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Risk Factor Analysis for Dog Bite Victims in Davao City, Southern Philippines

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Rabies, as one of the most serious bite-associated infectious diseases, kills 59,000 humans annually worldwide through the inoculation of rabid animal's saliva into bite wounds or scratches. In the Philippines, over 200 human rabies deaths are recorded annually and the majority of the cases are associated with dog bites. This paper aims to identify the risk factors affecting the severity of rabies exposure of dog bites in humans in Davao City. Probit and logistic regression models are used to determine the association of rabies exposure with age and gender of the dog bite victim, location of the biting incident, ownership of the biting dog, and bitten location in the victim's body. A total of 1,658 dog bite cases collected from the Davao City Health Office (CHO) are used in this study. The age of the dog bite victim and the bitten location in the victim's body have significant effects on the severity of rabies exposure in both models. Results showed that the probability of getting exposed severely to rabies gets lower as the dog bite victim gets older. This finding can be observed in the data where the percentage of severe rabies exposure is highest at 0–4 yr old and dog bite incidence is highest at 5–14 yr old, both decreases as the person gets older. Moreover, dog bite victims bitten on the arm and/or hand, leg and/or thigh, and foot are less likely to be severely exposed to rabies than those who are bitten in other parts of the body. These results suggest that the involved authorities should strengthen information, education, and communication (IEC) campaigns targeting parents with toddlers and in pre-schools and elementary schools. Furthermore, prompt medication – including first aid treatment – is advised when bitten by a dog.

Keywords: dog bite incidence, logistic model, probit model, rabies exposure, risk factor analysis

INTRODUCTION

Rabies is a viral infectious disease that causes acute inflammation in the brain of both humans and animals and is one of the neglected tropical diseases with a high incidence among the least developed and developing countries (WHO 2019). It has a case-fatality rate of almost 100% and so remains a major public health issue (Aguèmon *et al.* 2017), even though it is known to be 100% preventable (Hampson *et al.* 2008). It accounts for the deaths of approximately 59,000 humans and hundreds of thousands of dogs annually worldwide (Wallace *et al.* 2017). The disease is transmitted to humans through bites or scratches of rabid animals, and 99% of the reported

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human rabies cases are related to dogs (Rupprecht *et al.* 2006).

Dog bite victims are most likely to be infected with rabies but it is not always the case (Cleaveland *et al.* 2002). The protocol of the World Health Organization (WHO) in giving treatment to the dog bite victims depends on the severity of the bite wound or rabies exposure. The three categories of rabies exposure are considered by WHO: Category I – touching of animals and animal licks on intact skin (no exposure); Category II – nibbling of uncovered skin and minor scratches without bleeding (exposure); and Category III – transdermal bites or scratches and contamination of mucous membrane or broken skin with saliva from animal licks (severe exposure). Once clinical signs of rabies appear in humans, there is no treatment and so prevention is crucial (DEFRA UK 2011).

International communities are moving towards a recently set goal of eliminating human deaths due to dog-mediated rabies by 2030 (WHO 2015). The Philippines showed its support by passing the Anti-Rabies Act of 2007 (RA 9482), which has developed a National Rabies Prevention and Control Program and has extended its network of Animal Bite Treatment Centers (ABTC) across the country (Medina *et al.* 2016). Despite these efforts, the Philippines remains rabies endemic over the last decade (Amparo *et al.* 2018). In Davao City alone, the CHO recorded over 47,000 dog bite victims from 2011–2017 (Davao CHO 2018; pers. comm. 30 July).

The central tenet to rabies prevention and elimination is prompt access to post-exposure prophylaxis (PEP) after rabies exposure. The government provides PEP to bite victims for free, which can be availed on over 500 ABTCs across the country (Amparo *et al.* 2018) yet is very limited due to the increasing number of animal bite victims (DOH 2012). Moreover, access to PEP is challenging and expensive in the Philippines. Identifying the risk factors (*i.e.* characteristics associated with disease occurrence (Van Dyke and Dave 2005) of rabies exposure is a major approach to efficiently maximize the scarce supply of PEP to eliminate human rabies, in conjunction with other prevention strategies (Grill 2009).

Understanding the risk factors and current status of the dog bite incidence is important in designing prevention strategies. For instance, in South Africa, Hergert *et al.* (2016) indicated that husbandry practices, rabies knowledge, geographical area, and the ages of dogs were important factors associated with the risk of non-vaccination of dogs. They further highlighted that these risk factors need to be elucidated and addressed for meaningful progression toward better control and elimination of rabies. In Mozambique, the significant factors associated with human rabies were age < 15 yr, severity of the bite, location of the bite, and failure to use soap and water to cleanse the wound. The poor implementation of control measures for rabies had led to the rabies outbreak in the area (Salomão *et al.* 2017). In Brazil, the characteristics of biting dogs were evaluated to establish risk factors for aggression by dogs (Buso *et al.* 2016). Moreover, Andrade *et al.* (2019) suggested that the evaluation of the risk factors associated with human rabies infection and which treatment is more appropriate will avoid unnecessary expenditures by the health service.

In ascertaining whether certain information such as socio-demographics can be considered as a risk factor, statistical approaches such as probit and logistic regression models are used (Das and Rahman 2011; Rubin *et al.* 2013). Furthermore, these models measure the impact of each risk factor on the likelihood of the disease occurrence. Thus, in this study, we aim to determine the factors affecting the risk of rabies exposure of dog bite victims in Davao City. The results of this study can give relevant and up-to-date information on dog-mediated rabies exposure and can provide a reference to policymakers on the type of intervention that may be implemented or intensified to eliminate human rabies.

MATERIALS AND METHODS

Data

The data on animal-bite incidence in Davao City recorded by the Davao CHO from 2015–2017 were used in this study. Only the dog bite victims who went to Davao CHO, hospitals, and registered medical clinics in Davao City after the bite incidence were accounted in the dataset (bite victims may either self-medicate or seek unqualified individuals for medication). The datasets on rabies exposure, age and gender of the dog bite victim, location of the biting incident, ownership of the biting dog, and the bitten location in the victim's body were also collected and are the risk factors considered in this study.

Probit and Logistic Regression Models

Risk factor analysis is commonly performed using probit and logistic regression models. Probit and logistic regression methods are utilized to model binary response variables and discrete, continuous, and/or binary predictor variables (Korkmaz *et al.* 2012; Reed and Wu 2013). Logit and probit models are suitable for estimating the probability of occurrence (Park 2013) and have become the standard methods of analyzing binary response variables (Allison 1999). The main difference between probit and logistic models is that probit models assume that the residuals are standard normally distributed while logistic models assume that the residuals follow a logistic distribution (Cameron and Trivedi 2005). In this study, probit and logistic regression models were both used to measure the association between rabies exposure of dog bite victims and the different predictor variables in order to generate robust results [*e.g.* similar interpretations of model coefficients (Holmes and Held 2006; Schnettler *et al* 2012)] and the marginal effects were calculated, respectively. The marginal effects measure the change in the predicted probability of the bite victim to be severely exposed to rabies with the changes in the associated risk factors. Furthermore, the Akaike's Information Criterion (AIC) (Zhou *et al.* 2005) and Bayesian Information Criterion (BIC) (Wang and Day 2010) were used to compare the two models (Pour-Rouholamin and Zhou 2016).

In this study, the response variable in the probit and logistic regression models is the severity of rabies exposure of the dog bite victim and is based on the categories set by WHO. It takes on two values: 1 if the exposure is severe (Category III) or 0 if the exposure is non-severe (Categories I and II). The predictor variables are age of the dog bite victim (categorized into eight age groups), gender of the dog bite victim (male or female), location of the biting incident (District 1, 2, or 3 of Davao City), ownership of the biting dog (owned or stray), and bitten location in the victim's body (arm and/or hand, leg and/or thigh, foot, or other body parts). The names and descriptions of these variables are summarized in Table 1. Mathematically, the probit/logistic specification for the severity of rabies exposure of dog bite victim is denoted as:

$$\begin{aligned} P(q_i = 1 \mid X_i) = {} & \beta_0 + \beta_1 age\_2_i + \beta_2 age\_3_i + \beta_3 age\_4_i + \\ & \beta_4 age\_5_i + \beta_5 age\_6_i + \beta_6 age\_7_i + \beta_7 age\_8_i + \\ & \beta_8 age\_gender_i + \beta_9 dist\_2_i + \beta_{10} dist\_3_i + \\ & \beta_{11} arm\_hand_i + \beta_{12} leg\_thigh_i + \beta_{13} foot_i + \mu_i \end{aligned} \tag{1}$$

where q_i is the severity of rabies exposure of the *ith* dog bite victim, X_1 is the vector of variables that are related to the rabies exposure, and the constant β_0 and the model coefficients β_1, β_2, …, β_{13} are the parameters to be estimated. Finally, μ_i is the error term of the model, which is assumed to either follow a standard normal or a logistic distribution (Cameron and Trivedi 2005).

Also, this study used the classification table to assess the usefulness of the probit and logistic regression models (Young *et al.* 2011; Soureshjani and Kimiagari 2013). In generating the classification table, an optimal cutoff point was determined by the ratio of the total number of

Table 1. Description of the variables used in this study.

Variable name	Description	Mean	Min.	Max.
exposure	1 if dog bite wound is Category III; 0, otherwise	0.0983	0	1
age_1[a]	1 if dog bite victim aged less than 5 yr; 0, otherwise	0.1122	0	1
age_2	1 if dog bite victim aged 5–14 yr; 0, otherwise	0.2370	0	1
age_3	1 if dog bite victim aged 15–24 yr; 0, otherwise	0.1731	0	1
age_4	1 if dog bite victim aged 25–34 yr; 0, otherwise	0.1387	0	1
age_5	1 if dog bite victim aged 35–44 yr; 0, otherwise	0.1236	0	1
age_6	1 if dog bite victim aged 45–54 yr; 0, otherwise	0.1062	0	1
age_7	1 if dog bite victim aged 55–64 yr; 0, otherwise	0.0651	0	1
age_8	1 if dog bite victim aged 65 yr and above; 0, otherwise	0.0440	0	1
gender	1 if dog bite victim is male; 0 if female	0.5422	0	1
dist_1[a]	1 if biting occurred in District 1; 0, otherwise	0.6007	0	1
dist_2	1 if biting occurred in District 2; 0, otherwise	0.2262	0	1
dist_3	1 if biting occurred in District 3; 0, otherwise	0.1731	0	1
ownership	1 if biting dog is stray; 0 if owned	0.0193	0	1
arm_hand	1 if dog bite victim bitten on arm/hand; 0, otherwise	0.3812	0	1
leg_thigh	1 if dog bite victim bitten on leg/thigh; 0, otherwise	0.3197	0	1
foot	1 if dog bite victim bitten on foot; 0, otherwise	0.1641	0	1
bite_others[a]	1 if dog bite victim bitten on other parts of the body such as head, chest, and neck; 0, otherwise	0.1351	0	1

[a] Reference category so as to avoid the dummy variable trap

dog bite victims to the total sample of dog bite victims identified to have severe rabies exposure. The cutoff point gives an optimal probability to separate predicted versus observed successes and failures (Hilbe 2009). Stata 15.1 was used in estimating the coefficients of the parameters, marginal effects, classification matrix, and AIC and BIC in both models.

RESULTS AND DISCUSSION

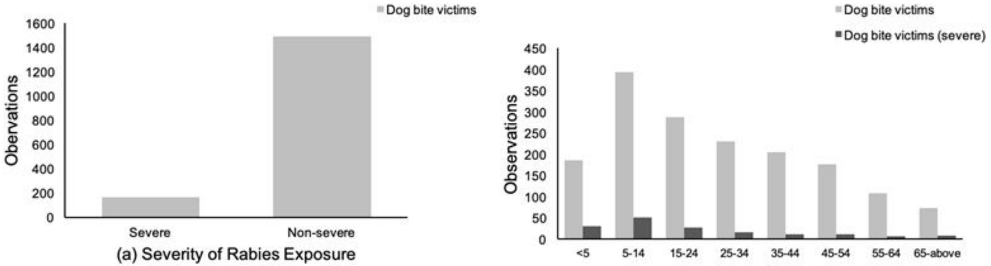
Dog Bite Cases in Davao City, Philippines from 2015–2017

This study utilized a total of 1,658 dog bite cases for the analysis. Figure 1 shows the frequency graphs according to the severity and non-severity of rabies exposure of dog bite victims in each variable. The data show that 9.8% of the bite victims, or 1 out of 10 bite victims, has a Category III bite wounds or severe rabies exposure.

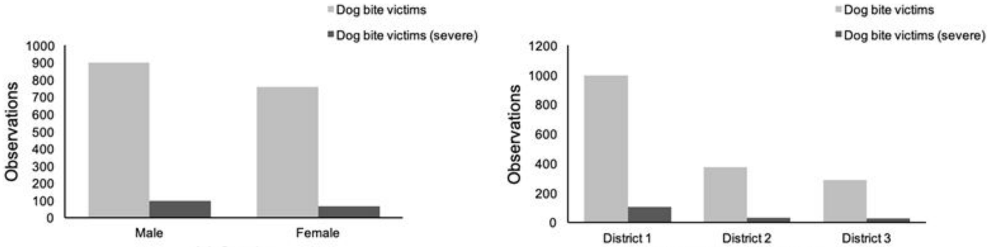
The distribution of dog bite cases according to age are as follows: 11.2% (186) were below 5 yr old and 16.7% (31) of which have severe rabies exposure; 23.7% (393) were 5–14 yr old, in which 13.0% (51) have severe exposure; 17.3% (287) were 15–24 yr old, in which 9.8% (28) have severe exposure; 13.9% (230) were 25–34 yr old, in which 7.0% (16) have severe exposure; 12.4% (205) were 35–44 yr old, in which 5.4% (11) have severe exposure; 10.6% (176) were 45–54 yr old, in which 6.3% (11) have severe exposure; 6.5% (108) were 55–64 yr old, in which 6.5% (7) have severe exposure; and 4.4% (73) were 65 yr old and older, in which 11.8% (8) have severe exposure.

In terms of gender, 54% (899) of the dog bite victims were male and 46% (759) were female. Moreover, 10.8% (97) of the male bite victims and 8.7% (66) of the female bite victims have severe rabies exposure.

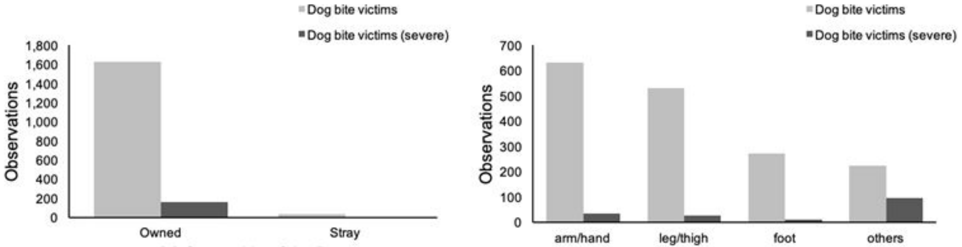
For the location of biting incident, though 60.1% (996) of the dog bite cases occurred in District 1 and only 22.6% (375) and 17.3% (287) occurred in Districts 2 and 3,



(a) Severity of Rabies Exposure (b) Age Groups



(c) Gender (d) Davao City Districts



(e) Ownership of the Dog (f) Bitten Location

Figure 1. Frequency graph of dog bite victims according to (a) severity of rabies exposure, (b) age groups, (c) gender, (d) location of biting incident, (e) ownership of biting dog, and (f) bitten location.

respectively; the portion of severe exposure in each district is almost the same. Furthermore, 10.4% (104), 8.5% (32), and 9.4% (27) of the bite incidence occurred in District 1, 2, and 3, respectively, were severe exposure.

Most of the biting incidence involved with owned dogs, *i.e.* 98.1% (1,626), and the remaining 1.9% (32) were involved with stray dogs. Moreover, 10.0% (162) of the bites from owned dogs resulted in severe exposure while 3.1% (1) of the bites from stray dogs resulted in severe exposure.

As for the bitten location in the victim's body, most of the bites or 38.1% (632) were located in the upper extremities such as arm and hand, followed by the lower extremities and least in the other parts of the body. Furthermore, 32.0% (530) of the bite victims were bitten on the leg and thigh, 16.4% (272) were bitten on the foot, and 13.5% (224) were located on the head, chest, and neck. The severe bite wounds in terms of the location were 5.5% (35) on the arm and hand, 4.7% (25) on the leg and thigh, 3.3% (9) on the foot, and 42.0% (94) on the head, chest, and neck.

Risk Factor Analysis

Estimation results and assessment of predictive capacity. Both logistic and probit regression models were estimated since these models take into account binary dependent variables. From the Wald x^2 statistic and its p-value, overall, both the logistic and probit models are statistically significant. The maximum likelihood estimates of the parameters and marginal effects of the probit and logistic regression model analysis are summarized in Table 2 and Appendix Table I, respectively. Both logistic and probit regression results were consistent with each other. The qualitative inferences on rabies exposure risk factors (*e.g.* older people are less likely to acquire severe rabies exposure) can then be considered robust (Holmes and Held 2006). However, the AIC and BIC values of the probit regression model are smaller compared to that of the logistic regression model. Furthermore, the residuals of Equation 1 can be assumed to follow a standard normal distribution since the sample size of this study (n = 1,658) is greater than the considered sufficiently large sample size (n is at least 450) (Hahn and Soyer 2005). Hence, the probit regression model was the better model to use in the quantitative analysis (*e.g.* marginal effects computation).

Table 2. Parameter and marginal effects estimates of the probit model of rabies exposure.

Predictor	Estimates	Robust std. err.	p-value	Marginal effects	p-value
age_2	–0.0526	0.1488	0.724	–0.0067	0.718
age_3	–0.0312	0.1647	0.850	–0.0040	0.847
age_4	–0.2345	0.1819	0.197	–0.0268	0.139
age_5	–0.4253	0.2052	0.038^{**}	–0.0435	0.006^{***}
age_6	–0.2139	0.2055	0.298	–0.0245	0.231
age_7	–0.3335	0.2328	0.152	–0.0348	0.067^{*}
age_8	0.2443	0.2441	0.317	0.0373	0.388
gender	–0.0438	0.0976	0.654	–0.0057	0.653
dist_2	–0.1641	0.4920	0.165	–0.0199	0.138
dist_3	0.0947	0.1182	0.453	0.0117	0.431
ownership	–0.3243	0.1261	0.510	–0.0332	0.383
arm_hand	–1.4010	0.1203	0.000^{***}	–0.1585	0.000^{***}
leg_thigh	–1.4481	0.1282	0.000^{***}	–0.1438	0.000^{***}
foot	–1.6214	0.1679	0.000^{***}	–0.1068	0.000^{***}
constant	–0.0625	0.1539	0.685		
Number of observations	1,658				
Wald statistic (14)	217.03				
p-value	0.000				
Pseudo R^2	0.2101				
AIC	871.7524				
BIC	952.9529				

$^{*}p$-value < 0.10 is significant at 10%.
$^{**}p$-value < 0.05 is significant at 5%.
$^{***}p$-value < 0.01 is significant at 1%.

The classification table or prediction success table was used to assess the usefulness of the probit model. The cutoff value equal to 0.098, which is the ratio of the total number of severe rabies exposure (or dog bites) to the total number of dog bites in the sample, was used instead of the default value equal to 0.500 (Alviola and Capps 2010). From Table 3, the probit model is correct, approximately 87% of the time, in predicting the severity and non-severity of rabies exposure. Moreover, the probit model is correct, approximately 60% of the time, in terms of sensitivity or the ability of the model to correctly predict severe rabies exposure. In terms of specificity or the ability to correctly predict non-severe rabies exposure, the model is correct, approximately 89% of the time.

Table 3. Classification table in the probit model: severe and non-severe rabies exposure of dog bite victims.

Predictions	Actual bite		
	Severe	Non-severe	Total
Severe rabies exposure	98	159	257
Non-severe rabies exposure	65	1,336	1,401
Total	163	1,495	1,658
Percentage of right predictions (%)	86.49		
Sensitivity (%)[a]	60.12		
Specificity (%)[b]	89.36		
Cutoff value	0.098		

[a]The percentage of correctly predicting the dog bite victim's wound as severe (98/163)

[b]The percentage of correctly predicting the dog bite victim's wound as non-severe (1,336/1,495)

Rabies exposure severity risk factors. The predictor *age_1* (< 5 yr old) was used as the reference variable for the age, *dist_1* for the location of biting incident and *bite others* for the bitten location. At 5% level of significance, *age_5* ($p = 0.006$), *arm_hand* ($p = 0.000$), *leg_thigh* ($p = 0.000$), and foot ($p = 0.000$) were the significant factors associated with the severity of rabies exposure. The predictor *age_7* ($p = 0.067$) was also a significant factor at a 10% level of significance as well.

I. Age. From Table 2, in general – as a person gets older – he is less likely to acquire severe rabies exposure when bitten by a dog. Looking at the marginal effects, the probability that a dog bite victim will have severe rabies exposure is less by 0.0435 or 4.35% for *age_5* (35–44 yr old) and 0.0348 or 3.48% for *age_7* (55–64 yr old), relative to a dog bite victim aged less than 5 yr. This can be observed in the data where the percentage of severe rabies exposure is highest at age group 0–4 yr old and decreases as age increases. It can also be observed that dog bite cases are highest at age group 5–14 yr old and decrease as the age increases.

This finding is consistent with several studies where most of the dog bite victims aged less than 15 yr acquire severe dog bite wounds (Griego *et al.* 1995; Chang *et al.* 1997; Salomão *et al.* 2017). Studies conducted in Brazil showed that the highest number of dog aggressions were registered in children (Andrade *et al.* 2019) and the presence of a child in a household increased the probability of a dog bite incident (Buso *et al.* 2016). A study also emphasized that children aged below 5 yr old are at high risk in rabies exposure and need hospitalization compared to older children (Chen *et al.* 2013). The high dog bite incidence in children can be attributed to their extreme curiosity, lack of inhibition, and limited knowledge about dogs and rabies (Sacks *et al.* 1996; Daniels *et al.* 2008; Overall and Love 2001). The playful and abusing/teasing actions of children towards animals provoke dogs, which may cause aggression resulting in biting incidence (Khokhar *et al.* 2003). When dogs become aggressive and try to bite, children have less to no ability to escape and defend themselves (Overall and Love 2001). Moreover, bite incidence in children are more likely to be reported than in adults because of more parental concern towards children (Sacks *et al.* 1996). However, it is also believed that children do not report dog bites or scratches to their parents, which increases the risk of having severe rabies exposure (Dodet 2010).

II. Location of dog bite. The bitten location in the victim's body is significantly associated with the severity of rabies exposure. A person bitten by a dog in other parts of the body (*e.g.* head, chest, or neck) is more likely to be severely exposed to rabies. The probability that a dog bite victim will have severe rabies exposure is less by 0.1585 for *arm_hand*, 0.1438 for *leg_thigh*, and 0.1068 for foot, relative to other parts of the body.

The bite location in the victim's body is another significant risk factor of the severity of rabies exposure. Victims bitten in other parts of the body (*e.g.* head, chest, or neck) are more at risk of severe rabies exposure. This finding can be observed from the data where 42% of the bites located in other parts of the body are severe wound bites while only 6% of the bite wounds in the arm and/or hand are severe, 5% in the leg and/or thigh, and 3% in the foot. Since rabies travels towards the brain through the nervous system, the incubation period – or the time between the rabies exposure and appearance of the rabies symptoms – is shorter when the bite location is closer to the brain (Gluska *et al.* 2014). This makes the dog bites located in the head and/or neck more dangerous than bites located in the arm, hand, or lower extremities (Tenzin *et al.* 2011). Upper extremities including the arm and hands are frequently bitten by dogs; followed by the lower extremities such as the leg, thigh, and foot; and the least on other parts of the victim's body such as the neck and head (Eslamifar *et al.* 2008). The bite victims more likely used their hands or legs to interact with dogs or defend themselves from dog attacks, resulting in more bite incidence located in the arm, hand, thigh, or leg (Rosado *et al.* 2009). Despite the high frequency of dog bites, results show that the risk of being severely exposed to rabies is less by 16% when bitten in the arm and/or hand, less by 15% when bitten in the leg and/or thigh, and less by 11% when bitten in the foot. The location of the bite on the body is one of the principal factors affecting the severity of rabies exposure (Knobel *et al.* 2005). The closer the bite location to the brain, the victim is more likely to be severely exposed to rabies, which implies that an immediate vaccination, administration of rabies immunoglobulin, and local treatment of the wound is necessary (WHO 2019).

Limitations of the analysis. The risk factors considered in this study were limited to the information gathered by the Davao CHO from the dog bite victims who visited their office to seek medication for dog bite wounds. Dog bite incidence reports from hospitals and medical clinics in Davao City submitted to CHO were also used in the analysis. Only basic information was gathered from the bite victims; thus, other potentially important information such as the dog's gender, breed, and size; other socio-demographic information (*e.g.* educational attainment, profession, *etc.*); and the level of rabies awareness of the bite victims were not available. These pieces of information might serve as significant factors affecting the severity of rabies exposure. For example, the location of a biting incident may be further categorized as home, road, commercial facilities, or public areas; whereas an owned dog may be further categorized as owned by the household, relatives, or neighbor. These underline the need for the Davao CHO, including health facilities in the city, to gather more information from dog bite victims.

CONCLUSIONS

The findings of this study provide information about the risk factors associated with the severity of rabies exposure of dog bite victims in Davao City. The risk factors considered in this study are the age and gender of the dog bite victim, location of the biting incident, ownership of the biting dog, and bitten location in the victim's body. A total of 1,658 dog bite incidents in Davao City from 2015–2017 were used in this study.

The victim's age and bitten location in the victim's body significantly affect the severity of rabies exposure. Older persons (*e.g.* 35–44 yr old and 55–64 yr old) are less likely to be severely exposed to rabies. Moreover, the farther the bite location to the brain (*i.e.* arm and/or hand, leg and/or thigh, and foot), the bite victim is less likely to be severely exposed to rabies. These results are consistent with the studies conducted in other countries.

Since older people have less risk to severe rabies exposure and high dog bite incidence is observed in aged 0–14 yr old, IEC campaigns on rabies awareness must be strengthened in pre-school and elementary schools and must target parents with toddlers. Furthermore, prompt and proper wound handling and care – especially in crucial areas such as head and neck – must be taught and employed in both children and adults, *e.g.* immediate and extensive washing for a minimum of 15 min with water, detergent, povidone-iodine, *etc.*, that will eliminate the rabies virus.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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Appendix Table I. Parameter and marginal effects estimates of the logistic analysis of rabies exposure.

Predictor	Estimates	Robust std. err.	*p*-value	Marginal effects	*p*-value
age_2	–0.1169	0.2756	0.672	–0.0068	0.663
age_3	–0.0876	0.3131	0.780	–0.0051	0.774
age_4	–0.4581	0.3503	0.191	–0.0237	0.131
age_5	–0.8792	0.3987	0.027***	–0.0398	0.003***
age_6	–0.5076	0.4172	0.224	–0.0255	0.141
age_7	–0.6045	0.4485	0.178	–0.0287	0.089*
age_8	–0.4242	0.4961	0.392	0.0299	0.467
gender	0.1049	0.1917	0.584	–0.0062	0.582
dist_2	–0.2644	1.1593	0.246	–0.0148	0.222
dist_3	0.1441	0.2280	0.555	–0.0082	0.540
ownership	–0.8386	0.2442	0.469	–0.0355	0.279
arm_hand	–2.5188	0.2263	0.000***	–0.1362	0.000***
leg_thigh	–2.6297	0.2495	0.000***	–0.1245	0.000***
foot	–2.9905	0.3630	0.000***	–0.0941	0.000***
constant	–0.0673	0.2731	0.805		
Number of observations	1,658				
Wald statistic (14)	219.70				
p-value	0.000				
Pseudo R^2	0.2094				
AIC	872.4651				
BIC	953.6656				

**p*-value < 0.10 is significant at 10%.
***p*-value < 0.05 is significant at 5%.
****p*-value < 0.01 is significant at 1%.