

## **Incidence of Dog Bites and Rabies Infection in Ozamiz City, Philippines**

**Jycelle Anne H. Abcede<sup>1</sup>, Nojin John S. Agnas<sup>1</sup>, Cherrie May R. Aliño<sup>1</sup>,  
Cherry Mae C. Amaquin<sup>1</sup>, Kristine C. Dandan<sup>1</sup>, Jezreel Marc E. Pasay<sup>2</sup>,  
Marie Rosellynn C. Enguito<sup>3</sup>**

<sup>1</sup>College of Medical Technology, Misamis University, H. T. Feliciano St.,  
Ozamiz City, Philippines

<sup>2</sup>College of Nursing and Midwifery, Misamis University, H. T. Feliciano St.,  
Ozamiz City, Philippines

<sup>3</sup>Natural Sciences Department, College of Arts and Sciences, Misamis University, H. T.  
Feliciano St., Ozamiz City, Philippines

Corresponding author: Jezreel Marc E. Pasay, email: [jmepasay14@gmail.com](mailto:jmepasay14@gmail.com)

### **Abstract**

The incidence of dog bites is the primary cause of the transmission of the rabies virus, which has been a serious health and welfare issue in the Philippines for many years. Hence, the Philippine government aims to eliminate the problem of rabies infection by 2020. This study aimed to investigate the incidence of dog bites and rabies infection in Ozamiz City, Philippines. A documentary analysis of medical records obtained from the City Health Office and the hospitals in the city was carried out. There were 3,608 cases of dog bites recorded from January 2013 to June 2015. A relative increase of dog bites was noted in 2014. Monthly distribution of the incidence of dog bites showed that most cases occurred in May (426 cases) which was followed by April (408 cases). Incidence of dog bites started to drop from June to December. The predominance of male victims in this study was consistent for two and a half years. Adults were more frequently victims of a dog bite. Five fatalities were recorded for the period covered due to rabies with three deaths in 2013 and one in each of the years 2014 and 2015. The data will contribute to the growing literature on the occurrence of dog bites and rabies cases for possible interventions by the local government.

**Keywords:** health, hospitals, male, virus, transmission

## **Introduction**

The mutually beneficial relationship between humans and dogs is overshadowed by bites (Rezac et al., 2015) because of that trauma of being bitten, at the same time because of the effects of rabies. Dog bites are of serious concern to public health and safety (Cornelissen & Hopster, 2010). The Department of Health (DOH) officials in the Philippines estimate that about 100,000 Filipinos are treated for dog bites, and 200 to 250 individuals die from rabies annually (Gonzales, 2017). Based on the same report, dogs account for 98 percent of rabies infection.

Rabies is a serious public health problem in the Philippines. The country is among the top 10 countries with the highest incidence of rabies in the world (Gonzales, 2017). The DOH describes rabies as a zoonotic disease and human infection caused by Lyssavirus, usually occurring after a transdermal bite or scratch by an infected animal. Transmission may also occur when infectious material, usually the saliva, comes into direct contact with the victim's mucosa or new skin lesions (DOH, 2012). People are usually infected following a deep bite or scratch by an infected animal, where dogs are the main host and transmitter of rabies (World Health Organization, 2014). Dog to dog transmission also occurs when infected saliva makes contact with mucous membranes or through an open, fresh wound which is usually acquired when dogs fight with each other (American Society for the Prevention of Cruelty to Animals, 2015). Dogs are the main source of infection in all human rabies deaths annually in Asia and Africa (WHO, 2014).

The incidence of deaths caused by rabies worldwide is pegged at 55,000 individuals every year (DOH, 2012). Several initiatives at the local level in the Philippines have been undertaken to minimize death due to rabies such as the provision of pre-exposure treatment to high-risk personnel and post-exposure prophylaxis to animal bite victims (Martina, 2016). There is also the provision of free routine immunization or pre-exposure prophylaxis and mass vaccination of dogs. Establishment of a central base system for registered and vaccinated dogs, impounding, field control and disposition of unregistered, stray and unvaccinated dogs are also carried out. Information and education

campaign on the prevention and control of rabies is regularly conducted. About 10,000 dogs are believed to be infected with the disease each year (Wallerstein, 1999).

Dog bites are preventable (Rosado et al., 2009). Territorial aggression (Wake et al., 2009) and a lack of dog awareness and behavioral education (De Keuster et al., 2006) are significant causes of dog bites, which can be controlled. Many Filipinos remain unaware of the dangers of rabies (Martina, 2016). It is 100 percent fatal, but also 100 percent preventable, according to the Department of Health (DOH). Animal bites or scratches are often ignored until it is too late and rabies has set in. Davlin (2011) found that only 46% of households in Bohol, Philippines were aware that rabies is also spread through the bite of an infected dog.

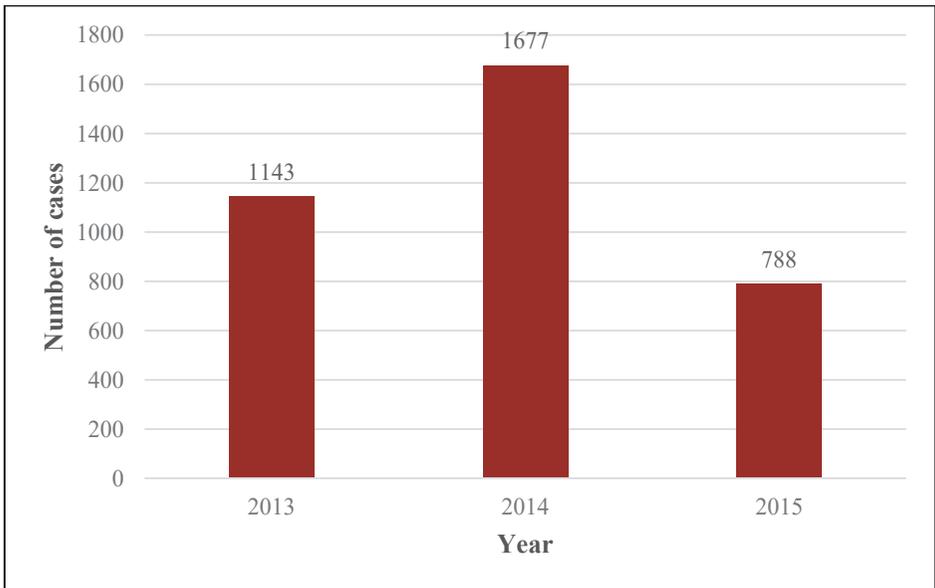
Government efforts would deem useless without the cooperation of its citizens, which starts within the community. The number of cases of dog bites leading to rabies infection may still not be that alarming or in the state of being an outbreak, which may lead to complacency. People tend to indulge their ignorance regarding that matter, which will possibly lead to more incidents of dog bites. This study aimed to determine the incidence of dog bites and rabies infection in Ozamiz City, Philippines. The data will contribute to the growing literature on the occurrence of dog bites and rabies cases for possible interventions by the local government.

## **Materials and Methods**

This is descriptive research using documentary analysis as the survey method. Retrospective data analyses were done for the medical records from the City Health Office of Ozamiz City about dog bite injuries and the data acquired from key hospitals in the city from 2013 to 2015. Age, gender, home address, and the location of the incident were extracted from the medical records. Consent from the City Health Center was secured before the conduct of the study, ensuring the anonymity of the identity of the patients. Data gathered from this study were then analyzed using descriptive statistics and displayed via bar and line graphs.

## Results and Discussion

A total of 3,608 cases of dog bite were reported to medical authorities from January 2013 to June 2015 in Ozamiz City. Among the 51 barangays in the city, 257 dog bites were recorded from Barangay Tinago, which is an urban area and highly populated. An increase of more than 46% was observed from 2013, with only 1143 recorded number of cases to 1677 cases in 2014 (Figure 1). The lowest number of recorded cases was seen in the first half of the year 2015 (788). The incidence of dog bites in Ozamiz City for two and a half years requires full attention from the government and all other sectors, including dog owners. Under the Anti-Rabies Act of 2007, or Republic Act 9482, pet owners should not allow their dogs to roam the streets without a leash (Martina 2017a). Few dogs are still seen roaming around the streets in Ozamiz City, notably in the public market. The local government can mainly help this situation through the full enforcement of the Anti-Rabies Act of 2007 without compromising the animal's welfare.



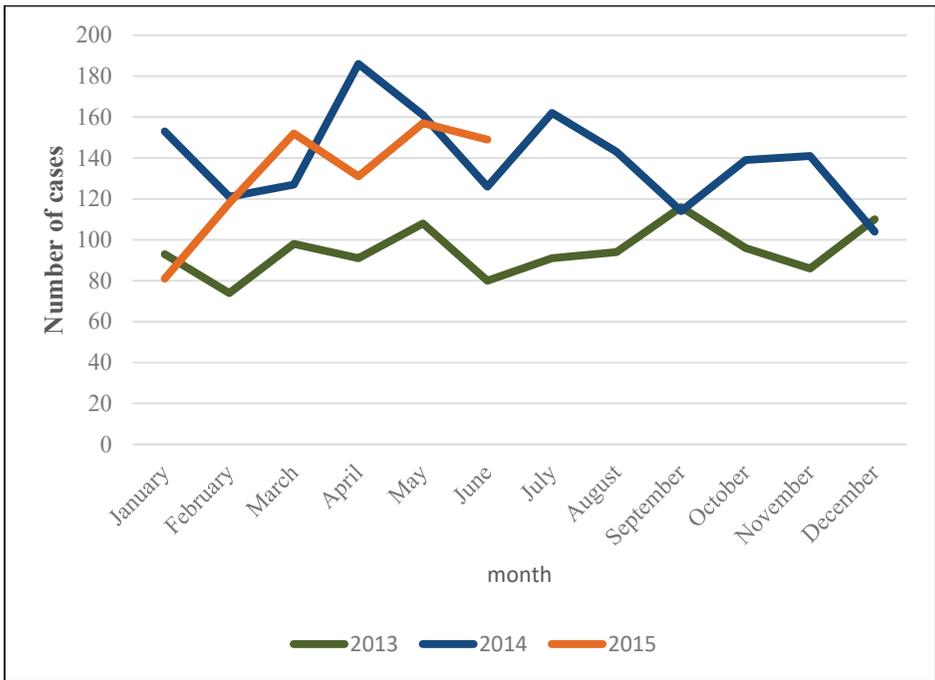
**Figure 1. Total cases of a dog bite from January 2013 - July 2015.**

In the Philippines, there were 432,458 animal bite cases in 2015, and 226 individuals died (Martina, 2017b). The numbers are alarming, given that there were only 260,000 animal bite cases in 2010 (Martina, 2016). The DOH is campaigning for a rabies-free Philippines by 2020. Establishment of Animal Bite Treatment Centers (ABTCs) in inter-local health zones, health awareness through education and information campaign, and partnership between the DOH and the Department of Agriculture in the evaluation and declaration of rabies-free islands are the strategies of the DOH (Martina, 2016). Moreover, the DOH continues to partner with other organizations for its National Rabies Prevention and Control Program, including local government units, as strategies to address this public health concern. In 2017, dog bites accounted for 84% of rabies cases in the country, and of the nine million dogs in the country, only one million are vaccinated against rabies (Martina, 2017b).

In Ozamiz City, the Mayor Hilarion A. Ramiro Sr. - Regional Training and Teaching Hospital is the animal bite clinic and treatment center. In 2014, a mass anti-rabies dog vaccination was carried out in a few barangays in Ozamiz City as well as a symposium on rabies in animals in one barangay (Global Alliance for Rabies Control, 2014). The provisions of pre- and post-exposure prophylaxis in Ozamiz City, health education, advocacies, training and capability building may have contributed to the reduction of dog bites in the first half of 2015 relative to 2014.

A comparison of the number of cases for the years 2013, 2014, and the first half of 2015 (Figure 2) shows a significant increase in 2014 compared to the number of cases in 2013. On the other hand, 2015 had an onset having the lowest incidence of dog bites in its first month compared to the same time in the past two years. However, it rapidly increased by 46% the following month. The increase was consistent until March. Monthly distribution of dog bite cases showed that most cases occurred in May (426 cases), which was followed by April (408 cases). The months aforementioned are summer months in the Philippines, and are identified by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) as the months with the highest recorded temperatures throughout the year.

The month of December with a temperature that is usually low had the lowest number of dog bite cases. Moreover, the data on the monthly incidence of dog bites showed that the number started to drop during the month of June to December. Hence, the variation in temperature could be one of the leading factors that affect the activities and behavior of human and dogs.

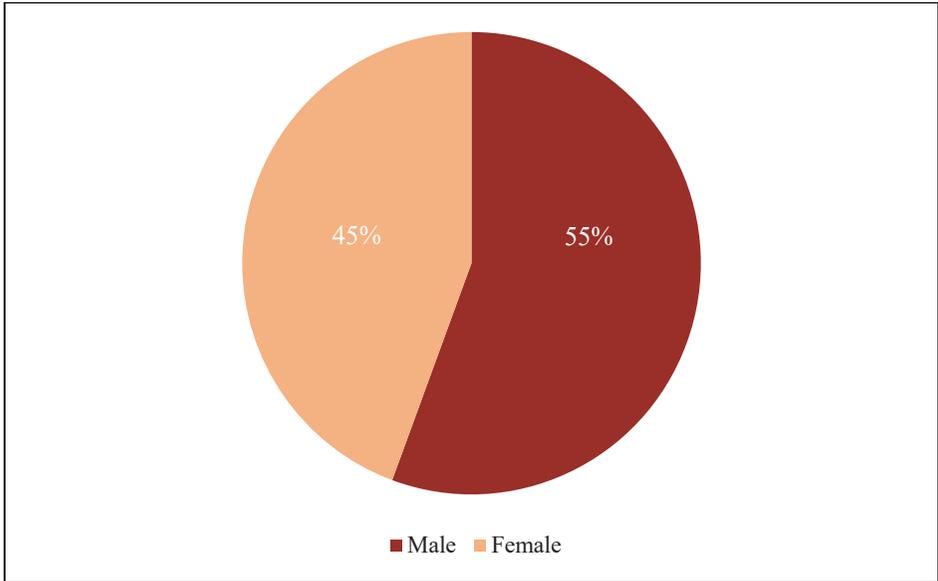


**Figure 2. Annual report of dog bite cases from January 2013 to July 2015.**

San Lazaro Hospital Medical Specialist IV, Dr. Ferdinand De Guzman, explained that hot weather in the Philippines is likely the reason why dogs tend to bite during the summer months (Martina, 2017b). Accordingly, dogs become irritable and thirsty, when they are not bathed or given water to drink, thus increasing their tendency to bite. Further, animal bites typically increase during March, April, and May and begin to taper off around June.

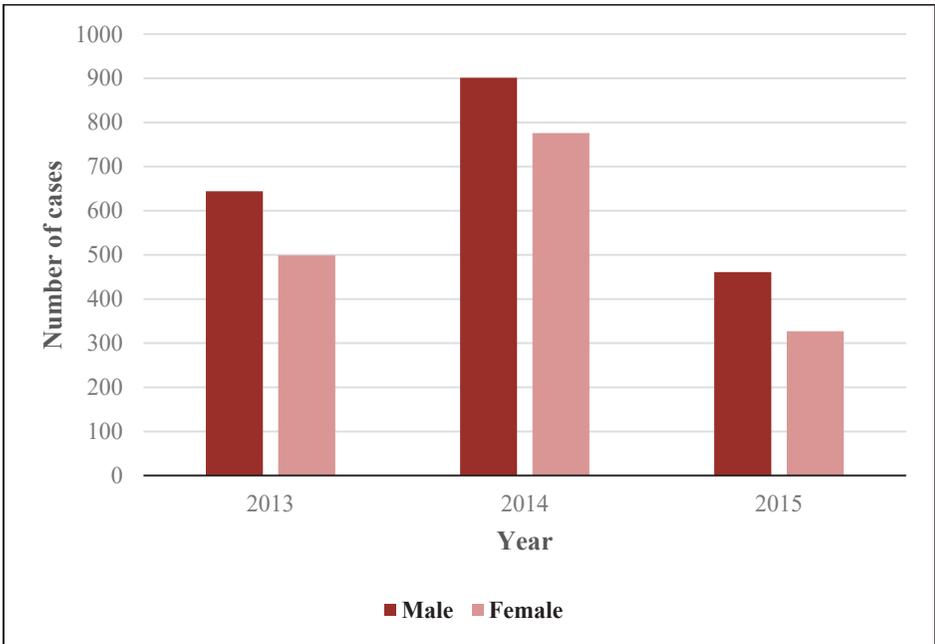
Findings of this study also confirm the results of other studies. On hotter days, dogs tend to hunt and bite more often (Creel et al., 2016). Findings of Zhang et al. (2017) showed that hospital emergency department visits due to dog bites (EDVDBs) were associated with the ambient temperature in Beijing, China. In their study, high and low temperatures were both associated with dog bites, but the risk was higher, more immediate and longer in hot days and lower, delayed, and shorter in cold days. The greater impact of high temperature may be due to mental instabilities. Individuals with mental disorders are likely at an elevated risk for serious dog bites (Berry et al., 2010; Lai et al., 2014). The risk for a dog bite is also high with less clothing in hot days (Yeh et al., 2012). The quick decline in alertness towards danger due to heat stress may also contribute to the high risk of a dog bite during elevated temperature (Lundgren et al., 2013). During rainy days, the temperature is comfortable and dogs pass their time in open places and are found in predictable locations (Hossain et al., 2013), thereby reducing the risk of dog bite. It can be deduced that exposure risk is associated with inappropriate behavior of humans or dogs such as encroachment on dog's territory, breed, and failure to neuter dogs (Zhang et al., 2017) or irritability of dogs (Martina, 2017b).

The information has been sorted out by the gender and age of the patient in this study. In totality, dog bites were particularly common with (2,006 cases) men than (1,602 cases) women. In this study, there is disparity in the incidence of dog bites between males and females with the former registering a 10% higher incidence compared to the latter (Figure 3). This finding is similar with the results of previous studies (Cornelissen & Hopster, 2010; Modi, 2017). These statistics may indicate that some patterns of interaction that possibly include play between dogs and humans are gender-biased and that some aspects of these interactions may be conducive to aggression (Overall & Love, 2001). Biting dogs were more frequently reported to be afraid of men as a result of the aggressive behavior of dogs (Guy et al., 2001). However, Gupta et al. (2004) showed that people of all ages, races, and sex are potentially at risk for a dog bite, and it is unlikely that dogs discriminate.



**Figure 3. Frequency of reported cases of dog bites by gender.**

The predominance of male victims in this study is consistent for two and a half years based on the data gathered (Figure 4). Male patients also outnumbered females in the retrospective review conducted by Dimaano et al. (2011) in the medical records of 1,839 patients admitted to San Lazaro Hospital, Manila in the Philippines between 1987 and 2006, with a clinical diagnosis of rabies. Men are much more likely to be the victims of dog bites (Overall & Love, 2001). In one report, dog attacks on postmen increased during summer holidays (Nelson, 2016). The study of Chaudhary et al. (2017) in Nepal also showed that men are more prone to have dog bite than women that might be due to the difference in their attire and working station. Men usually wear half-pants, t-shirt, and are outdoor workers but women are usually housewives who stay home and cover the body from top to bottom, which might protect them from a dog bite.

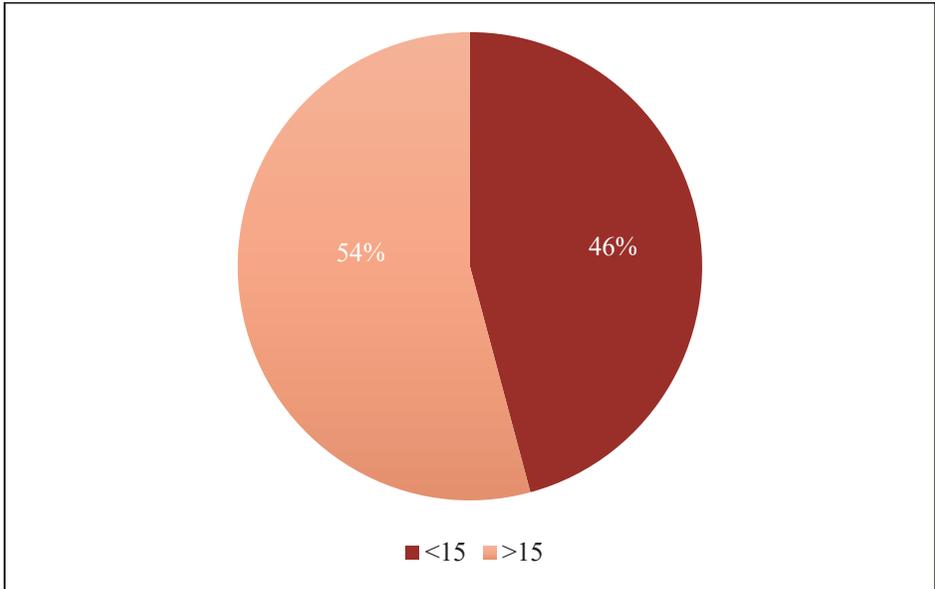


**Figure 4. Dog bite incidence in relation to gender from January 2013 to July 2015.**

In this study, people above the age of 15 years old were more frequent victims of a dog bite (Figure 5). This finding may be the result of dominance aggression as exhibited by the adults. Most of the children aging below 15 years old may spend more time at home, thereby decreasing the risk of exposure to stray dogs. The finding is similar to the study of Cornelissen and Hopster (2010), and Dimaano et al. (2011) indicating that adults are more prone to dog attacks than children.

However, there were reports that most dog bites occur in children, with the highest number seen between the ages of five and nine years old (Sribnick et al., 2016; Kumar et al., 2017; Baddour et al., 2017). The facial areas and neck are the most common sites of dog bites in children (Sarcey et al., 2017), probably because a child's head is close to the level of the dog's mouth, and small children may frequently provoke dog to bite by hugging and kissing (Borud & Friedman, 2000; Schalamon et al., 2006; Sribnick et al., 2016). The arms and legs, particularly the right hand, are the most frequent site of injury for adults

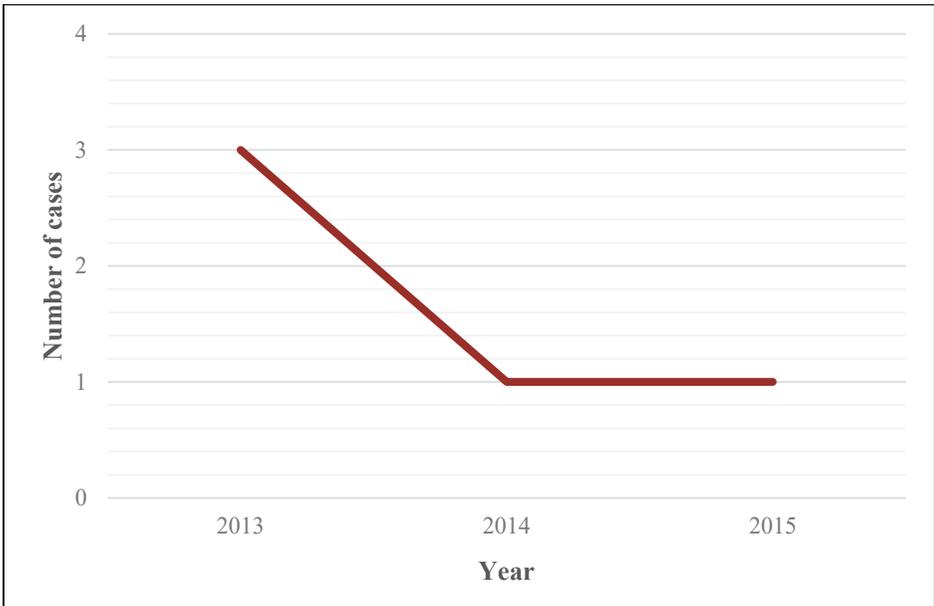
(Baddour et al., 2017) and the lesions are more severe (Sarcey et al., 2017). Young children are especially vulnerable to dog bite, and close monitoring on dog-child interaction even if the dog is familiar to the child could greatly reduce dog bite incidence in children (Sribnick et al., 2016).



**Figure 5. Frequency of reported cases of dog bites by age.**

Figure 6 shows the mortality rate of rabies in Ozamiz City. Five fatalities were recorded from 2013 to 2015 (first half) due to rabies infection with three deaths in 2013 and one in each following year of 2014 and 2015. The mortality rate shown in this study is relatively low compared to the reports of Wallerstein (1999) and Dimaano et al. (2011). In the year 1998, a total of 362 Filipinos died of rabies, compared with 321 in 1997 and 337 in 1996 as reported by Wallerstein (1999). A total of 1,839 patients diagnosed with rabies were admitted to San Lazaro Hospital, Manila between 1987 and 2006 and all of these patients died based on the retrospective review carried out by Dimaano et al. (2011). In May 2001, a case of human rabies imported into the United Kingdom from the Philippines was identified.

A 55-year-old man was admitted to University College Hospital, London, with clinical symptoms and a history consistent with exposure to rabies. It was found that the virus isolate was closely related to that of canine variants currently circulating at that time in the Philippines (Smith et al., 2003).



**Figure 6. The mortality rate due to the rabies virus.**

Despite the low mortality rate of rabies in Ozamiz City compared to past incidences, mass dog vaccination has to intensify to reduce or even eliminate rabies cases. In the report of Wallerstein (1999), it was stressed that the number of rabies cases in the Philippines is increasing and the underlying reason is that public awareness of the disease remains poor and that dog owners are not taking up the offer of subsidized rabies immunizations given by the government.

In 2010, with support from the Bill and Melinda Gates Foundation, a canine rabies elimination project was initiated in the Philippine Archipelago of Visayas (Miranda et al., 2017). The findings of their project showed that eliminating rabies in dogs through mass vaccination is more cost-effective than treating rabies exposures in

humans. Moreover, it was found that mass dog vaccination campaigns conducted in each village are more cost-effective than fixed-site campaigns. The willingness of local governments to invest and reassure donors of their cooperation and resource contribution to sustain disease elimination efforts was the main driver for their project to succeed.

The same effort against rabies elimination was initiated in Ilocos Norte in 2012 by the provincial veterinary and health offices with the support of many other partners. The project delivered a comprehensive dog vaccination program and increased awareness of the need for postexposure prophylaxis (PEP), aiming to eliminate human and animal rabies cases in Ilocos Norte by 2015 (Valenzuela et al., 2017). A reduction in rabies cases in both dogs and humans to 0 in 2014 and 2015 was the primary outcome of their project, which has subsequently been maintained. The project demonstrated that rabies elimination could be achieved in a short period, with the participation of many organizations.

## **Conclusion and Recommendations**

Majority of the incidence of dog bites in Ozamiz City is not fatal, and the mortality rate due to rabies is low but serious enough to warrant health care treatments and intense mass dog and human rabies vaccination. The statistics gathered on dog bites are currently fragmented and incomplete due to the lack of a comprehensive reporting system made by the public. There is a need for significant public support to control the number of stray dogs. It is also important to consider whether or not the methods done to apprehend these stray dogs would compromise the animal's welfare. Implementation of the programs of the government to eliminate rabies by 2020 has to be fully carried out by concerted effort across multiple sectors.

## **Acknowledgment**

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