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Study of Factors Associated with Knowledge, Attitudes and Practices Regarding Rabies in the Commune of *Niakhéne* in Senegal, in 2022

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Abstract

Introduction: Rabies is a serious disease, as it is always fatal, but it can be prevented by sero-vaccination. It is a neglected tropical disease endemic in Asia and Africa. The aim of this study was to assess knowledge, attitudes and practices regarding rabies and to determine the factors associated with them among people aged 18 and over in the commune of *Niakhène*. **Methods**: This was a cross-sectional, descriptive and analytical survey of subjects aged 18 and over living in the commune of *Niakhène*. A sample of 300 individuals was drawn from a two-stage cluster survey stratified by age and sex. Bivariate analysis was performed using association tests. **Results**: The mean age of respondents was 35.3 ± 16.9 years. It was noted that 67% (201) of respondents had a good knowledge of rabies. The results showed that 7.3% (22) of respondents owned a dog. Of the 278 people who did not own a dog, 78.4% (218) said they would have vaccinated their dog if they had had one. It should be noted that 83.7% (251) of respondents said they would go to a health facility if an animal bit them. None of the dog owners had vaccinated their dogs against rabies. Of the 41 people exposed to rabies, 39% went to a health facility. The age and education of the respondents had statistically significant associations with knowledge of rabies. Respondents' age and education were statistically significantly related to whether they had vaccinated a domestic dog. The age, education and economic well-being quintile of respondents' households had statistically significant associations with the use of a health facility in the event of being bitten or scratched by an animal vector. The

education of respondents who had been bitten by an animal vector was statistically significantly associated with the use of a health facility. **Conclusion**: It would be imperative for human and animal health authorities to collaborate in a "One Health" approach in order to increase knowledge and promote the adoption of good practices in rabies prevention.

Keywords

Rabies, Knowledge, Attitudes, Practices, Associated Factors, Senegal

1. Introduction

Rabies is a serious disease because it is still fatal, but preventable by sero-vaccination. It is a neglected tropical disease endemic to Asia and Africa. WHO reported 60,000 rabies-related deaths and 2.5 million cases of rabies exposure worldwide in 2020 [1] [2] [3] [4].

With 25,000 deaths, Africa is one of continents most affected by rabies [2]. Established vaccination coverage in the dog population (30% to 50%) in many African countries is not high enough to break the transmission cycle of the disease [5].

In Senegal, rabies is a reportable disease in humans and animals. It is included in the list of diseases covered by Integrated Disease Surveillance and Response (IDSR). Epidemiological data on the disease are disparate and not exhaustive [6]. In 2020, our country reported 4216 cases of animal bites leading to exposure to rabies and 60 outbreaks of animal rabies. The number of cases of exposure to rabies is on the rise. The number of cases recorded has risen from 1105 cases in 2011 to 4296 cases in 2021. The animal in question is represented by the dog in 58.7% of cases, followed by the donkey (20%) and the horse (14.6%) [7].

Of 15 cases of human rabies reported in 2010, Senegal had no cases in 2021. However, three cases were reported in 2022. The aggressor animal was the dog in all cases of human rabies in Senegal. This data comes from the epidemiological surveillance system, which does not take into account unreported cases.

The main areas of intervention of the rabies control program in Senegal are prevention by vaccination of dogs and slaughter of stray dogs, early management of exposure through rabies sero-vaccination and strengthening epidemiological surveillance. These interventions must be carried out in a multi-sectoral and community approach.

Senegal, a member of the Pan-African Rabies Control Network, intends to implement all proven effective strategies to achieve the goal of "Zero human deaths from rabies transmitted by dogs by 2030" [8].

Progress has been made in the fight against human rabies in Senegal. Vaccination and sero-therapy are available in health districts in Senegal. However, the cost of medical products is quite expensive. Vaccination of domestic dogs and slaughter of stray dogs is done by veterinary services. Insufficient awareness and

preventive measures (early care, vaccination and dog surveillance) reduce the engagement of populations in rabies elimination efforts [9]. It has been shown that rabies can be prevented by improving knowledge, attitudes and practices [10] [11].

In Senegal, most Knowledge-Attitudes-Practices rabies studies have been conducted with healthcare providers, but few have focused on communities. To improve response measures, it is important to have an estimation of people's knowledge, attitudes, and practices toward the disease. This study was necessary in a rural context where people are more exposed to dogs because of the importance of these factors.

The aim of this study is to assess the knowledge, attitudes and practices regarding rabies and to determine the factors associated with these different elements in people aged 18 years at least in the commune of *Niakhéne*.

2. Methodology and Study Framework

2.1. Study Framework

The commune of *Niakhene* is part of the arrondissement of the same name, located in the department of *Tivaouane* in the *Thiés* region of Senegal. In terms of health, the commune depends on *Mekhé* health district. The commune comprises 25 villages covering an area of 128 km^2, with a population of 1360 in 2022, representing a density of 89 inhabitants per km^2 [12]. It is located 165 km northeast of Dakar. The population is predominantly poor. The main economic activities are farming, livestock rearing, handicrafts and small-scale commerce. The commune has 2 health centers and 8 health huts. There are no private or semi-public health facilities. The target population located less than 5 km from a health post is estimated at 60% of the total population.

2.2. Methodology

This was a cross-sectional, descriptive and analytical survey conducted in October 2020. The study population consisted of people aged at least 18 at the time of the survey, living in the commune of *Niakhène.*

Any person aged 18 or over living in the commune of *Niakhène* was eligible for inclusion in the study. Anyone who was absent, or ill during the data collection period, or who refused to participate, was not included.

The sample size was calculated using the Schwartz formula [$n = ez^2p(1 - p)/i^2$]; with: n (sample size), e (cluster effect = 1.5), z (smallest deviation = 1.96 for a first order risk $\alpha = 0.05$), p (expected frequency of good knowledge, estimated in a study of rabies conducted in *Sokone*, Senegal: $p = 22.4\%$ [13]), q (complement of p; $q = 1 - p$) and i (desired precision 5%).

These parameters gave a number of subjects of 267. For greater power, the sample size was increased to 300 individuals, taking into account a refusal rate of 10%.

Sampling was carried out using a two-stage cluster survey stratified on sex and

age. The size of a cluster was 10 individuals, with 30 clusters spread across the villages.

The first level corresponds to the villages selected by a systematic draw according to the weight of the population. At the level of each selected cluster, a stratification proportional to the size of the population by age and sex was applied to be more representative. The itinerary method was used to direct the interviewers to the concessions. After randomly selecting an intersection of several roads, the interviewer used his or her pen to choose a direction at random. All the concessions on this street/road were included until 10 people per cluster had been obtained, broken down by sex and age. A single person was selected at household level when several people met all the selection criteria by drawing lots.

Data were collected using a questionnaire based on a review of the literature. Two studies published in 2020 in Burkina Faso and Senegal, as well as WHO guidelines, were used to develop the questionnaire [13] [14] [15].

The questionnaire was administered through individual interviews. After being pre-tested with 40 respondents in the clusters, it was corrected and validated by the research team.

The variables studied were:

- Dependent or explanatory variables: knowledge (symptoms of the disease, rabies vector animals, transmission mode, preventive measures, rabies evolution), attitudes (vaccination of domestic dogs, reactions to the bite or scratching of a vector animal in front of exposure to rabies), and practices (vaccination of domestic dogs, behavior in front of the bite or scratching by a vector animal).
- Independent or explanatory variables: socio-demographic characteristics (age, sex, marital status, level of education, occupation, household economic well-being quintile) and sources of information.

The mean rabies knowledge score was calculated from 17 items assessing knowledge of the signs, vector, transmission mode, preventive measures and course of the disease, using a 05-point Likert scale.

This average score was used to divide the study population into two groups. Respondents with a score above or equal to the mean were considered to have good knowledge and those with a score below the mean were considered to have poor knowledge of rabies.

Attitudes and practices were defined based on criteria. Attitudes were analyzed based on four criteria (correct, approximate, incorrect and harmful). The correct attitudes (vaccination of dogs and recourse to a health structure in the event of a bite by a vector animal) were considered good.

The analysis of rabies practices was divided into 3 levels (harmful, inadequate, and adequate). Adequate practices (effective vaccination of domestic dogs and effective recourse to a health facility in the event of a bite by a vector animal) were then judged good.

The socio-economic well-being quintile was also assessed using a questionnaire to calculate the socio-economic score of women in our study. This questionnaire has 10 questions calculated based on variables related to the living conditions of the household: electricity, toilet with toilet flush, fixed telephone, mobile phone, television, refrigerator, car, washing machine, bathroom or shower inside the house, and faucet inside the house. Scores were calculated for each pregnant woman by assigning the poorest quintile for those with a score between (0% - 20%), second poor for those with a score between (21% - 40%), average for those who have between (41% - 60%), fourth between (61% - 80%) and richer between (81% - 100%).

At the end of the survey, data were extracted, compiled and cleaned before being analyzed using R 4.2.2 software.

Univariate analysis was based on a description of the data (mean, frequency, standard deviation, etc.).

Bivariate analysis was performed using the Khi2 independence test or exact Fisher's test if the conditions for applying the Khi2 test were not met. The confidence interval was 95%, and a significant and independent relationship was established when the p-value was less than 0.05.

Ethical considerations

The health authorities authorized the study after reviewing the study protocol. Participation in the study was free and voluntary, with informed consent from the respondent. No harm or benefit was derived from participation or non-participation in the study. Data were collected anonymously and confidentially. The results of the study were shared with local health authorities.

3. Results

In total, 300 people participated in the survey, representing a 100% response rate.

3.1. Descriptive Study

3.1.1. Socio-Demographic Characteristics of Respondents

The table shows the socio-demographic characteristics of the population studied (Table 1). The average age of the respondents was 35.3 (±16.7) years, with a median of 30 years and extremes of 18 and 83 years. The most representative age group was between 25 and 39 years, with 37.7% of respondents.

The majority of respondents were married (65.7%) and uneducated (67.7%). Almost 75% of the population were unemployed (40%), farmers (21%) and shopkeepers (14%). The distribution of the population according to socio-economic well-being quintile showed that those below the "least wealthy" level accounted for 44.4% (Table 1).

3.1.2. Knowledge of Rabies

The survey revealed that 40% of respondents suspected rabies when faced with behavioral problems, particularly when a person behaved like a dog, and 36% suspected rabies when a dog or animal bit a person (Table 2).

Table 1. Distribution of respondents by socio-demographic characteristics (n = 300).

Socio-demographics characteristics	N	%
Age (years)		
<25 years	98	32.7
[25 - 40[years	113	37.7
[40 - 60[years	48	16
≥60 years	41	13.6
Sex		
Female	157	52.3
Male	143	47.7
Marital status		
Married	197	65.7
Single	83	27.7
Widower	15	5.0
Divorced	5	1.7
Level of education		
Without instruction	203	67.7
Primary	51	17.0
Secondary and above	46	15.3
Profession		
Housewife/unemployed	120	40.0
Cultivator	63	21.0
Retailer	42	14.0
Student/Pupil	19	6.3
Worker	15	5.0
Breeder	4	1.3
Senior executive	2	0.7
Other	35	11.7
Socio-economic well-being		
Poorer	46	15.3
Poor	46	15.3
Medium	75	25.0
Rich	69	23.0
Richer	64	21.4

Table 2. Distribution of respondents according to areas of knowledge about rabies.

Areas of knowledge	N	%
Signs suggestive of rabies		
Behavioural problems: the person behaves like a dog	120	40.0
Person bitten by a dog/animal	108	36.0
Other answers	14	4.7
Don't know	92	30.7
Animals vectors of rabies		
Dog	239	79.7
Cat	11	3.7
Monkey	8	2.7
Rodents	8	2.7
Ruminants	5	1.7
Equidae	5	1.7
Reptil	9	3.0
Other answers	6	2.0
Don't know	58	19.3
Transmission mode		
Bite	241	80.3
Scratch	8	2.7
Licking	5	1.7
Other answers	3	1.0
Don't know	58	19.3
Knowledge of prévention measures		
Wash the wound with plenty of water and soap	2	0.7
I'll go to a health facility	240	80.0
Monitoring the animal	2	0.7
Send the animal to a vet	8	2.7
Other answers	1	0.3
Don't know	23	7.7
Knowledge of the evolution of rabies declared		
Deaths	111	37.0
Healing	97	32.3
Others answers	5	1.7
Don't know	87	29.0

Dogs were cited as the main animal (79.7%) responsible for rabies.

With regard to preventive measures, 80% of them knew that they should go to a health facility in the event of a bite, less than 1% (0.7%) said that they should wash the wound with soap and water, and 7.7% did not know about preventive measures. However, 37% also mentioned that the outcome of rabies when declared was death.

In all, 67% (201) of respondents had a good overall knowledge of rabies.

3.1.3. Sources of Information

The graph below shows the sources of information on rabies identified by respondents (Figure 1).

Friends and family were the main source of information on rabies (69.3%), followed by schools and education centers (7.7%). Information from human health and animal health personnel accounted for 3.7% and 0.7% of respondents respectively.

3.1.4. Attitudes

Attitudes were determined in two situations: the vaccination of domestic dogs and the bite or scratch of a vector animal. The table below shows the distribution of respondents according to attitudes.

The results showed that 7.3% (22) of respondents owned a dog. Of the 278 people who did not own a dog, 78.4% (218) said they would have vaccinated their dog if they did (Table 3). Consequently, 78.4% of respondents had the right attitude, 9.3% the wrong attitude and 12.2% the wrong attitude (Table 3).

However, 83.7% of respondents said that they would go to a health facility if an animal, particularly a dog, bit them. Only 1% of the study population would wash the wound with soap and water, and the same proportion said they would check on the animal. Less than 2% would send the animal to the vet and 12.3% planned to use traditional medicine (Table 3).

In all, 83.7% of respondents had the right attitude, 1% had an approximate attitude, 12.3 had the wrong attitude and 3% had a harmful attitude in the event of a vector animal bite (Table 3).

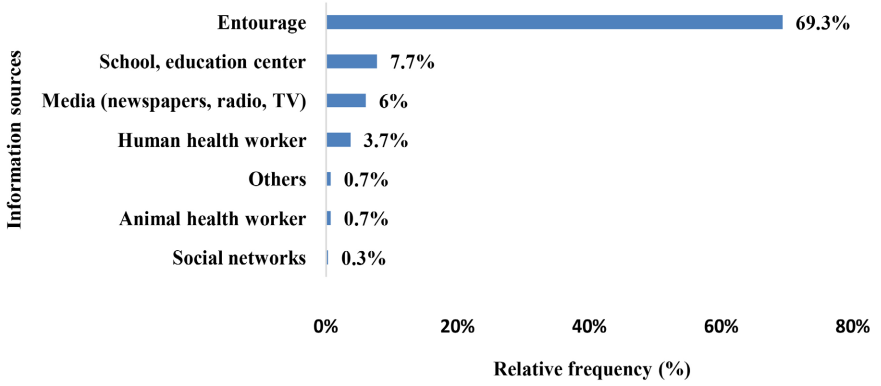

Figure 1. Distribution of respondents according to sources of information about rabies.

Table 3. Distribution of respondents according to attitudes towards rabies (vaccination of domestic dogs, bite of a vector animal).

Attitudes	N	%
If you had a dog would you have vaccinated it against rabies? (N = 278)		
Yes	218	78.4
No	26	9.3
Don't know	34	12.2
What would you do, if a vector animal bit you? (N = 300)		
Wash the wound with plenty water and soap	3	1
I'll go to health facility	251	83.7
See a practitioner of traditional medicine	37	12.3
Don't know	9	3

3.1.5. Practices

Two practices were identified: vaccination or non-vaccination of domestic dogs and behavior in the event of a bite or scratch by a vector animal.

The table shows the types of animal that cause bites or scratches and the different ways of dealing with rabies (Table 4).

The results showed that 7.3% (22) of respondents owned a dog. None of them had vaccinated their animal against rabies. All the people surveyed who owned a dog therefore had inadequate vaccination practices for their animals (Table 4).

It was noted that 13.7% (41) of respondents had been exposed to rabies. Of those exposed to rabies, 36.7% (15) had been exposed by a horse, 26.8% (11) by a scorpion, and 14.6% (6) by a dog.

Of the 41 people exposed to rabies, 39% (16) went to a health facility, 29.3% (12) went to a practitioner of traditional medicine and 17% (7) simply cleaned the wound. This means that 39% of respondents had an adequate response, 29.3% a harmful response, and 17% an inadequate response to the bite of an animal carrying rabies (Table 4).

3.2. Analytical Study

3.2.1. Factors Determining Knowledge

The table shows the results of the association test (chi2 or Fisher's exact test) between knowledge of rabies and the socio-demographic characteristics of the respondents (Table 5).

Respondents' age and education had statistically significant associations with knowledge of rabies ($p < 0.05$).

No significant relationship was found between gender, marital status, occupation and household economic well-being quintile with knowledge of rabies.

3.2.2. Factors Determining Attitudes

The table shows the results of the association test (Khi2 or Fisher's exact test) between attitudes to rabies and the socio-demographic characteristics of the respondents (Table 6).

Table 4. Distribution of respondents according to rabies-related practices (vaccination of domestic dogs, reaction after being bitten or scratched by a vector animal).

Rabies practices	N	%
Vaccination of domestic dogs (N = 22)		
No vaccination	41	100
Behaviour after being bitten or scratched by a vector animal (N = 41)		
I went to one of the health facilities	16	39.0
I only cleaned the wound	7	17
I went to see a practitioner of traditional medicine	12	29.3
Leave it like that	6	14.7

Table 5. Results of the test of association (chi2 or Fisher's exact test) between knowledge of rabies and socio-demographic characteristics.

Socio-demographic characteristics	Good knowledge of rabies		p value
	Yes (N = 201)	Non (N = 99)	
Sex			
Female	101 (70.6%)	42 (29.4%)	0.249
Male	100 (63.7%)	57 (36.3%)	
Age (years)			
<40 years	131 (62.0%)	80 (38.0%)	**0.007**
≥40 years	70 (78.6%)	19 (21.4%)	
Marital status			
Unmarried	68 (66%)	35 (34%)	0.68
Married	136 (69%)	61 (31%)	
Instruction			
No instruction	171 (84.20%)	32 (15.8%)	**<0.001**
With Instruction	30 (31.0%)	67 (69.0%)	
Profession			
No profession	81 (67.5%)	39 (32.5%)	0.9
With profession	120 (66.7%)	60 (33.3%)	
Economic well-being quintile			
Poorer and poor	64 (69.6%)	28 (30.4%)	0.62
Other	137 (65.9%)	71 (34.1%)	

Table 6. Results of the association test (chi2 or Fisher's exact test) between attitudes to rabies and socio-demographic characteristics.

Socio-demographics characteristics	If you had a dog, would you have vaccinated it? (n = 278)		p	If a vector animal bites you, would you go to a health facility? (n = 300)		p
	Yes (N = 218)	No (N = 60)		Yes (N = 251)	No (N = 49)	
Sex						
Female	115 (79.3%)	30 (20.7%)	0.81	130 (82.8%)	27 (17.2%)	0.7
Male	103 (77.4%)	30 (22.6%)		121 (84.6%)	22 (15.4%)	
Age (years)						
< 40 years	170 (87.6%)	24 (12.4%)	**0.001**	183 (86.7%)	28 (13.3%)	**0.04**
≥40 years	48 (57.1%)	36 (42.9%)		68 (76.4%)	21 (23.6%)	
Marital status						
Unmarried	91 (78.5%)	25 (21.5%)	1	166 (84.3%)	31 (15.7%)	0.82
Married	127 (78.4%)	35 (21.6%)		85 (85.3%)	18 (14.7%)	
Instruction						
No instruction	171 (90.5%)	18 (9.5%)	**0.001**	181 (89.2%)	22 (10.8%)	**0.001**
With instruction	47 (52.2%)	12 (47.2%)		70 (72.2%)	27 (27.8%)	
Profession						
No profession	89 (79.5%)	23 (20.5%)	0.8	101 (84.2%)	19 (15.8%)	0.9
With profession	129 (77.7%)	37 (22.3%)		150 (83.3%)	30 (16.7%)	
Economic well-being quintile						
Poorer and poor	73 (71.7%)	24 (28.3%)	0.4	69 (75%)	23 (25%)	**0.01**
Others	145 (78.3%)	36 (21.7%)		182 (87.5%)	26 (12.5%)	

The age and education of the respondents have statistically significant links with the possible vaccination of a domestic dog ($p < 0.05$).

No significant association was found between sex, marital status, occupation and economic well-being quintile of respondents with possible vaccination of domestic dogs (Table 6).

The age, education and economic well-being quintile of the respondents have statistically significant links with the use of a health structure in the event of biting or scratching by a vector animal ($p < 0.05$).

No significant association was found between sex, marital status and occupation with the use of a health structure in the event of a vector animal bite or scratch (Table 6).

3.2.3. Factors Determining Practices

The table shows the results of the association test (Khi2 or Fisher's exact test)

between rabies practices and the socio-demographic characteristics of the respondents (Table 7).

The education of respondents who had been bitten by an animal carrying rabies was statistically significantly associated with the use of a health facility ($p < 0.05$).

No significant relationship was found between the other socio-demographic variables of respondents exposed to rabies and the use of a health facility (Table 7).

4. Discussions

4.1. Knowledge

Our results showed that 67% of the inhabitants of *Niakhéne* had a good knowledge of rabies.

Table 7. Results of the association test (chi2 or Fisher's exact test) between rabies practices and socio-demographic characteristics.

Socio-demographics chararcteristics	Use of a health facility after exposure to rabies		p value
	Yes (N = 16)	No (N = 25)	
Sex			
Female	9 (47.4%)	10 (52.6%)	0.48
Male	7 (31.8%)	15 (68.2%)	
Age (years)			
<40 years	10 (40%)	15 (60%)	1
≥40 years	6 (37.5%)	10 (62.5%)	
Marital status			
Unmarried	7 (43.7%)	9 (56.3%)	0.6
Married	9 (36%)	16 (64%)	
Instruction			
No instruction	9 (32.1%)	19 (67.9%)	**0.02**
With instruction	9 (69.2%)	4 (30.3%)	
Profession			
No profession	6 (37.5%)	10 (62.5%)	0.8
With profession	10 (40%)	15 (60%)	
Economic well-being quintile			
Poorer and poor	5 (41.7%)	7 (58.3%)	1
Others	11 (38%)	18 (62%)	

Respondents demonstrated a certain level of knowledge of the signs of rabies; 80.3% of them were able to describe the mode of transmission of rabies by bite. These results were similar to those of other studies carried out in Pakistan (78.6%) in 2019, Morocco (72.0%) in 2018, India (84%) in 2012, Granada (85.6%) in 2014, Uganda (89.8%) in 2013 and Cameroon (84%) in 2015 [10] [16] [17] [18] [19] [20]. The high presence of dogs and the frequency of bite cases in our study area could be possible reasons for the good level of knowledge observed. Although the majority of respondents knew that dogs are the main source of rabies, they were unaware of the role of other vectors. This finding is consistent with other studies in Guatemala, Morocco and Sri Lanka [10] [21] [22].

Almost all respondents (99%) were unaware that they should wash a post-bite wound with soap for 15 minutes. This result is high, compared to other countries such as Cameroon (18%), Bangladesh (2%), Ethiopia (30.7%) and Morocco (44%) [10] [20] [23] [24].

A small proportion of our study population (37%) reported that the outcome of rabies was death. These data are similar to those of Niang K* in 2017 [13]. However, different results are noted in other countries: notably in Morocco (89.2%) in 2018, in Pakistan (72.4%) in 2019 and in Indonesia (93%) in 2021 [10] [16] [25]. The results of our study reveal a weak knowledge of the evolution of rabies. The lack of communication on rabies in this locality could be one of the explanations.

The study carried out in 2017 in *Sokone* (Senegal) found that only 22.4% of the community members surveyed had a good overall knowledge of rabies and the management of bites exposing them to rabies [13]. The good level of knowledge currently observed in our study area could be explained by the awareness-raising efforts developed by the health authorities, especially as *Niakhéne* is a hotbed of animal rabies.

Our study found a statistically significant link between the age of respondents and good knowledge of rabies. In addition, 78.6% of respondents aged over 40 had a good knowledge of rabies. Our results are similar to those found in a study carried out in Morocco, which showed that age and level of education were associated with better knowledge of the disease and the adoption of good attitudes and practices [10]. Similar results were also found in a study in Kigali in 2019 [11]. This could be explained by the fact that elderly subjects may have been confronted with bites or confirmed cases of rabies; as a result, they gain experience in terms of what to do in the event of a bite, but also in terms of knowledge of symptoms suggestive of rabies and its evolution.

The good level of knowledge is significantly linked to the respondent's education in our study. France's "Haut Conseil de la Santé Publique" reported the same findings in 1998, which indicated that the level of education has an enormous impact on people's perceptions and attitudes to public health issues [26]. Other studies have been carried out in Morocco in 2018, Burkina Faso in 2020 and Brazil in 2021 [10] [13] [27]. In the context of our study, where 67.7%

of respondents were uneducated, it is not surprising that only around 2/3 of the population have a good knowledge of rabies. "The transition to school has a considerable impact on later life: school performance influences health" [26]. The level of education and awareness also contribute to improving the level of knowledge.

Family and friends were the main channel of information for the population in our series. However, this contradicts the findings of Adjé KJF* in 2015, who found the media to be the main channel of information [28]. Health education through awareness raising (social networks, media campaign, etc.) could be useful for better consideration of rabies risk in communities. The use of posters and town criers revealed the potential effect of communication in improving vaccination coverage of dogs in Mali, as described by Mosimann* in 2017 [29].

4.2. Attitudes

The attitude of the respondents to the possible vaccination of a domestic dog (if owned) was satisfactory, with 78.4% (278) of people who did not own a dog having the right attitude. These results could be explained by the good overall level of knowledge of the respondents in our series (67%). In fact, the relationship between knowledge and attitude is well known. Knowledge through education and health education promotes the emergence of good attitudes [30] [31]. This also explains the statistically significant links found between the age and education of the respondents and whether or not they had vaccinated a domestic dog. In fact, in addition to education, which enables knowledge about rabies to be acquired, age enables knowledge to be developed through the accumulation of experience. These findings are corroborated by many studies carried out in Morocco, Rwanda, Grenada and Sri Lanka [10] [11] [18] [22].

Respondents' attitude to seeking care in the event of a bite by an animal carrying rabies is satisfactory, with 87.7% of people having the right attitude. This attitude can also be explained by the good overall level of knowledge observed in our series. This finding could be explained by the same reasons as the previous attitude (possible vaccination of domestic dogs).

The age, education and economic well-being quintile of the households surveyed had statistically significant associations with the use of a health facility in the event of being bitten or scratched by an animal vector. These results were found in other studies in Morocco, Sri Lanka and Indonesia and can also be explained by the same reasons as above [10] [22] [25]. However, the statistically significant link found between the eventual use of healthcare and economic well-being could be explained by the poverty observed in *Niakhéne*. Poverty limits the use of health care, given the high cost of care in the event of exposure to rabies; the attitude of seeking care will therefore be affected.

4.3. Practices

Few respondents 7.3% (22) owned a dog. None of them had vaccinated their animal against rabies. These results differ from those of Toussef A* in Pakistan,

where 53.6% of respondents said they had pets at home and 25.9% had vaccinated their animals against rabies [16]. This difference may be explained by the fact that our populations do not have a culture of vaccinating pets. In addition, mass vaccination campaigns against rabies organized by the veterinary services are not regular.

It was found that 13.7% (41) of respondents had been exposed to rabies. Of these, 39% (16) had taken appropriate action by going to a health facility. This low rate of seeking care is very different from those found in other studies in Pakistan, Sri Lanka, Bhutan and Tanzania, where rates of seeking care vary between 60 and 90% [16] [22] [32] [33]. This low use of health facilities could be explained by the relatively high cost of sero-vaccination in a context of poverty. In addition, there is a strong belief in traditional medicine, which delays medical treatment [23] [34] [35]. Consequently, community awareness is very important in rabies prevention and control.

Our study also showed a significant link between the education of respondents exposed to rabies and the use of a health facility. These results are corroborated by many studies in Indonesia, Brazil and Ethiopia [25] [27] [35]. The level of education has a definite impact on the development of good attitudes and consequently on the adoption of healthy behavior [26] [30] [31].

4.4. Limitations of the Study

The main strength of this study lies in the fact that it is the first of its kind in the commune of *Niakhène*. It is a first step towards future research.

However, the study has its limitations. Firstly, it is observational and cross-sectional. In this respect, the causal relationship between the independent variables and the dependent variables is not established. Secondly, information on practices was measured based on respondents' statements. Thus, it is possible that a bias of social desirability occurred; with the understanding that respondents could report more socially desirable behaviors.

In our context, the bias is related to the fact that the questions were about a health problem and that respondents might think that the answers provided would be a reason for stigmatization. Good training of the investigators minimized this bias, so that they do not fit into the negative considerations of the person and that they guarantee anonymity to the participants.

5. Conclusions

Our study showed that people in the commune of *Niakhéne* have a good level of knowledge about rabies. Unfortunately, we found very little evidence of good practice in dealing with rabies (vaccination of domestic dogs and early recourse to a health facility in the event of exposure to rabies).

It is very important to increase community awareness of human rabies so that preventive measures are applied (vaccination of domestic dogs, early recourse to health facilities in the event of exposure). Collaboration with the livestock sector

as part of a "One Health" approach will also need to be strengthened, in order to organize regular dog vaccination campaigns and cull stray dogs. Community commitment should also be encouraged through the effective involvement of local people in the fight against this zoonosis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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