Original Article

Utility of the health belief model to assess predictors of rabies preventive measures

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ABSTRACT

Introduction: Rabies is a fatal zoonotic viral disease that is spread to people through animal bites. Around 35,000-50,000 individuals worldwide die of rabies each year, of which more than 99% of deaths occur in the developing countries. Since legislative actions does not appear to have been effective in reducing the incidence and severity of the bites in some developed countries, it seems public education is key to reducing animal bites. For effective education, understanding factors affecting the preventive and protective behaviors based on appropriate health behavior change models is important. So, the study tried to examine the relationship between Health Belief Model (HBM) constructs and rabies preventive measures. **Materials and Methods:** In the cross-sectional study, a HBM-based researcher-designed questionnaire was completed by 204 participants who were selected via cluster sampling design from urban families of the Abadeh, Iran. The psychometric properties of the questionnaire were established. Descriptive statistics, independent sample *t*-test, bivariate correlations, and stepwise multiple regression analysis were applied to analyze data using SPSS 19. The level of significance was set *a priori* at 0.05. **Results:** The scale mean for the total knowledge of the participants about rabies was 14.12 ± 6.04 out of 29. Participants' preventive behaviors were significantly correlated with their total knowledge, perceived susceptibility, perceived severity, perceived benefits and cues to action, which 19% of the variation in these behaviors were explained by perceived benefits and cues to action. Protective activities of participants who kept animals in their house had statistically significant correlation with their total knowledge score and cues to action. 32.1% of the variation in these activities was explained by cues to action. **Discussion:** Findings indicate that participants had not enough knowledge about routes of infecting by rabies and how to prevent it. The most powerful predictors for preventive behaviors and protective activities were perceived benefits and cues to action, respectively, which indicate the importance of the availability of accurate information about efficacy of these behaviors, from sources that are easily accessible, such as healthcare providers and veterinary professionals. **Conclusion:** Educational programs are needed for increasing public knowledge in this area. And more studies should be done to determine predictive factors of rabies preventive measures based on other health behavior change models.

Key words: Determinant, health belief model, rabies preventive measures

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INTRODUCTION

Rabies is a fatal zoonotic viral disease that is spread to people through close contact with infected saliva via bites or scratches.[1,2] Children especially 5 to 9-year-old boys are

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the most frequent victims of animal bites.[3] Dog and cat bites make up 80-85% and 10% of all reported incidents, respectively,[3-5] and other animals including rodents, rabbits, horses, raccoons, bats, skunks, and monkeys, make up the remaining 5-10% of instances.[3]

The World Health Organization (WHO) estimates that around 35,000 to 50,000 individuals worldwide die of rabies each year.[3] An average of one death every 10 min,[1] more than 99% of human deaths from rabies occur in the developing countries.,[6] and more than 95% of these deaths occur in Asia and Africa.[1] Despite some Asian countries such as Japan and Malaysia which have performed successful rabies control programs and become rabies-free, other countries still face problems with disease control.[4] In Iran, the incidence of animal bites in different parts of the country has increased from 35.1 per 100,000 in 1987 to 151 per 100,000 in 2001,[4] and it has been detected in all provinces, especially in North, North-West, and North-East of the country.[2] The number of people receiving post-exposure prophylaxis in the 300 bite management centers across the country has more than doubled between 1997 and 2009.[7]

A component of the impact of disease is the economic cost incurred by society as a result of the disease. The costs due to rabies were considered under the following categories: 1) direct (medical) human costs from post-exposure treatment, 2) indirect (patient) costs from post-exposure treatment, 3) costs to control rabies among dogs, 4) livestock losses, and 5) surveillance costs. Estimated annual expenditure due to rabies is 563.0 millions of US$ in Asia.[6] Although the accurate rate of rabies costs in Iran is not available, the Fars news agency (2012) reported that 130 billion Rials is founded annually for providing rabies vaccine (1$≈25000 Rls).[8] So, for the possibility of contracting rabies,[3] animal bites are one of the most important public health problems.[3,5]

Several studies have been done to assess communities' knowledge, attitudes, and practice about rabies prevention. For example, in a community-based, cross-sectional study in a slum area of India, by Prakash and colleagues (2013), only 23% of participants had knowledge about rabies transmission by scratches and licks while all of them knew that rabies transmit by dog bite. Only 40% of the participants were aware that the rabies is a fatal illness. Sixty-six percent of the participants responded that they would wash the wound with water, 24% said that they would visit a doctor, and the rest responded that either they would do nothing (3%) or would adopt some unconventional methods/religious practices (7%) to prevent the development of rabies. Of them, 55.5% of the participants were aware about the role of vaccine in preventing rabies.

They concluded that there is a large gap in people's knowledge, attitude, and practices about rabies.[9] Altmann and colleagues (2009) in a prospective study in the Marseille reported that only 6.7% of French travelers knew that the risk of rabies was important, while 40.1% considered it moderate or low. Dog bites appeared to be a well-known mode of transmission of rabies. By contrast, licks on broken skin or contamination of the mucous membrane with saliva (10%) and scratches (0.7%) were rarely known. Cats (23.7%), foxes (28.3%), monkeys (10.3%), and bats (5.0%) were rarely mentioned as possible rabies vectors. Only 50.7% of travelers were aware of the preventive vaccination. Immediate washing of the injury with water and soap was mentioned by only 3.0% of individuals and self-disinfection with antiseptics by 21.3%.[10]

Matibag and colleagues (2009) reported that in a rural area of Sri Lanka, 94.5% of respondents had heard of rabies mainly from tri-media (radio, newspaper, television) (44.3%); school, neighbors and friends (28.5%); and government campaigns (26.5%).[11] In another study in nine villages in the same area by Matibag and colleagues (2007), there was a high level of awareness (90%) that dogs are the most common rabies reservoir, 31.1% have blamed cat, 26.6% monkey, and 25.7% fox. Seventy-nine percent were aware that the disease is fatal, and 88% responded that rabies can be prevented by vaccination. Most of the subjects (96%) would seek treatment from a doctor or a hospital after being bitten by a dog. Only one-half of the respondents were able to present their pet dog's vaccination certificate. 86.6% of individuals were aware about anti-rabies vaccine, and 24.4% knew that pet dogs need vaccine against rabies. Pet owners (93%) were more aware about the availability of dog rabies vaccines than non-pet owners (87%). They concluded pet owners tend to be more co-operative to rabies control activities.[12]

In general, animal owners have a wide variety of views about their responsibilities. For some, dog care means providing food and water, and some others may actively make sure that pet is appropriately fed, well-trained, licensed, and healthy.[13]

Since legislative actions does not appear to have been effective in reducing the incidence and severity of the bites in some developed countries,[14] and education is key to reducing animal bites within a community,[13,15] it seems that the attention should be focused on public education, which emphasize on increasing risk perception through general awareness of rabies transmission and severity, and promote prevention strategies such as exposure avoidance and wound washing and healthcare utilization following animal bites and scratches.[4,15]

The World Health Organization (2001) states that the lack of effective health education programs results in a low degree of awareness of the disease burden and the methods necessary to prevent and control rabies. Low awareness also causes poor community participation in local rabies control programs.[16] But, for effective education about above mentioned preventive measures, understanding factors affecting these behaviors is important.

Since the early 1950s, the Health Belief Model (HBM) has been one of the most widely used conceptual frameworks

in health behavior research, both to explain change and maintenance of health-related behaviors and as a guiding framework for health behavior interventions.[17]

The model contains several primary concepts that predict why people will take action to prevent, to screen for, or to control illness conditions.[17] This model addresses the individual's perceptions of the threat posed by a health problem (susceptibility, severity), the benefits of avoiding the threat, and factors influencing the decision to act (barriers, cues to action, and self-efficacy.)[17,18]

We searched for papers which assessed health education and communication models in predicting voluntarily vaccinating animals and other above mentioned preventive measures, but we didn't find any. So, it is decided to examine the relationship between Health Belief Model constructs and rabies preventive measures.

MATERIALS AND METHODS

This cross-sectional study was conducted on 204 families who were selected via cluster random sampling design from urban families of the Abadeh, Iran in 2012.

A researcher-designed questionnaire was administered to head of household (father or mother) or one of over 15 years members of the family. The questionnaire consisted of multiple sections. The first section consisted of general information including family size, respondent (Father/mother/others) and his/her age and education level. The second part consisted of 29 three-way (Yes/No/I don't know) questions asking participants' knowledge about different aspect of rabies including: Animals that would be infected with rabies (6 items), ways of getting rabies (8 items), symptoms of rabies infection in animals (5 items) and human (5 items), environmental conditions that cause more viability of rabies virus (3 items), the possibility of vaccinating animals against rabies (1 item), and if the symptoms of rabies appear in humans, is it possible to treat it (1 item). The total score range of knowledge was 0-29.

Other parts of the questionnaire were based upon the constructs of the model. These included: Protective activities (the behaviors, which should be done by families who keep domestic animals such as dog and cat in their house) consisted of 6 two-ways (Yes/No) questions (score range 0-6) such as "Did you vaccinated your farm animals?" and preventive behaviors (precautionary behaviors against animal bite and other measures that all people should do when encountered animal bites) consisted of 5 two-ways (Yes/No) questions (score range 0-5) such as "If you encounter any scratches or bites by domestic or wild animals, would you wash it with water and soap?" Perceived susceptibility (people's beliefs about their risk for getting a condition) consisted of 3 three-ways (None/Some/Much) questions (score range 3-9) such as "How much do you think it is possible that you may be infected by rabies?" Perceived severity (people's concerns about the seriousness of a condition or illness) consisted of 1 Four-ways (None/Some/Much/Very Much) question (score range 1-4), which was "In your idea, how much serious is rabies?" Perceived benefits (related to the outcomes of a certain behavior to reduce their susceptibility to or severity of an illness) consisted of 10 three-ways (None/Some/Much) questions (score range 10-30) such as "To what extent do you think each of these measures is effective in preventing rabies? Vaccinating animals, reporting suspected cases of the disease to the health center." Perceived barriers (people's concerns or negative beliefs about a health behavior) consisted of 7 three-ways (None/Some/Much) questions (score range 7-21) such as "How much does each of the following factors hinder you to do measures to prevent rabies? Not enough space to keep animals away from the living environment," and cues to action (strategies or information sources that promote adoption of a behavior) consisted of 8 two-ways (Yes/No) questions (score range 0-8) such as "Have you ever read a book or a pamphlet about rabies?"

The questionnaire content validity was approved by panel of experts, and for the domains with three or more items, internal consistency was calculated through Cronbach's alpha (0.67-0.70) test to assess reliability. The questionnaires were completed through face-to-face interviews with respondents' consent and after ensuring them about confidentiality of their responses. The Statistical Package for the Social Sciences (SPSS) was used for the purpose of data entry, manipulation, and analysis. The statistical techniques included descriptive analysis, bivariate correlations (Pearson's product-moment correlation coefficient), Stepwise multiple regression analysis to determine the factors that predict participants protective activities and preventive behaviors, and *t*-test for independent samples. The level of significance was set *a priori* at 0.05.

RESULTS

A total of 204 families completed the questionnaire. The respondents were aged 15 to 77 years old (mean: 35.98 ± 14.83), and their family size were 1 to 8 (mean: 3.81 ± 1.25). Fathers and mothers of the families consisted 36.3% and 23% of respondents, respectively, and 40.7% of respondents were other members of the families. Most of the respondents (54%) were at diploma or higher education levels.

Data revealed that most of participants knew dog (97.5%) and wolf (85,5%) as animals, which may be infected with rabies; and less than half of them knew that jackal (49%), cat (46.1%), bat (15.2%), and mouse (14.7%) might be infected by it.

Out of 204 families, 54 (26.5%) families had kept animals such as dog and cat in their house. The scale mean for preventive behaviors and protective activities were 4.12 ± 1.19 (possible range: 0-5) and 2.92 ± 1.61 (possible range: 0-6), respectively. Table 1 shows the responses frequencies of participants about behaviors that they should do for preventing rabies or protecting against it.

Table 1: Responses frequency distributions of participants preventive measures

	Yes		No	
	N	Percent	*N*	Percent
Preventive behaviors				
Putting their trash out of the reach of stray animals	145	71.8	57	27.2
Preventing children from getting closed to stray animals	177	87.2	26	12.8
Taking necessary precautions if any part of their body smeared with animals' saliva	179	88.2	24	11.8
Doing specific action against even a minor animal bites and scratches	173	84.8	31	15.2
Washing any scratches or bites with soap and water if they encounter any, by domestic or wild animals	166	81.8	37	18.2
Protective activities				
Investing farm animals collars	45	83.3	9	16.7
Vaccinating farm animals	41	75.9	13	24.1
Informing the vet about any change in behavior of their farm animals	19	35.2	35	64.8
Supervising their farm animals by the vet	20	37	34	63
Keeping farm animals away from their living environment	13	24	41	76
Avoiding their farm animals from contacting with stray animals	20	37	34	63

The scale mean for the total knowledge of the participants about rabies including: Ways of getting rabies, its symptoms among animals and human, environmental conditions causing more viability of virus, the possibility of vaccinating animals against rabies, and treating rabies in humans was 14.12 ± 6.04.

Table 2 compares scale means of HBM constructs between participants who had kept animals in their house and who had not.

Pearson correlation analysis revealed that participants' preventive behaviors were significantly correlated with their total knowledge, perceived susceptibility, perceived severity, perceived benefits, and cues to action, but there was not any statistically significant association between these behaviors and participants perceived barriers. On the other hand, it was found that protective activities scale mean of participants who kept animals in their house in the study time had statistically significant correlation with their total knowledge and cues to action, but no statistically significant relationship was found between their protective activities and other constructs of HBM. Table 3 indicates the correlation coefficients between health belief model constructs and preventive behaviors' scale mean of all participants and protective activities' scale means of participants who kept animals in their house.

Table 2: Comparing scale means of HBM constructs between two groups of participants

Construct	Participants keeping animals in their house		Participants with no animal in their house		*P*
	Mean	SD	Mean	SD	
Knowledge					
Animals that would be infected with rabies	3.24	1.18	3.02	1.35	0.30
Ways of getting rabies	4.33	2.44	3.84	2.17	0.17
Symptoms of rabies infection in animals	3.22	1.56	2.61	1.42	0.009
Symptoms of rabies infection in human	2.62	1.68	2.01	1.46	0.012
Environmental conditions causing more viability of virus	1.62	1.29	1.04	1.08	0.004
The possibility of vaccinating animals against rabies	0.72	0.45	0.68	0.46	0.63
The possibility of treating rabies in humans	0.29	0.46	0.19	0.39	0.15
Total	16.07	6.82	13.42	5.59	0.012
Preventive behaviors	3.44	1.38	4.37	1.01	<0.001
Perceived susceptibility	6.20	1.63	6.00	1.57	0.42
Perceived severity	2.87	0.77	2.95	0.77	0.5
Perceived benefits	20.92	3.40	22.89	3.82	0.001
Perceived barriers	13.31	3.62	13.45	2.76	0.77
Cues to action	2.59	1.86	2.34	1.77	0.38

SD = Standard deviation, HBM = Health belief model

In multiple regression analysis with Stepwise method, it is revealed that 19% of the variations in participants' preventive behaviors are explained by their perceived benefits and cues to action, which is statistically significant at the 0.05 level. The unique contributions of these two variables were 18.6% and 1.9%. Table 4 shows the model summary of this analysis.

Also, it is revealed in multiple regression analysis with Stepwise method that 32.1% of the variation in participants' protective activities is explained by cues to action, which is statistically significant at the 0.01 level. Table 5 shows the model summary of this analysis.

DISCUSSION

This study was conducted to assess predictors of rabies preventive measures and factors influencing them by applying the HBM. As far as we know, most of studies which have been carried out based on HBM are about non-communicable diseases such as cancers screening, smoking etc., and most of studies which are conducted about contagious diseases are in the area of HIV/AIDS and influenza,[19] and we didn't find any study investigating causes of rabies preventive behaviors based on any health behavior change models, so researchers thought that the study is unique in this area.

Table 3: The correlation coefficients between health belief model constructs In all participants

		1	2	3	4	5	6	7	Range	Mean	SD
1	Preventive behaviors	1							0-5	4.12	1.19
2	Knowledge (total)	0.154*	1						0-29	14.12	6.04
3	Perceived susceptibility	0.217**	0.332**	1					3-9	6.05	1.58
4	Perceived severity	0.264**	0.445**	0.285**	1				1-4	2.93	0.77
5	Perceived benefits	0.431**	0.346**	0.327**	0.461**	1			10-30	22.37	3.81
6	Perceived barriers	−0.055	−0.060	0.153*	0.133	0.044	1		7-21	13.42	3.01
7	Cues to action	0.194**	0.480**	0.153*	0.339**	0.147*	−0.036	1	0-8	2.41	1.81
8	Protective activities	-	0.287*	0.243	0.173	0.102	−0.099	0.554**	0-6	2.92	1.61

**Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed)

Table 4: Model summary of predictive variables of preventive behaviors

Model	R square	Change statistics		
		R square change	F change	*P*
1[a]	0.186	0.186	44.344	0.000
2[b]	0.205	0.019	4.493	0.035
3[c]	0.209	0.005	1.169	0.281
4[d]	0.216	0.006	1.515	0.220
5[e]	0.223	0.008	1.850	0.175
6[f]	0.226	0.003	0.737	0.392

[a]Predictors: (Constant), BENFIT, [b]Predictors: (Constant), BENFIT, CUEST, [c]Predictors: (Constant), BENFIT, CUEST, SUSEPTI, [d]Predictors: (Constant), BENFIT, CUEST, SUSEPTI, BARRIER, [e]Predictors: (Constant), BENFIT, CUEST, SUSEPTI, BARRIER, KNOW, [f]Predictors: (Constant), BENFIT, CUEST, SUSEPTI, BARRIER, KNOW, sev1

Table 5: Model summary of predictive variables of protective activities

Model	R square	Change statistics		
		R square change	F change	*P*
1[a]	0.321	0.321	24.128	0.000
2[b]	0.361	0.040	3.112	0.084
3[c]	0.368	0.007	0.540	0.466
4[d]	0.369	0.001	0.104	0.748
5[e]	0.369	0.000	0.014	0.906
6[f]	0.369	0.000	0.002	0.963

[a]Predictors: (Constant), CUEST, [b]Predictors: (Constant), CUEST, BENFIT, [c]Predictors: (Constant), CUEST, BENFIT, BARRIER, [d]Predictors: (Constant), CUEST, BENFIT, BARRIER, KNOW, [e]Predictors: (Constant), CUEST, BENFIT, BARRIER, KNOW, sev1, [f]Predictors: (Constant), CUEST, BENFIT, BARRIER, KNOW, sev1, SUSEPTI

Data showed that the respondents' age were 15-77 years (mean = 35.98), and most of them had more than a high school education (80.4%).

Whereas the main reservoirs of rabies in Iran are dog, wolf, fox, and jackal,[7] 97.5% of respondents knew dog as reservoirs of rabies, which is consistent with the study of Prakash and colleagues (2013)[9] and Matibag and colleagues (2007),[12] in which more than 90% of respondents knew that rabies transmit by dog bite. In the study of Altmann and colleagues (2009)[10] also, dog bites appeared to be a well-known mode of transmission of rabies. In the study, 85.5% of respondents knew wolf as reservoirs of rabies, which seems to be suitable; however, no similar study was found for comparing the result. Only fewer than 50% of respondents knew other rabies reservoirs, which is consistent with many other studies such as Altmann and colleagues (2009)[10] and Matibag and colleagues (2007).[12] So, it seems that educational programs are needed for increasing public knowledge about routes of infecting by rabies, especially for less common but important rabies reservoirs.

More than 70% of all respondents reported that they do preventive behaviors mentioned in the questionnaire, such as putting their trash out of the reach of stray animals, preventing children from getting closed to stray animals, washing any scratches or bites with soap and water, if they encounter any, by domestic or wild animals etc., but among families who kept animals in their house, only two protective activities (investing collars for farm animals and vaccinating farm animals) were done by most of them (more than 75%), and about other activities such as supervising their farm animals by the vet, keeping farm animals away from their living environment, informing the vet about any change in behavior in their farm animals etc., the positive response rates were less than 37%. The differences which were seen between performing this two types of behaviors may be because of the fact that almost all of preventive behaviors were personal-dependent, they are low cost, and didn't need for any facilities and supports from responsible organizations, but protective activities did.

As far as researchers know, the main focus of the most of studies which have done in this area is on the post-exposure preventive measures, and it was not found in any study about pre-exposure preventive or protective measures such as putting their trash out of the reach of stray animals, preventing children from getting closed to stray animals, investing collars for farm animals etc., So, comparing the results were not possible. But, in the area of post-exposure preventions, comparisons revealed that participants behavior in this study did better than some other studies; for example, while in the present study, 81.8% of respondents said that they wash any scratches or bites with soap and water, if they encounter any, by domestic or wild animals, only 66% of the participants in Prakash and colleagues (2013) responded that they do same,[9] and only 3.0% of French travelers in Altmann

and colleagues (2009) study reported that they immediately wash the injury with water and soap.[10] On the other hand, in pre-exposure prevention area, it was seen that while 75.9% of respondents in the study reported that they have vaccinated their farm animals, only one-half of the respondents in Matibag and colleagues (2007) study had presented their pet dog's vaccination certificate.[12]

The participants knowledge about symptoms of rabies infection in human, environmental conditions causing more viability of virus, and the possibility of treating rabies in humans were significantly lower than the mean of the possible scale range, and their knowledge about symptoms of rabies infection in animals and the possibility of vaccinating animals against rabies were significantly more than the mean of the possible scale range, while the scale mean for the total knowledge of the participants about rabies was at moderate level, and it wasn't seen any statistically significant difference between its scale mean (14.12) and the mean of the possible scale range (14.5). So, educational programs in this area seem to be necessary.

Comparing participants keeping animals in their house and participant with no animals in their house revealed that the first group's knowledge about ways of getting rabies, symptoms of rabies infection in animals, symptoms of rabies infection in human, environmental conditions causing more viability of virus, and their total knowledge were more than second group, which were statistically significant at 0.05 level. It may be because of educational programs, which had been held for the first group by Health Centers and Veterinary Networks.

Scale means of perceived susceptibility and severity of getting rabies and perceived benefits and barriers of preventive behaviors and also their scale means of cues to action among all participants were significantly higher than midpoint of possible ranges. Scale mean of preventive behaviors and perceived benefits of these behaviors in families with no animals in their house were significantly higher than families who kept animals, but it wasn't found any statistically significant difference in other constructs of HBM between these two groups.

In the study, it was revealed that participants' preventive behaviors were significantly correlated with their total knowledge, perceived susceptibility, perceived severity, perceived benefits, and cues to action, but perceived barriers hadn't any statistically significant relationship with them, and the most powerful predictor of preventive behaviors was perceived benefits. In the case of protective activities, it was found that they had positive significant correlations with only total knowledge and cues to action, and in this case, the most powerful predictor was cues to action.

These findings were inconsistent with many other studies, for example, the critical review of HBM studies conducted between 1974 and 1984 (the most current synthesis available till 2008) suggested that perceived barriers were the most powerful single predictor of behaviors.[17] A review of studies using the Health Belief Model theoretical framework also found that for preventative health behaviors, such as influenza H1N1 vaccination, the construct of perceived barriers was significant in all studies reviewed.[20] Matsui, *et al.* (2011) study results also indicated that perception of the efficacy of vaccination was the most significant factor associated with obtaining influenza vaccination, and the perception of vulnerability to and the possible severity of influenza were critical factors affecting the probability of vaccination.[21] Teitler-Regev, *et al.* (2001) analysis of the HBM categories showed that on average, individuals who intend to be vaccinated against influenza H1N1 had more perceived severity and susceptibility than those who do not intend to be vaccinated.[22] It should be mentioned that in this study, results were compared with some other studies, which were conducted to examine predictive values of HBM constructs on other communicable diseases such as HIV/AIDS, influenza, and influenza H1N1, but non-communicable diseases didn't include in these comparisons. Nevertheless, there is an important difference between these diseases; while influenza H1N1 and rabies are zoonotic disease, HIV/AIDS and influenza are not.

CONCLUSION

Using the HBM, we evaluated factors affecting the probability that residents of an urban community in Iran perform behaviors to protect themselves against rabies. Our findings indicate that participants had not enough knowledge about routes of infecting by rabies, especially for less common but important rabies reservoirs, symptoms of rabies infection in human, environmental conditions causing more viability of virus, and the possibility of treating rabies in humans. So, it seems, educational programs are needed for increasing public knowledge in this area.

In the study, the most powerful predictors for preventive behaviors and protective activities were perceived benefits and cues to action, respectively, which indicate the importance of the availability of accurate information about efficacy of these behaviors, from sources that are easily accessible, such as healthcare providers and veterinary professionals. Although to promote these behaviors, it is critical to provide financial and informational supports. We suggest that future work should examine other geographical regions, such as larger urban centers and rural areas, where factors influencing rabies-preventive and protective behaviors may be different. Also, more studies should be done to determine predictive factors of rabies-preventive and protective behaviors based on health behavior change models such as HBM.

LIMITATIONS

Our study findings should be interpreted in light of several limitations. First, the study relied on self-reported data that are subject to response bias. Second, the cross-sectional nature of the study does not allow us to make causal inferences. Finally, the study was limited to an urban center, and its results couldn't be generalized to other areas, especially rural centers.

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