareness. The cities of Ooty and Coonoor were chosen as they were not checkpoints in the vaccination campaign, had not been subjected to the awareness campaign in the media but instead have had a long term anti-rabies work in the area done by local NGOs, and have not had reported cases in the area for more than ten years as far as the author of this study has been able to find (I. Otter, WVS, personal communication, 2013). Ten schools in Madurai and three schools in Ooty and Coonoor were part of the survey. The schools were coded as A-N. The schools represented a convenience sample with representation from different religions, caste and socioeconomic background.

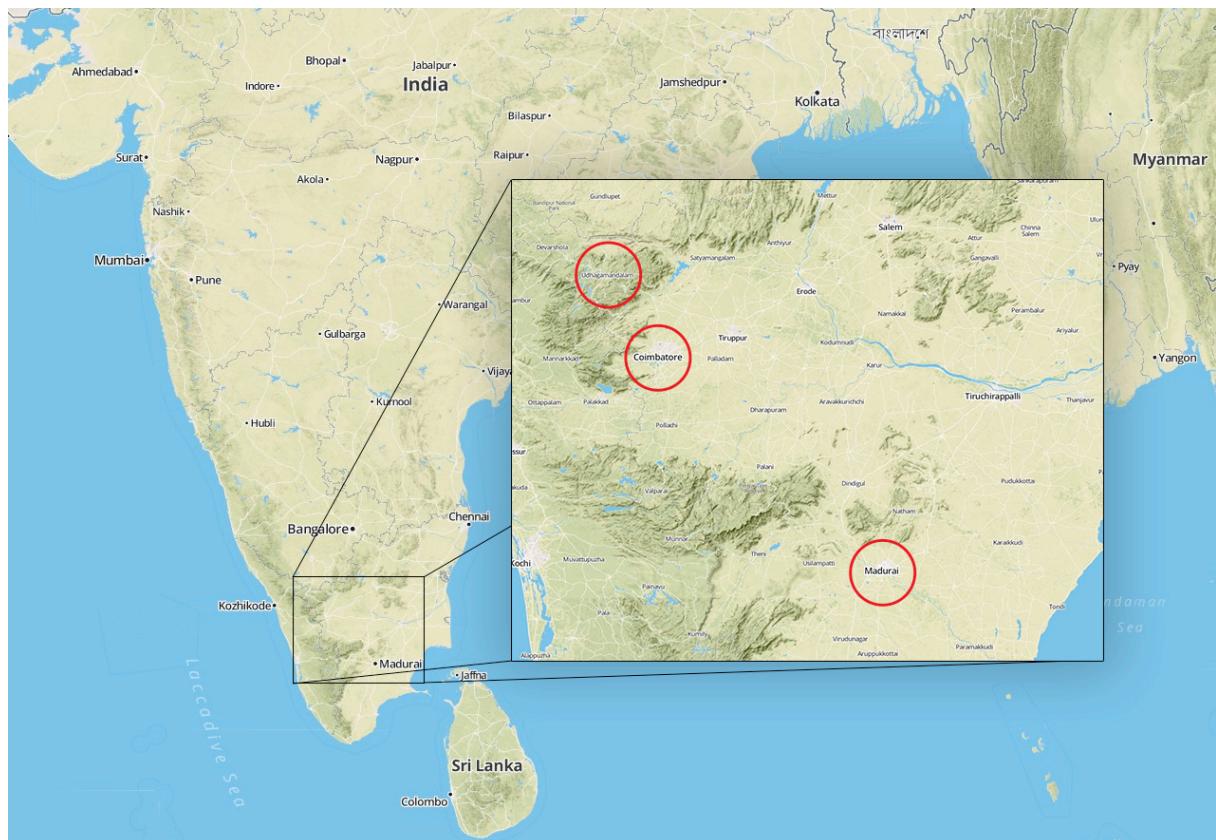


Figure 2. Map of Tamil Nadu and selected locations for the survey (Modified from [www.mapbox.com](http://www.mapbox.com), 2014)

## Intervention

A rabies information package was developed, with a lecture and written material handed out to the schools. The written material consisted of two brochures, one on the importance of

ABC-programs, and one about dog behaviour, describing steps to take to avoid getting bitten by dogs and what to do if bitten, targeting children up to 10 years of age. The lecture included the present problem of rabies in India, steps to take after getting bitten by dogs, how to avoid getting bitten by dogs and the importance of ABC-programs to control the dog population and take control of the disease. The lectures were held in Tamil, in schools B-G the lecture was held by a Tamil speaking volunteer from a local Rotary club that had previously been educated on rabies by the veterinarian coordinator for the Mission rabies project. In schools H-J the lecture was held by the veterinary coordinator for the Mission rabies in Madurai, in Tamil (Figure 3). Schools K-N were given the lecture by the author of this report together with a colleague, in English.



Picture 3. *Rabies awareness lecture held by Tamil native speaker. Photo credits to Naomi Kenton, WVS*

### **Data collection**

Each of the participating schools was visited personally and the children were then asked to fill in the KAP questionnaires (Figure 4). The visits were organized in connection with the WVS Mission Rabies awareness program. The WVS obtained necessary permissions prior to the survey. The staff and the children were informed of the purpose of the study, and that the participation was optional and anonymous. Twelve schools were English medium schools with education in English and were given questionnaires in English; one (school E) was given questionnaires in Tamil.

Five schools (A, F, H, M, N) were given the questionnaires prior to the spoken lecture and were defined as pre-intervention schools. Schools B, C, D, E, G, I, J, K were given the questionnaires after the lecture and were defined as post-intervention schools. School L was given the questionnaires four days after the lecture and was defined late post-intervention school.

The schools were divided into categories:

1. pre-intervention schools - subdivided according to area (n=number of questionnaires)
  - a. Madurai (n=150)
    - i. Checkpoint in the Mission Rabies campaign
    - ii. Subjected to rabies awareness campaign in local media prior to visit
  - b. Ooty/Coonoor (n= 304)
    - i. Not a part of Mission Rabies campaign
2. post-intervention schools subdivided into
  - a. supervised filling of the questionnaires (Madurai schools) (n=226)
  - b. unsupervised filling of the questionnaires (Madurai schools) (n=540)
  - c. late post-intervention schools (Ooty school) (n=73)



Figure 4. *Supervised filling of questionnaires. Author's photo*

The questionnaires answered in Tamil were translated back to English by two native Tamil-speaking interpreters. All the questionnaires were transformed into digital version using Excel, and analyzed in their respective categories. Free text answers were manually grouped for the analysis. Answers that were clearly the result of misunderstanding the question or where it was not possible to comprehend what the child had intended to answer were discarded from the analysis. Not all children had answered all questions. The answers were then analyzed as percentages of the number of responses for that particular question. Significance testing was done using Chi2-test for 2 by 2 table with a 95% significance level, via Epitools (<http://epitools.ausvet.com.au>). On the demographic section questions regarding dogs and people in household, only the ones that had stated a specific number were included in the demographics analysis, answers such as “more than 15 dogs” or “more than 50 people” were discarded.

## RESULTS

### Demographics

A total of 1293 children answered the questionnaires, 731 (57%) of them female, 556 (43%) male and 6 (0.4%) whom had not specified gender. Detailed results from background section are seen in Table 2. The average age of the respondents was 14 years of age, although the ages varied from 10 to 18 years of age (Table 2). Of the responding children, 340 (26%) children said that they had one or more dogs in their household, 931 (72%) had no dogs in their home and 21 (2%) did not answer the question. The average number of dogs per household was 0.49.

Table 2. *Demographics from all respondents according to groups*

	Post-intervention*			Pre-intervention	
	<i>Unsupervised</i>	<i>Supervised</i>	<i>Later</i>	<i>Ooty/Coonoor</i>	<i>Madurai</i>
<b>Age average</b>	14.6	13.21	12.73	13.50	14.07
<b>No respondents</b>	540	226	73	304	150
<b>Sex Female/Male/blank</b>	311/227/2	170/56/0	14/58/1	190/111/3	46/104/0
<b># Dog owners/non dog owners/blank</b>	111/422/7	67/157/2	25/47/1	94/210/5	41/104/5
<b>Average no. of dogs</b>	0.39	0.61	0.97	0.49	0.47
<b>Average no. of people in household</b>	5.29	10.52	5.18	5.28	5
<b>Average no. of children in household</b>	2.4	5.15	2.66	2.07	2.16

\* *Madurai and Ooty schools*

### Knowledge

#### ***Disease and transmission***

Almost a third (27%) of the children in the pre-intervention group (N=424) said that they did not know what rabies is, and 11% had answers that were grouped into the category “other” such as “poison” or something that comes from bad food. In the post-intervention group (N=804), only 1% said they did not know what rabies is and 2% answered “other”. The post-intervention groups were more aware that the disease is viral and/or infectious. Detailed results of the answers to the question “what is rabies” are given in Figures 5 and 6.

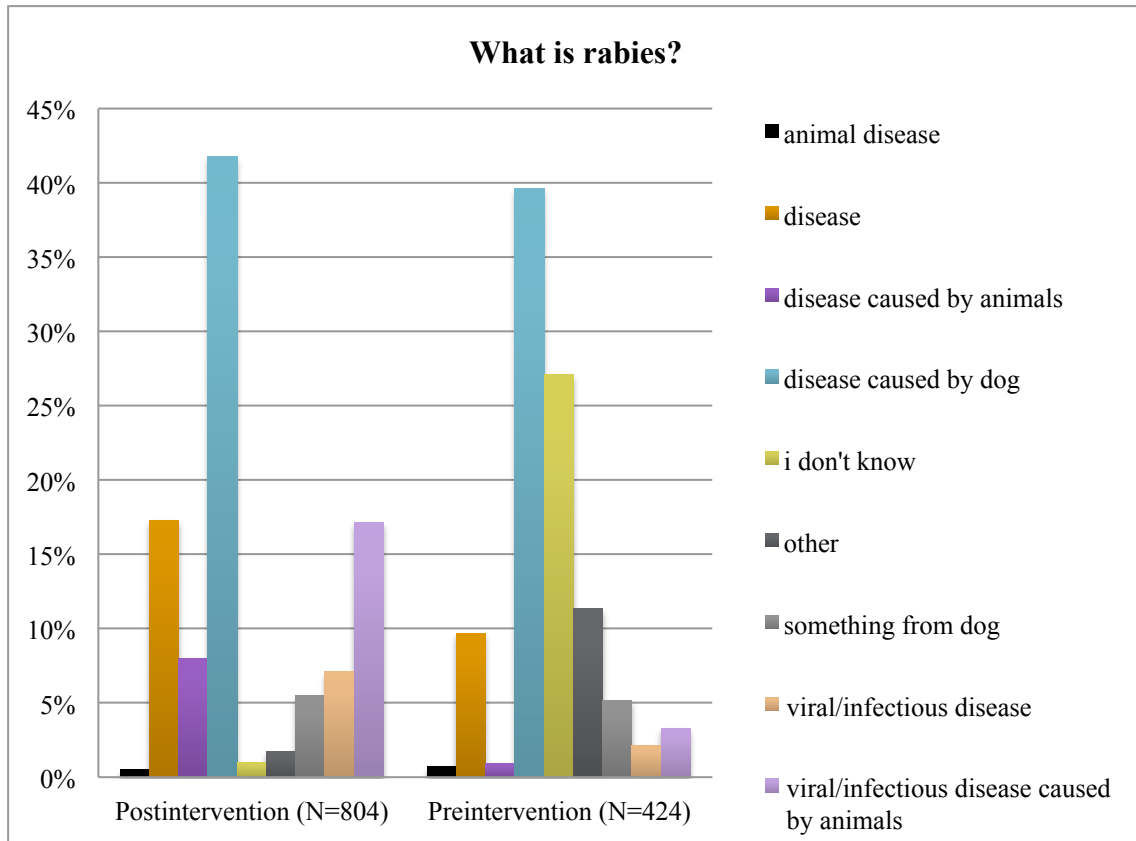


Figure 5. Grouped answers to the question “What is rabies?” in pre- and post intervention groups

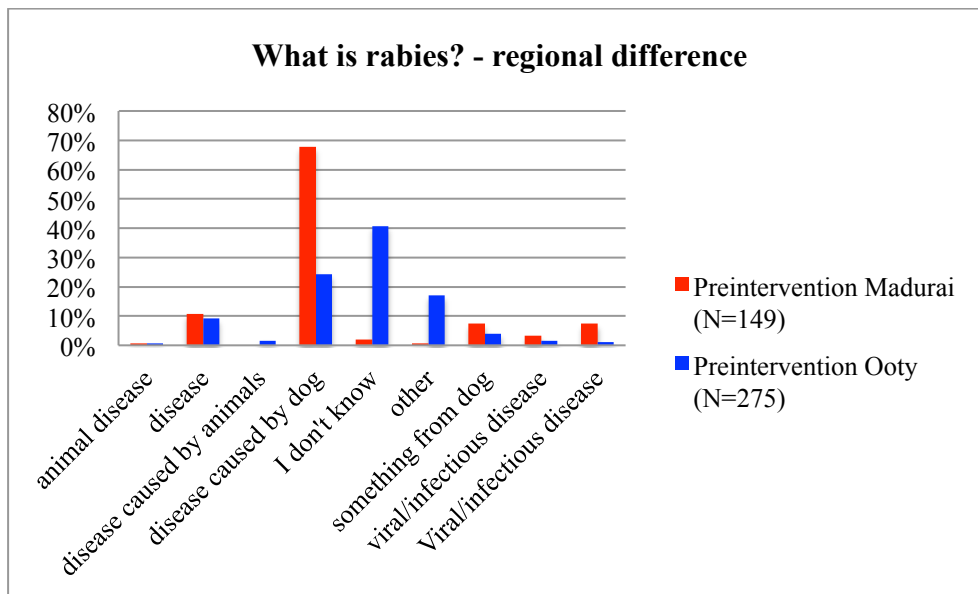


Figure 6. Grouped answers to the question “What is rabies?” analyzed according to region

The group of pre-intervention in Ooty (N=275) stood out as seen in Figure 6, where 17% ( $p < 0.05$ ) had answers that fell under the category “other” and a large proportion (41%) said that they did not know what rabies is. In the other groups (N=953) only 2% of the answers fell into the category “other”.

The pre-intervention group of Madurai (N=149) were more aware of the association between rabies and dogs than the Ooty group, as 68% answered that it is a disease caused by dogs, and 7% that it is something that has to do with dogs.

The majority (95%) of the children who answered this question (N=970) knew that people can get rabies. The pre-intervention group in Ooty (N=285) differed however, where 58% answered yes, 35% answered that they did not know, and 7% answered no.

The post-intervention groups (N=800) had good knowledge of how rabies is transmitted as seen in Figure 7. The majority of the children (68%) responded that it is transmitted through dog bites and/or dog saliva, 7% responded that it is transmitted through animal bites and/or animal saliva and 17% responded that it comes from dogs/street dogs.

On this question, the pre-intervention group in Ooty (N=241) also stood out (Figure 7), as only 30% answered that it came from dog bites or dog saliva, compared to 61% of the whole group (N=1182) and 78% of the pre-intervention group in Madurai (N=141). Forty-one percent of this group said that they did not know how people get rabies, compared to the others where 0-2% said they do not know.

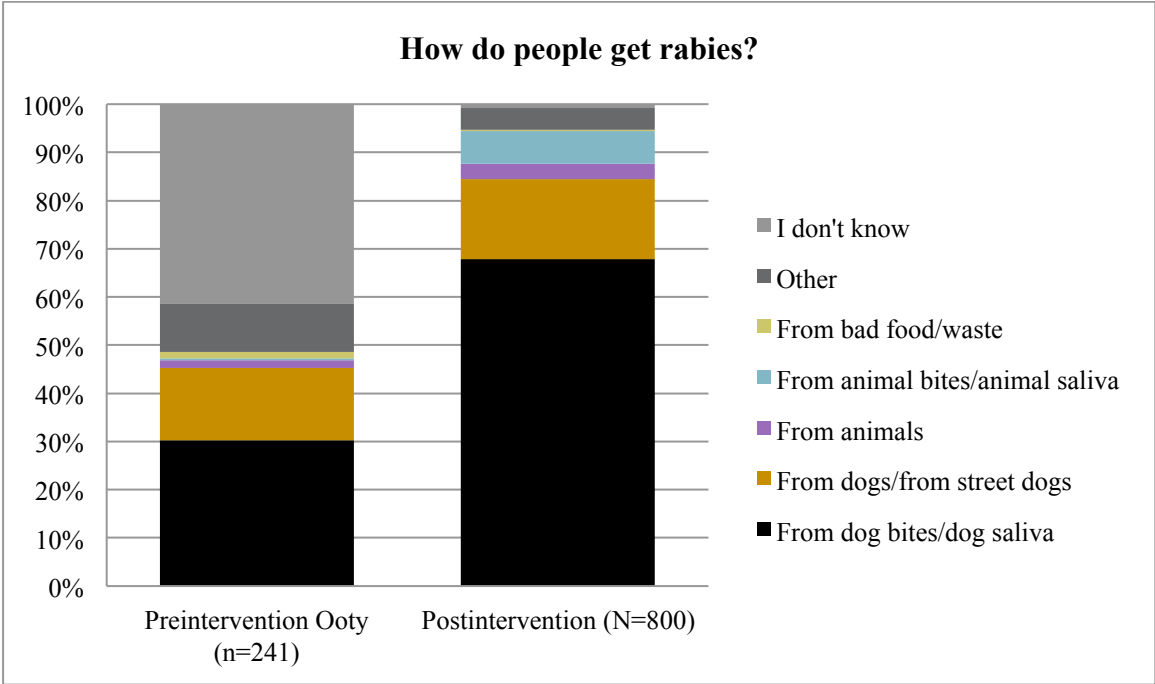


Figure 7. Detailed answers to “How do people get rabies?” from post-intervention respondents and pre-intervention group Ooty

**Regional differences in Knowledge of transmission**

As many as 41% of the children in the pre-intervention group in Ooty answered that they did not know how people get rabies, whereas only 0.7% of the pre-intervention group in Madurai said they did not know. In the pre-intervention group in Ooty (N=278), the children also answered to a greater extent that they did not know if animals can get rabies or not (30%), and that animals cannot get rabies (19%) both compared to the total group and to the pre-intervention group of Madurai. In the Ooty group, 1% believed that rabies comes from bad

food or bad waste management. In the pre-intervention Madurai group, 78% stated that rabies comes from dog bites and/or dog saliva, and 10% (N=141) fell into the category Other.

None of the groups (N=1016) had good knowledge of the fact that all mammals can get rabies; only 14% answered that all animals can get rabies. Thirty-nine percent answered that only dogs get rabies, 24% that dogs and other animals can get rabies and 11% that they did not know.

**Risk and consequence**

In the post-intervention group (N=823), 68% of the children were aware that rabies is a fatal disease, (Figure 8) while only 32% of the children in the pre-intervention group (N=451) responded yes to that question. The post-intervention children however, believed that rabies will not kill them if it is treated properly, for example by washing a wound after bitten by a dog. The pre-intervention children said to a greater extent that they did not know if rabies would kill them (19%) than the post-intervention group (1%).

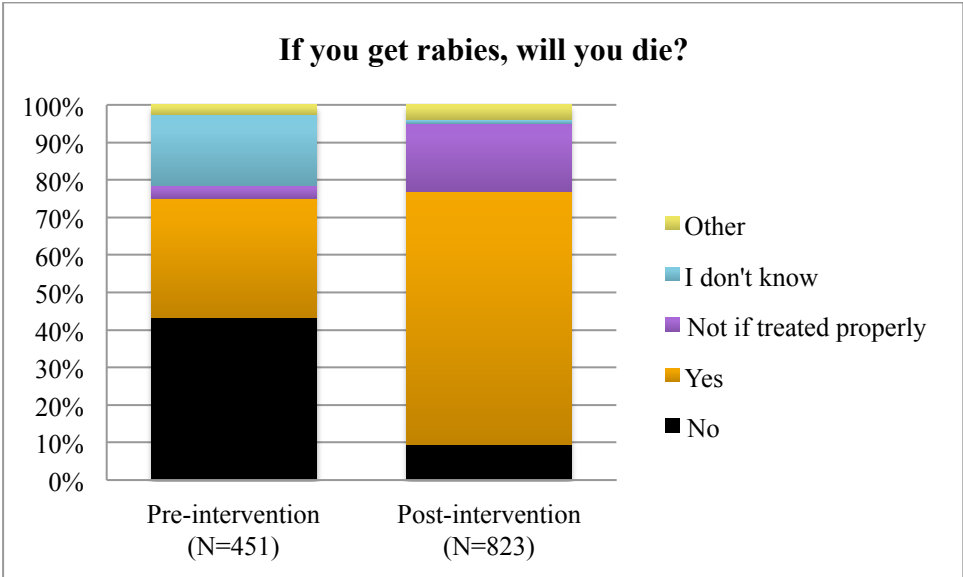


Figure 8. Responses to “if you get rabies will you die?” from pre- and post-intervention respondents

There was an apparent regional difference in the knowledge that rabies is a fatal disease (Figure 9); the majority (57%) of the children from Ooty (N=302) believed that rabies will not kill you; only 17% of the children in Madurai (N=149) said it will not kill you. The children of Ooty said to a greater extent (26%) that they do not know if rabies will kill you, and only 5% of the children of Madurai said they did not know.



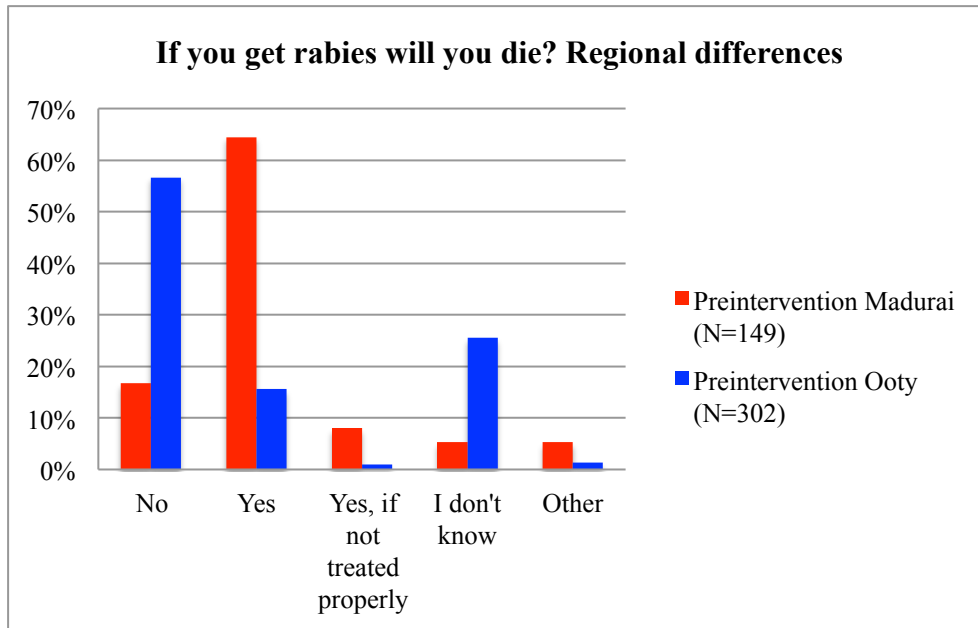


Figure 9. Responses to “if you get rabies will you die?” from pre-intervention respondents divided according to region

The post-intervention group (N=783) showed a greater knowledge as to whether rabies can be treated or not (Figure 10). Forty-three percent answered that it cannot be treated, 6% said it can be treated if the correct steps are taken after a dog bite, such as washing the wound and seeking medical attention.

In the pre-intervention group (N=440), 69% answered that rabies can be treated, and 16% said that they did not know if rabies can be treated. None of the children in the pre-intervention groups knew that steps taken after a dog bite were associated with rabies.

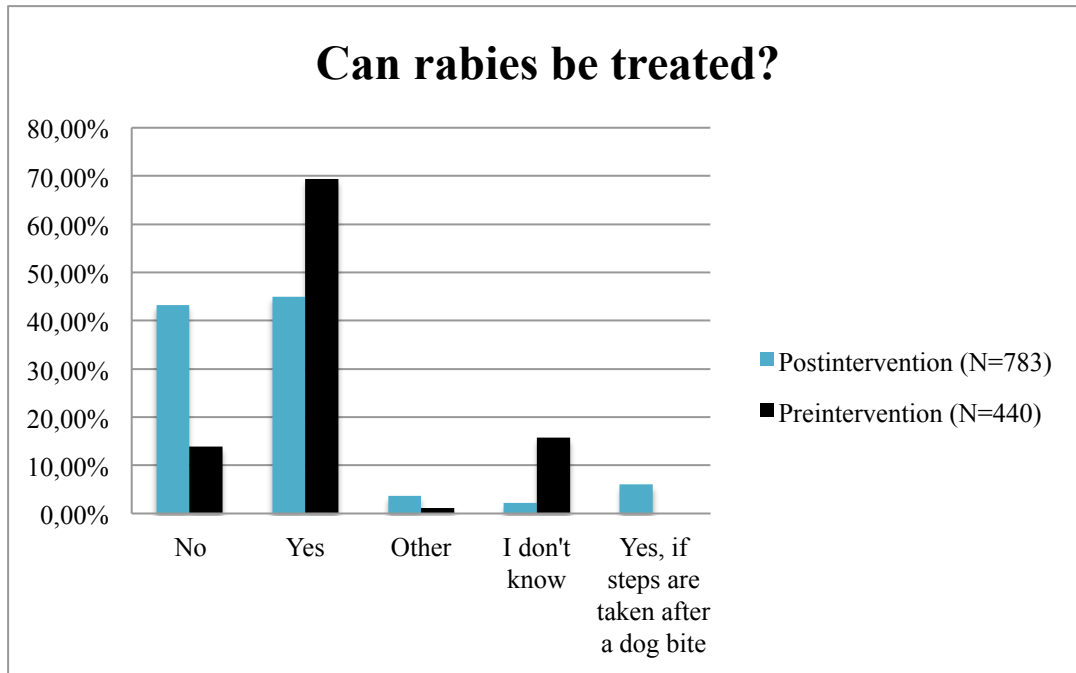


Figure 10. Responses to “can rabies be treated?”, post- and pre-intervention groups

The post-intervention group (N=839) knew to a greater extent about preventative measures (Figure 11), and also knew that vaccinating dogs is the appropriate way to prevent rabies compared to the pre-intervention group (N=454,  $p < 0.05$ ).

The post-intervention groups answered that wound management and seeking medical attention after dog bites was the appropriate way to prevent rabies to a greater extent ( $p < 0.05$ ) than the pre-intervention group and also answered to a larger extent that rabies should be avoided through avoiding dogs or being careful around dogs. The pre-intervention group stated to a greater extent that they did not know how rabies can be prevented and also had a higher number of non-respondents to this question.

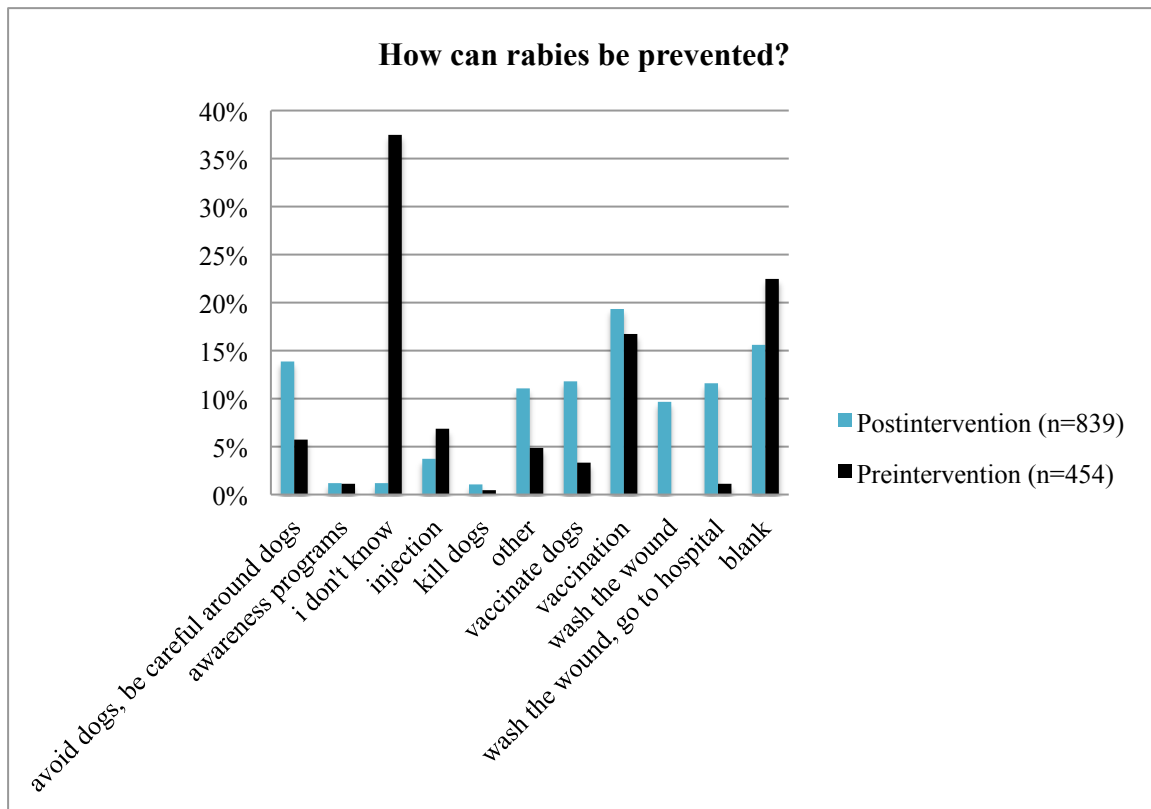


Figure 11. Knowledge of rabies prevention, post- and pre-intervention groups compared

### Attitudes

A very small portion of the respondents believed that they or their family might be in danger of contracting rabies, regardless of whether they lived in an endemic area or not (Figure 12).

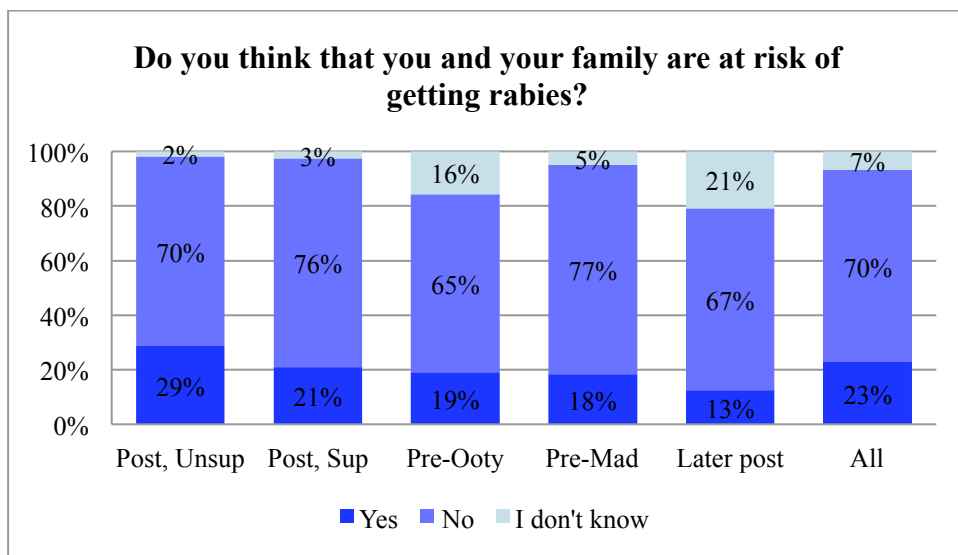


Figure 12. Perception of family at risk in all analysed categories and all respondents

The unsupervised post-intervention group had a slightly higher percentage answering yes to the question if they or their family were at risk compared to the other groups, the children of Ooty answered to a greater extent that they did not know if their family was at risk, than the

children of Madurai. The later post-intervention group (N=72) however stood out, where only 13% believed that their family was at risk of contracting rabies.

The majority of the children believed that dogs make good companions and are healthy animals to keep around. The children of Ooty expressed a slightly more positive attitude towards dogs as companions (Figure 13a). There was a regional difference, as the children of Madurai had a more indecisive attitude towards dogs, and believed that they can sometimes be healthy to keep around for guarding or other purposes. There were also more blank answers left from the Madurai group (Figures 13a and 13b).

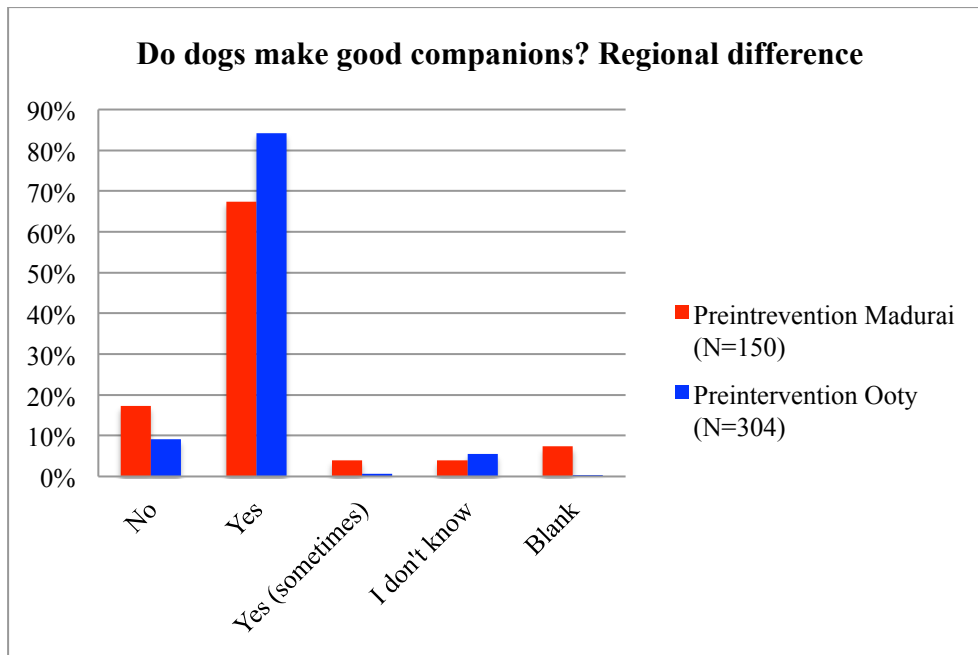


Figure 13a) Attitudes towards dogs as companions, differences between pre-intervention groups according to region

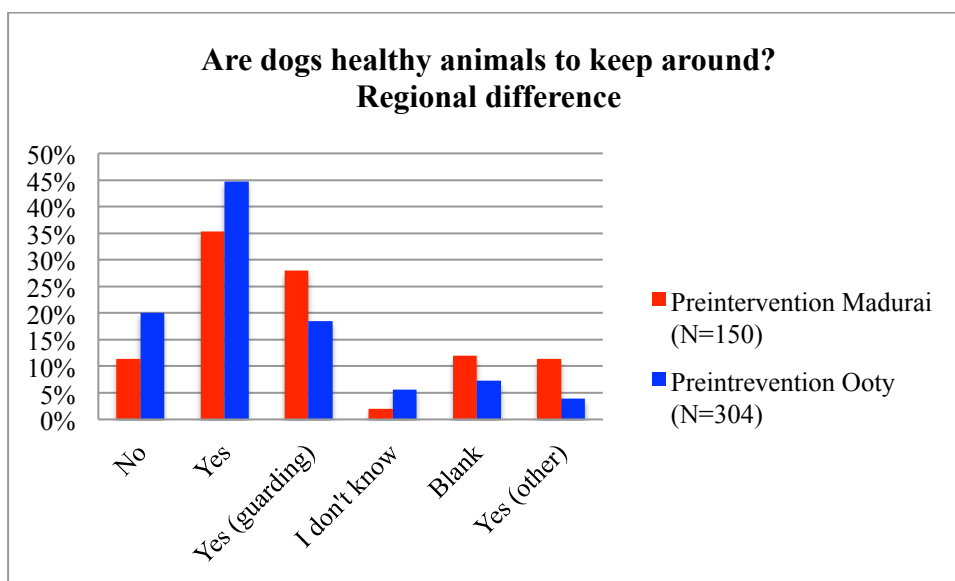


Figure 13b) Attitudes towards dogs as healthy animals to keep around, differences between pre-intervention groups according to region

The children answered the questions in the attitude section by expressing how a statement fit their beliefs on a scale 1-5, where 1 represented “Strongly disagree”, 5 represented “Strongly agree” and 3 represented a neutral position (Table 3).

There was an agreement on the statement that rabies is a problem in India (average 4.27) points in the group in total), but the children disagreed or responded neutrally on the statement that rabies was a problem in their particular area (average 2.87). This was also the case for the children in the post-intervention groups in the rabies endemic area of Madurai.

The children in the post-intervention groups agreed significantly more (average 4.5) than the pre-intervention group (average 3.8,  $p < 0.05$ ) that rabies is a problem in India. All the groups agreed that stray dogs were dangerous (average 4.08), and disagreed slightly or were neutral to the statement that rabies can be prevented through killing dogs (2.83). The post-intervention groups agreed more than the pre-intervention groups that they had been taught enough about rabies in school ( $p < 0.05$ ). The post-intervention groups also agreed to the statement that rabies can be effectively prevented through vaccination and education.

Table 3. Attitudes towards rabies, dogs and vaccinations, on scale 1 (strongly disagree) to 5 (strongly agree), all analyzed groups and total

	PU	PS	PO	PM	LP	All *
<b>All dogs are dangerous</b>						
Average	3.33	3	3.39	3	2.17	3.19
Median	3	3	3	3	2	
<b>Stray dogs are dangerous</b>						
Average	4.16	4	4.25	3.74	3.72	4.08
Median	5	4	5	4	4	
<b>Rabies is a problem in India</b>						
Average	4.58	4.39	3.65	4.05	4.68	4.27
Median	5	5	4	4	5	
<b>Rabies is a problem in your area</b>						
Average	3.09	2.63	2.81	2.76	2.51	2.87
Median	3	3	3	3	3	
<b>Children are at greater risk of contracting rabies than adults</b>						
Average	4.19	4	3.54	3.75	3.83	3.92
Median	5	4	4	4	4	
<b>I have been taught about rabies in school</b>						
Average	4.27	3.95	3.55	2.95	3.98	3.87
Median	5	5	4	3	4	
<b>I have been taught about rabies by my parents</b>						
Average	3.68	3.44	3.31	3.43	3.56	3.52
Median	4	4	3	4	4	
<b>Rabies can successfully be prevented by vaccination</b>						
Average	4.34	4	3.99	3.99	4.49	4.16
Median	5	5	4	4	5	
<b>Rabies can be prevented by killing dogs</b>						
Average	2.7	3.03	2.89	3.16	2.24	2.83
Median	2	3	3	3	2	
<b>Rabies can be prevented by education</b>						
Average	4.35	4.31	3.9	4.14	4.13	4.2
Median	5	5	5	5	4	

\* *PU – Postintervention, unsupervised; PS – Postintervention, supervised; PO – Preintervention Ooty, PM – Preintervention Madurai; LP – Later postintervention*

Less than half (46%) of the children (N=1293) stated that they would like to get a rabies vaccination for themselves. Among the reasons for not wanting to get one were that they were not close to dogs, had not been bitten by dogs or that they were afraid of injections. The unsupervised post-intervention group stood out, as 28% of the children that offered a reason said it was because they were not close to dogs, compared to 15% of the total group. The post-intervention groups also answered to a greater extent that they did not require a vaccination for themselves because they had not been bitten by a rabid dog.

There was also a regional difference to this question (Figure 14), as the majority of the children of Ooty wanted to get a vaccination for themselves, and the children of Madurai to a greater extent did not answer this question.

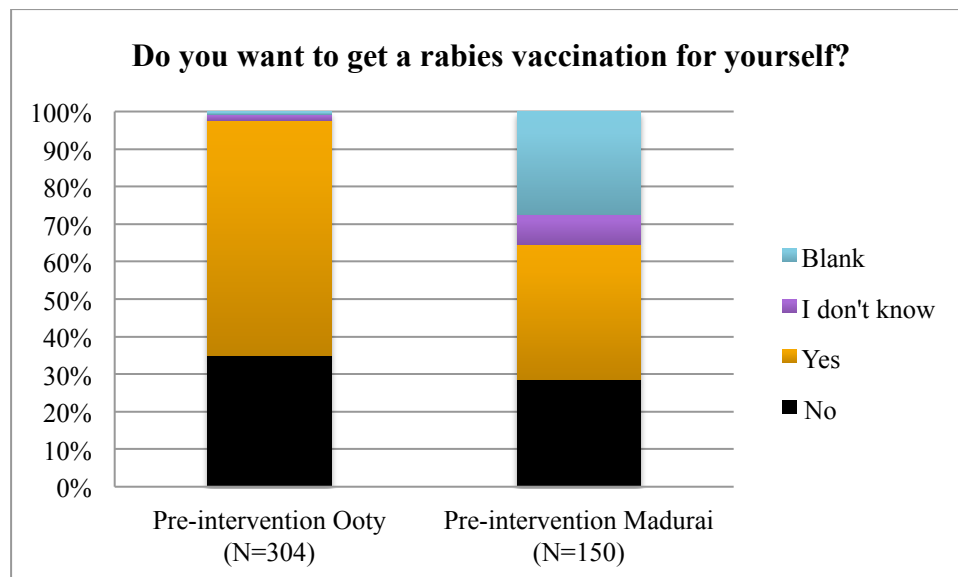


Figure 14. *Attitudes towards getting a rabies vaccination for themselves, regional differences in pre-intervention groups*

A majority (60%) of the children (N=1099) stated that they would like to get a vaccination for their dogs, to prevent rabies spreading or to protect their dog and themselves or their families from rabies. The children in the post-intervention groups answered to a greater extent that they would like a vaccination for their dogs, and they were also more inclined to wanting to vaccinate their dogs to protect their dog. Instead the pre-intervention groups would rather vaccinate their dogs to protect themselves or others.

### Practice

When asked questions about what to do if they met a dog in the streets, the pre-intervention groups showed more risky behaviour than the post-intervention groups, as they were more likely to approach the dog, either to make friends with it or to pet it or beat it, or to run away from the dog or try to scare it away through screaming at it or throwing stones at it (Figure

15). The post-intervention groups to a greater extent answered that they would avoid or ignore the dog, or that they would stand still and talk quietly to a friend.

The pre-intervention children from Ooty were more inclined to wanting to run away from the dog (31%), while many (46%) of the Madurai children (N=150) answering the question, said that they would avoid and/or ignore dogs that they meet in the streets.

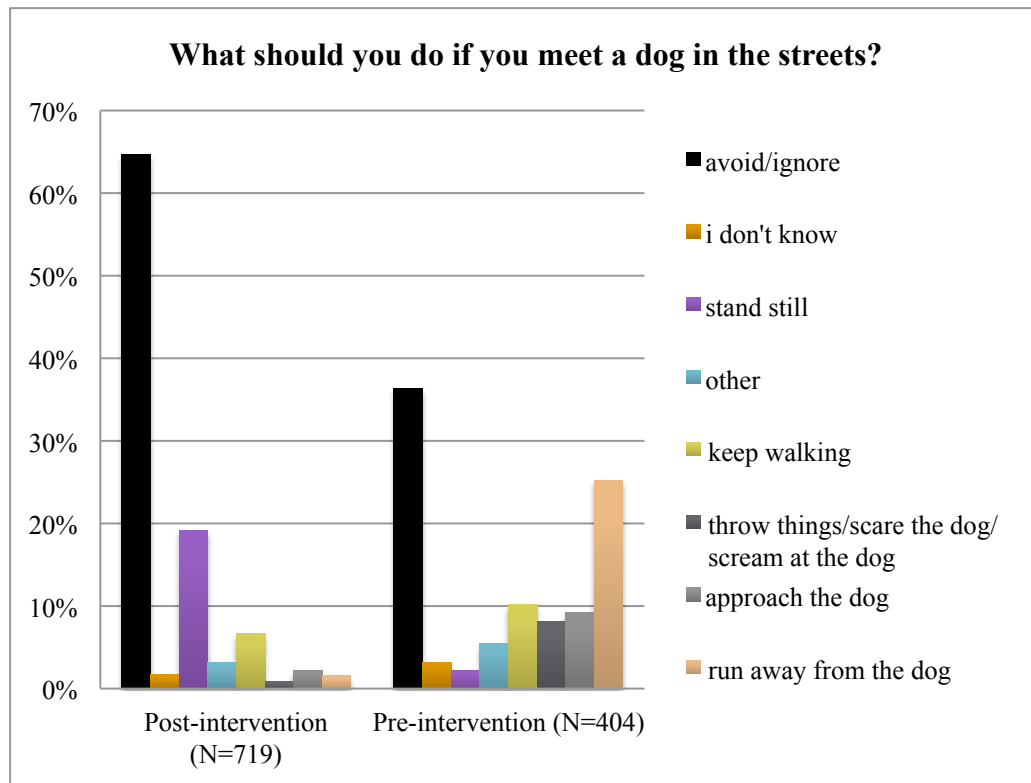


Figure 15. Respondents stating how to act if confronted with a dog in the streets. Post- and pre-intervention groups

The post-intervention groups had relatively good knowledge of an appropriate course of action if bitten by a dog (Figure 16). Most of them knew that they should wash the wound and a lot of them also knew to seek medical attention. In the pre-intervention group, most children responded that they would seek medical attention (doctor, hospital) if bitten by a dog, but were not aware of the importance of washing the bitten area after a dog bite.

Most of the children in all groups were aware that they should seek help with a doctor or in a hospital if bitten by a dog. The pre-intervention groups (N=402) however, answered to a greater extent that they did not know (7%), or that they should consult a veterinarian (6%).

The complete analysis of the scores on behaviour around dogs in the questionnaire will be addressed in another report (Seligsohn, 2014).



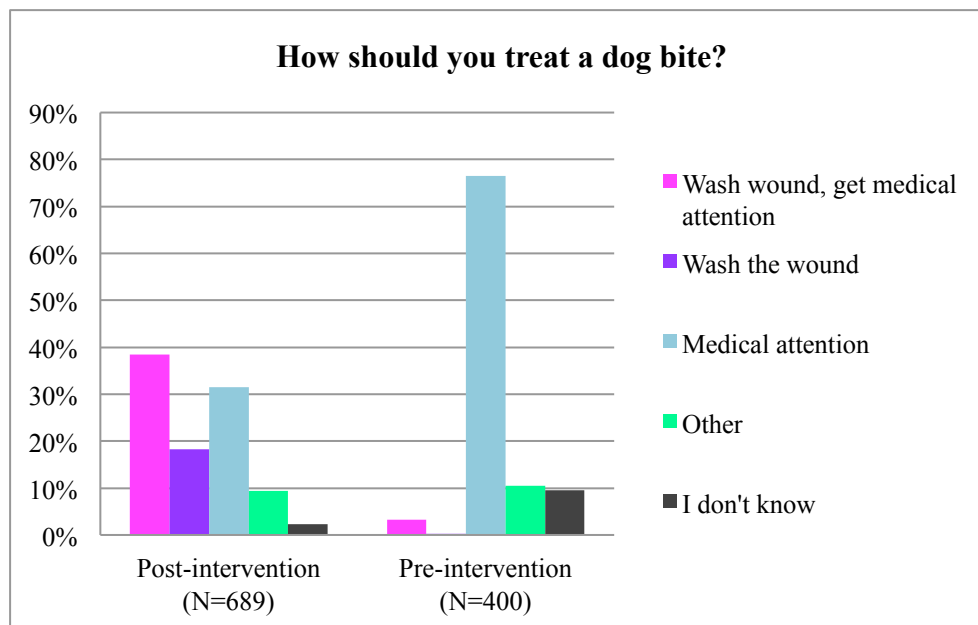


Figure 16. Pre- and post-intervention groups answer to appropriate course of action if bitten by a dog

### Effects of dog ownership

Overall, there was very little difference in knowledge between the children that had reported having one or more dogs in their household, and the ones that reported not having any dogs in their household.

On the question of how rabies can be prevented, the non dog owners were more inclined than the dog owners to want to prevent it through avoiding dogs, or being careful around dogs as a means of preventing rabies. When asked about vaccinations, 66% of the dog owners (N=304) answered that they would like their pet dog to be vaccinated. When asked for reasons for not wanting to vaccinate their pet dog, 18% of the dog owners answered that they would not like to vaccinate their dog because it is dangerous. Of the non dog owners (N=802) who answered this question, only 9% believed it to be dangerous.

On the attitude section, the non dog owners (N=935) agreed more on the statements that all dogs are dangerous (average 3.23), and that stray dogs are dangerous (average 4.12). The dog owners (N= 338) were more neutral on the statement with an average of 3.05 for “all dogs are dangerous” and 3.97 for stray dogs are dangerous.

The dog owners (N=336) agreed more that they had been taught about rabies by their parents (average 3.77). The non dog owners (N=934) believed to a greater extent that rabies can be prevented through education (average 4.23).

On the practice section of the questionnaire, the dog owners when asked what to do if they met a dog in the street, were slightly more inclined to wanting to approach the dog, either to make friends with it or to pet it or beat it. The non dog owners would rather avoid or ignore the dog, or to stand still and remain calm or talk quietly to a friend. The dog owners answered

to a greater extent than the non dog owners that they did not know what to do if confronted with a dog in the streets.

If bitten, the non dog owners answered to a greater extent that they would seek help with a doctor or in a hospital. The dog owners had a greater proportion stating that they would seek help with a veterinarian if bitten by a dog.

### ***Exposure to dog bites***

The children that reported having one or more dogs in their household reported having been bitten by dogs more often than the non dog owners. When bitten, the dog owners had been bitten by a family dog more often than stray dogs. The non dog owners had been bitten by stray dogs as much as they had by family dogs. The dog owners had been in their home when they were bitten, and the non dog owners had mostly been in the streets or at a friends or neighbours house. The full analysis of the dog bite data from the questionnaire is presented in another report (Seligsohn, 2014).

## **DISCUSSION**

### ***Rabies awareness***

It is quite alarming that only a few of the children responding believed that they or their family might be at risk, even after having had a massive vaccination campaign in their area and an education program in their school to inform them about the hazards of rabies and dog bites. This false sense of security might prevent children from seeking proper medical attention if bitten by dogs, even in areas endemic of rabies. It is also quite alarming to learn that only about one third of the children would like to be vaccinated against rabies, and that they believe they are out of risk for contracting the disease simply because they do not perceive themselves as close enough to dogs.

The children of the later post-intervention group stood out on the question of family at risk, where only 13% responded that their family might be at risk. The later post-intervention group consisted of only one school, which was an international school with English speaking children from international backgrounds living in an area not endemic of rabies. It is probable that this may have influenced the perception of risk in this group, as it consisted mainly of children with good access to medical care that might not live in close proximity to street dogs.

### ***Results of intervention***

The children that had been subjected to the intervention knew to a much greater extent than the other children that rabies is, in fact, a fatal disease, and also had a greater knowledge about life saving wound management than the pre-intervention groups. This information corresponds well to that of previous studies on the subject (Dodet et al., 2008; Matibag et al., 2009). Only 32% of the children in the pre-intervention group (N=451) knew that you will die if you get rabies, which shows an alarming lack of awareness, especially as many of the children in the pre-intervention schools come from Madurai which is an area endemic of rabies. The big difference between the two groups on this question shows that this is an important area where education programs can make a big difference and might lead to an awareness about the disease that can save lives.

In the knowledge section of the study, the pre-intervention group of Ooty stood out markedly both as compared to the pre-intervention group of Madurai and compared to the whole. This could indicate that the medial efforts of education of the public prior to the Mission Rabies campaign has indeed influenced the knowledge of the children living in the area of Madurai, but it cannot be excluded that it is due to the fact that the children of Madurai are living in an area endemic of rabies. Despite this, only about one third (36%) of the children in the pre-intervention group of Madurai (N=150) said that they would like to get a vaccination for themselves, whereas 63% of the pre-intervention group of Ooty (N=304) wanted a vaccination for themselves. A lot of the children in the Madurai group also avoided answering this particular question. This is interesting, as the children of Madurai showed much greater knowledge regarding the severity of the disease. When an explanation was given, it was mostly said that they did not need a vaccination as they were not close to dogs. This group of children also showed a more cautious attitude towards dogs, and did not agree as much that they make good companion animals.

The children in the post-intervention group were more aware that rabies is a fatal disease, but also thought that it will not kill you if you are treated properly, and examples on this were, among others, “if you wash the wound and go to doctor if bitten”. This is probably due to the fact that they had recently had a lecture at school and had learnt about the importance of wound management. It also reflects the fact that the children had failed to understand the difference between actually getting rabies and simply being bitten by a dog.

Many of the children in the pre-intervention group stated that if they were bitten, they would seek medical attention with a doctor or at a hospital. They did not, however, know about the importance of appropriate wound management. Compared to previous studies targeting adults, where approximately half of the respondents stated that they would wash the wound if bitten (Herbert et al., 2012) the children had a lot less knowledge of this. The high number of children saying that they would seek medical attention could also be because they assumed that this was the “correct” way of answering this question, rather than exactly what they would do if bitten by a dog. Some of the children that owned dogs in their homes said that if bitten by a dog, they would consult a veterinarian. This might be because they knew that it was a veterinary doctor holding the lectures on rabies for them that day, or because they simply made correlations on injury and dogs and assumed that a veterinarian should be involved somehow. If bitten, the non dog owners answered to a greater extent that they would seek help from a doctor or in a hospital. This could reflect that dog owners more often than non dog owners live in rural or remote areas where access to health care can be limited.

The non dog owning children were more inclined to wanting to avoid dogs or being careful around dogs to prevent rabies. It may be that the dog owning children were more confident as to how to behave around dogs, and therefore did not see it as a valid option, or at all necessary to avoid dogs as they were used to managing dogs in their homes.

Some of the children that owned dogs and gave a reason for not wanting to have it vaccinated (18%), said that it was because it is dangerous. It is unclear why the children would assume that a vaccination is dangerous to the dog. It is possible that the children either failed to understand the difference between getting the disease and getting a rabies vaccination, or that

is was simply the fear of injections that led them to believe that a vaccination might be dangerous.

### ***Constructing the study***

In constructing the lecture on rabies, it was an act of balance to on one hand underline the seriousness of the disease and its consequences, but on the other hand not scare the children of dogs in general. This may have resulted in an understatement of the severity of the disease and the very real risk of contracting rabies if bitten by a dog in India.

The different schools received their educational speech by different people, not all of whom were medically trained but had volunteered for the program. This may have influenced the outcome of the survey, as emphasis might have been different in the various post-intervention schools.

Most of the children that participated in this study were English Medium students and were given the questionnaires in English, apart from school E – a Tamil Medium that was given the questionnaires in Tamil. Even if the children are educated in English in school it is in many cases not their mother tongue. This may have led to some confusion on the answering of the questions, which is not possible to assess. This can however have been overcome in the results due to the size of the sample.

The schools that participated in the study and awareness lecture represented a convenience sample and can not be said to represent the whole of India, this would have required a different approach for selection and was not possible to organize for this study. The significant differences between the groups however provide useful information to the effect of vaccination campaigns and education programs in the area of Tamil Nadu nonetheless.

The children in the pre-intervention group of Madurai had been subjected to an extensive media awareness campaign and a vaccination campaign in the area, and thus had had an intervention already, even if they had not been handed out written material or had an awareness lecture yet. The children in this group showed a greater knowledge on rabies than the children in the pre-intervention group of Ooty that had not had the media campaign in their area, which may be interpreted as a positive effect of the campaign on the KAP, but it is not possible to assess as no data was collected on KAP before the campaign. It is also possible that the difference in knowledge is due to them living in a larger city which is endemic of rabies.

It would have been desirable to have done both pre-interventional and post-interventional questionnaires in all the schools, with a larger time span in between to reduce the impact of socioeconomic and environmental factors rather than the effect of the intervention, and to assess the more long term effect on the knowledge of dog behaviour in the children. This was not possible to achieve during this study due to practical and organisational reasons. A follow-up in the same schools in the future might give valuable information as to the long-term effect of education programs among children.

A multi variable statistical analysis would have been of great value but was out of the scope of this study. The univariate analysis here may be misleading as confounding or bias may be overlooked. The data have however been interpreted with care.

### **Sources of error**

As the children completed their questionnaires, they were given oral and written information stating that it was not a test and were requested to answer independently and truthfully. The persons supervising the filling of the questionnaires were instructed not to help the children or answer any questions other than those that were of the nature of understanding the questions themselves. Due to practical reasons however, it was not possible for the author of this study to supervise the filling of all the questionnaires, and therefore the analysis was made with a special group for the unsupervised post-intervention questionnaires. Some of the answers in this group were very similar to each other, which could indicate that the children either spoke to each other and filled the questionnaires together, or that they had help from their teachers as they completed the questionnaires, and therefore can not with certainty be considered to reflect each individual's answer.

In the questionnaires, some of the children stated that they did not require any vaccinations since they had already been vaccinated, or had already "had injections", but it is not clear whether they actually knew that they had been vaccinated against rabies or not, or whether they knew that they would still need new protection if bitten by dogs.

Some children seemed to be confused as to whether or not rabies can be treated. The answer "if treated properly/immediately" or "if you go to the hospital" was reoccurring throughout the answers. It is possible that the children did not comprehend the difference between having the rabies disease, i.e. showing symptoms, and simply being bitten by a dog that has not been diagnosed with rabies. The same problem goes for the question of if and how rabies can be prevented; the answer that it can be prevented through wound management ("washing the wound/going to hospital if bitten by a dog") is reoccurring in the answers. It is true that proper wound management can prevent rabies infection if bitten by a dog, but the proper way to actual prevention of rabies is through proper vaccination of the dogs that might contract the disease and spread it to others.

In the educational speech, the children were given a lecture by a native Tamil speaker. One of the lecturers had read the questionnaires that the children would be filling beforehand, so it is possible that it influenced the specific information that the children were given, to reflect the information sought in the questionnaires rather than the most important facts regarding rabies that the children needed to learn. This is also true in the section on dog-person interactions. In the schools where the information was given by a person who had not read the questionnaires, other hypothetical scenarios may have been used in the lecture to illustrate appropriate behaviour with dogs. The children who had been taught about the scenarios that later came as questions in the questionnaire therefore might have scored higher points if they remembered the specific course of action recommended in the speech, rather than that they had gained more detailed knowledge on how to behave with dogs.

The questionnaires in the post-intervention groups were handed out to the children shortly after the educational efforts, so no information can be attained as to the lasting effect of the education program. It is also possible that the post-intervention children on the practice section, answered what they had just been taught that they should do in certain situations, rather than what they would actually have done before (or even after) participating in the education program.

## **CONCLUSIONS**

The effect of the intervention in this study was primarily seen on the questions that dealt with knowledge about the seriousness of the disease, its prevention and treatment, and practice when faced with a dog or a dog bite. The children in the post-intervention groups showed a much greater knowledge as to appropriate management of bite wounds and also scored higher on the behavioural questions regarding what to do in specified situations with dogs. The children in the post-intervention groups were aware that rabies is a fatal disease and cannot be treated, but prevented through wound management and vaccinating dogs.

The results of this study show that media interventions and on-going vaccination campaigns do have a positive effect on rabies awareness, but this as well as long term work in the area are not enough to fully influence the knowledge, attitude and practice among school children. Educational programs are of the essence to ensure that the children are prepared and aware to avoid getting infected. A follow-up study to assess the long-term effect of brief education programs would be desirable in the areas of Madurai and Ooty.

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## APPENDIX 1

*This questionnaire aims to find out what you know about rabies and dogs, so that in the future we can provide you with all the information that you might need. Please note that this is not a test and try and answer the questions truthfully. If you do not know the answer to any question, just write that you don't know and move on to the next question. Thank you for your participation!*

A)

*Background data:*

1. How old are you?
2. Are you a boy or a girl?
3. How many dogs are in your household?
4. How many people are in your household?
5. How many children are in your household?
6. Have you ever participated in a vaccination campaign or education program regarding rabies?

B)

*Knowledge:*

7. What is rabies?
8. Can people get rabies? If yes, how can they get rabies?
9. Can animals get rabies? If yes, which animals?
10. How can rabies be *prevented*?
11. Can rabies be *treated*?  
Yes                      No                      I don't know  
Other:.....
12. If you get rabies, will you die?

Yes                      No                      *I don't know*  
Other:.....

13. Do you think that you and your family are at risk of getting rabies?

Yes                      No                      *I don't know*  
Other:.....

14. *What* should you do if you get bitten by a dog?

15. If you get bitten by a dog, *where* should you seek help?

C)

Attitude:

16. Do you want to get a rabies vaccination?

- a. Yes    *no*
- b. *Why? Explain your reasons for choosing yes or no:*

17. Do you want to get a rabies vaccination for your dog?

- a. Yes    *no*
- b. *Why? Explain your reasons for choosing yes or no:*

18. Do you think dogs should be allowed to play with children?

Yes                      No                      *I don't know*  
Other:.....

19. Do you think dogs make good companions?

Yes                      No                      I don't know  
Other:.....

20. Do you think dogs are healthy animals to keep around (for guarding, hunting, companionship etc?)

Indicate where you stand regarding the following statements on a scale by *circling* the option that best fits your belief.

21. All dogs are dangerous

*strongly agree*      *moderately agree*      *neutral*      *moderately disagree*      *strongly disagree*

22. Stray dogs are dangerous

*strongly agree*      *moderately agree*      *neutral*      *moderately disagree*      *strongly disagree*

23. Rabies is a problem in India

*strongly agree*      *moderately agree*      *neutral*      *moderately disagree*      *strongly disagree*

24. Rabies is a problem in your area

*strongly agree*      *moderately agree*      *neutral*      *moderately disagree*      *strongly disagree*

25. Children are at a greater risk of contracting rabies than adults

*strongly agree*      *moderately agree*      *neutral*      *moderately disagree*      *strongly disagree*

26. I have been taught about rabies in school

*strongly agree*      *moderately agree*      *neutral*      *moderately disagree*      *strongly disagree*

27. I have been taught about rabies from my parents

*strongly agree*      *moderately agree*      *neutral*      *moderately disagree*      *strongly disagree*

28. Rabies can be effectively prevented by vaccinating dogs

*strongly agree      moderately agree      neutral      moderately disagree      strongly disagree*

29. Rabies can be effectively prevented by euthanizing (killing) stray dogs

*strongly agree      moderately agree      neutral      moderately disagree      strongly disagree*

30. Rabies can be prevented by educating people about the disease

*strongly agree      moderately agree      neutral      moderately disagree      strongly disagree*

D)

### Practice

Chose the alternative that you would do in the following situations:

31. You are running or playing and a dog runs up to you. Should you

- *Stop playing, stand very still and don't shout or scream?*
- *Keep on playing, chase the dog away and shout at the dog?*
- *Stand still and shout at the dog or scream. Kick the dog if the dog comes close to you?*



You are riding your bicycle and a dog chases you. Should you

- *Stop riding and stand still?*
- *Carry on riding away as fast as you can and hope the dog doesn't catch you?*
- *Stop riding and try to make friends with the dog by trying to stroke the dog?*



.....  
A dog jumps at you. Should you:

- *Try to turn your back on the dog and stand still?*
- *Start to run away, shouting at the dog and kicking the dog away?*







## APPENDIX 2

***This questionnaire aims to find out what you know about rabies and dogs, so that in the future we can provide you with all the information that you might need. Please note that this is not a test and try and answer the questions truthfully. If you do not know the answer to any question, just write that you don't know and move on to the next question. Thank you for your participation!***

### A) Background data:

7. How old are you?
8. Are you a boy or a girl?
9. How many dogs are in your household?
10. How many people are in your household?
11. How many children are in your household?
12. Have you ever participated in a vaccination campaign or education program regarding rabies?

### B) Knowledge:

7. What is rabies?
8. Can people get rabies? If yes, how can they get rabies?
9. Can animals get rabies? If yes, which animals?
10. How can rabies be *prevented*?
11. Can rabies be *treated*?  
Yes                      No                      I don't know  
Other:.....
12. If you get rabies, will you die?

Yes                      No                      I don't know  
Other:.....

13. Do you think that you and your family are at risk of getting rabies?

Yes                      No                      I don't know  
Other:.....

14. What should you do if you get bitten by a dog?

15. Where should you seek help if you get bitten by a dog?

C) Attitude:

16. Do you want to get a rabies vaccination?

c. Yes                      No

d. Why? Explain your reasons for choosing yes or no:

17. Do you want to get a rabies vaccination for your dog?

c. Yes                      No

d. Why? Explain your reasons for choosing yes or no:

18. Do you think dogs should be allowed to play with children?

Yes                      No                      I don't know  
Other:.....

19. Do you think dogs make good companions?

Yes                      No                      I don't know  
Other:.....

20. Do you think dogs are healthy animals to keep around (for guarding, hunting, companionship etc?)

**Indicate where you stand regarding the following statements on a scale by *circling* the option that best fits your belief:**

21. All dogs are dangerous

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

22. Stray dogs are dangerous

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

23. Rabies is a problem in India

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

24. Rabies is a problem in your area

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

25. Children are at a greater risk of contracting rabies than adults

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

26. I have been taught about rabies in school

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

27. I have been taught about rabies from my parents

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

28. Rabies can be effectively prevented by vaccinating dogs

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

29. Rabies can be effectively prevented by euthanizing (killing) stray dogs

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

30. Rabies can be prevented by educating people about the disease

*strongly agree*    *moderately agree*    *neutral*    *moderately disagree*    *strongly disagree*

D) Practice

31. What do you do if you meet a dog in the street?

32.. *Have you ever been bitten by a dog?*

*Yes*

*No*

If yes, was it:

*32 a) family dog*

*39*

*b)*

*stray*

*dog?*

33. Where were you when you got bitten –

*at home*

*on the streets*

*friend or neighbours house*

*other place*

**34. Chose the alternative that you would do in the following situations:**

You are running or playing and a dog runs up to you. Should you



- *Stop playing, stand very still and don't shout or scream?*
- *Keep on playing, chase the dog away and shout at the dog?*
- *Stand still and shout at the dog or scream. Kick the dog if the dog comes close to you*

You are riding a bicycle and a dog chases you. Should you

- *Stop riding and stand still?*
- *Carry on riding away as fast as you can and hope the dog doesn't catch you?*
- *Stop riding and try and make friends with the dog by trying to stroke the dog?*



A dog jumps at you. Should you

- *Try to turn your back to the dog and stand still?*
- *Start to run away, shouting at the dog and kicking the dog away?*
- *Stand still and push the dog off you, screaming and shouting?*



A dog barks at you. Should you

- *Look at the floor and slowly back away from the dog?*
- *Run up to the dog shouting at the dog to stop making such a noise?*
- *Start to run away screaming and shouting?*



*Thank you for your participation!*