

# Knowledge and Attitudes of Health Care Providers and the Population about Rabies in Sokone Health District, Senegal

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## Abstract

Rabies is still a deadly disease, but it is 100% preventable through vaccination. In 2016, Senegal notified 1214 cases of dog bites. In the same year, the district of Sokone recorded 50 cases of dog bites, of which 31.2% of the cases were notified in the region of Fatick. The objective of this study is to assess the level of knowledge, attitudes and practices of communities and healthcare providers when faced with a case of exposure to rabies in Sokone health district. This quantitative estimation study is of a descriptive cross-sectional type, which took place during the third quarter of 2017. It targeted the community and health care providers in the Sokone health district. Three-stage cluster sampling was carried out in the community. The recruitment of healthcare providers has been comprehensive. A questionnaire was administered to the community in the form of individual interviews and another questionnaire was sent to health care providers in the form of self-administration. Knowledge, attitude and practice rating grids were developed for the two categories of interviewees. Data entry and analysis was done with Epi Info 3.5.3 software and R 3.3.1. Out of 813 community members surveyed, 6.8% had already been bitten by an animal. A good level of knowledge about rabies was found in 22.4% of the community members. The attitude to a bite was correct for 94.1%. Of the 38 healthcare providers surveyed, only 5.6% had a good understanding of rabies. No provider knew the indications for rabies vaccination and the post-exposure vaccination schedule. In the Sokone health district, communities knew little about rabies. Healthcare providers who are supposed to inform and supervise them in the fight against rabies know less about it. Strengthening the skills of healthcare staff in dealing with bites exposing them

to rabies is of urgency in the Sokone health district.

## Keywords

Rabies, Zoonosis, Neglected Tropical Disease, Bites, Senegal

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## 1. Introduction

Rabies is one of the oldest known diseases. In the third millennium BC, the Laws of Eshunna in Babylon stated: “If the fact that a dog is mad is brought to the attention of its owner, if the dog is not kept at home and bites someone causing his death, the owner will have to pay 40 silver coins. If he bites a slave causing his death, he will have to pay 15 silver coins”. And yet, more than 125 years after the discovery of the rabies vaccine by Louis Pasteur, human rabies still remains a neglected tropical disease and poses a public health problem [1].

Human rabies is a serious disease; once symptoms appear, it is always fatal [2]. It is responsible for 59,000 deaths and 90% of cases occur in Africa and Asia. The dog is responsible for 99% of rabies cases and the victims are children under 15 years of age in 30% to 50% of cases [3].

In Senegal, since June 2008, bites exposed to rabies have been under weekly epidemiological surveillance and technical sheets have been drawn up. Bite cases are regularly included in the weekly epidemiological bulletin issued by the prevention department of the Ministry of Health and Social Action [4].

In 2016, through weekly epidemiological bulletins, Senegal notified 1445 cases of animal bites exposing them to rabies. Of the biting animals, 1214, or 84%, were dogs. In the same year 2016, the Fatick region notified 133 cases of dog bites, 50 (31.2%) of which were notified by the Sokone health district [5].

Despite this risk of rabies transmission in humans, this disease remains in the lot of neglected tropical diseases (NTD). Thus, no studies on the knowledge, attitudes and practices of populations and human health providers regarding dog bites have been found in our literature review, both in Senegal and Africa. The rabies studies are mainly carried out by veterinarians on the vaccination of dogs, but also by doctors on the symptomatic rabies. This situation has led us to question the knowledge, attitudes and practices of populations and health care providers about rabies-exposing bites.

## 2. Methodology

### 2.1. Study Framework

Senegal is situated in the western-most part of the African continent on the Atlantic Ocean where Europe, Africa and the Americas converge and at the crossroads of major air and shipping routes.

The Sokone health district was established in 1991. It is located in the Fatick region, more precisely in the department of Foundiougne. It occupies an area of

1068 km<sup>2</sup> and has a population of 167,401 inhabitants.

Post-exposure management of rabies is available at the center and district health posts, however no communication activity has been conducted on the subject by the health district. Animal health is managed by private veterinarians who are much more active with cattle and sheep, and the veterinary surgeon of the Ministry of Livestock. Dogs are vaccinated at the request of owners and stray dogs are found straying in all neighborhoods and villages of the district.

## 2.2. Type and Period of Study

It is a cross-sectional, descriptive survey. It took place during the third quarter of 2017.

## 2.3. Study Population and Sampling Protocol

This study included a household component targeting population, and a structures component that targeted health care providers.

For the household component, all persons aged 15 years and over and residing in the health district area were eligible. All providers providing care services (nurses, midwives, doctors) from district health facilities were eligible for this study.

The criteria for non-inclusion were common to both strands. It was absence of the targeted person, and the refusal to participate. The district medical officer, who participated in developing the protocol and conducting the survey, was not included.

The recruitment of healthcare providers has been comprehensive. For the household component, the calculation of the sample size was done with the Schwartz formula ( $n = \epsilon^2 \times p \times q/i^2$ ) with  $\epsilon = 1.96$ , an expected frequency of 0.5 and an accuracy of 0.05 [6]. A cluster effect of 2 was taken into consideration in the calculation. The calculated size has been rounded to 810 to have 81 clusters of 10 people.

To identify the statistical units of the household component, a three-stage cluster survey was conducted. On a sampling frame comprising the different districts and villages of the health district with their population, a stratified random distribution with proportional allocation of the 81 clusters to be surveyed was made. At the level of each selected cluster, concessions were selected progressively according to the itinerary's method. Within each selected concession, a household was drawn by basic survey. All persons fulfilling the selection criteria within the selected household were included and surveyed.

## 2.4. Collection of Data

Two questionnaires were developed for this study. The first was intended for healthcare providers and included questions in the following headings: Identification of the respondent, Knowledge of rabies, Assessment of the level of rabies risk, Post-exposure treatment, Epidemiological surveillance of bites exposing

people to rabies, Prevention of rabies. The questionnaire was self-administered. It was just handed over to the service provider, then recovered as soon as it was filled. A team of two investigators visited the district health structures for this collection.

For the household component, a second questionnaire was developed according to the objectives of the study and inspired by the elements of the documentary review. This questionnaire included the following headings: Identification of the respondent, Experience in relation to bites and rabies, Knowledge of rabies, how to deal with a case of animal bite. A team of 10 interviewers conducted the collection of this data at the selected household's level.

The questionnaires were drawn up so as not to suggest expected answers, in order not to influence the respondent.

## 2.5. Data Enter and Analysis

The data collected was entered with the Epi info 7.2. software. After cleaning and data management, univariate analyzes were carried out using the same software.

To study knowledge and practices, new variables have been created to define the level [7]. Were considered to have a good level of knowledge, the individuals having given a good answer to at least 85% of the questions. For attitudes, the right level was defined by a correct answer to at least 85% of the questions (Table 1).

The description of the qualitative variables was done through frequency measurements, that of the quantitative variables called for the calculation of arithmetic means with their standard deviation.

## 2.6. Ethical Considerations

The consent of the people surveyed was previously obtained through the information form. Consent was given by the opening of the questionnaire and its filling which was done remotely on a voluntary basis.

Respondents were informed of the objectives and constraints of the study, of their rights to refuse to participate in the study or to leave it at any time. Anonymity and confidentiality were respected.

## 3. Results

### 3.1. Among Community Members

In this study, 813 community members were surveyed. Their average age was 29.1 years, with a standard deviation of 13.2 years. The minimum age was 15 and the maximum age 76 years.

The sex ratio M/F was 1.5. The Muslim religion was predominant with a proportion of 91.1%. The sample included 82.3% of students. In relation to occupations, 61.3% had an income-generating activity, 34.1% were pupils/students (Table 2).

6.8% of those surveyed in the community were once bitten by an animal other

**Table 1.** Questions asked of both targets about their knowledge and attitudes to rabies-exposing bites.

Areas	Targets/Questions asked	
	<b>Healthcare providers</b>	
<b>Knowledge</b>	<ul style="list-style-type: none"> <li>• What type of microbe is responsible for rabies?</li> <li>• How long is human rabies incubation?</li> <li>• What bite makes you suspect rabies?</li> <li>• How does declared human's rabies evolve?</li> <li>• Citing the different reservoirs/vectors of rabies</li> <li>• Citing the steps of managing a rabies-exposing bite</li> <li>• Citing rabies risk categories following an animal bite</li> <li>• Citing indications of rabies vaccination by category</li> <li>• Describe the timing of the two post-exposure rabies vaccination protocols available in Senegal</li> <li>• What is the circuit for notification of rabies bite cases?</li> <li>• How much does the dose of rabies vaccine cost?</li> </ul>	
	<b>Community members</b>	
	<ul style="list-style-type: none"> <li>• What are the risks to a person bitten by an animal?</li> <li>• Citing at least two symptoms of rabies in humans</li> <li>• Citing the routes of transmission of rabies to humans</li> <li>• What is the evolution of rabies reported in humans?</li> </ul>	
	<b>Healthcare providers</b>	
	<b>Attitudes, practices and management tools</b>	<ul style="list-style-type: none"> <li>• Do you systematically contact the veterinary services in the event of a bite exposing to rabies?</li> <li>• Do you have contact with at least one veterinarian in your work area?</li> <li>• Do you have rabies exposure notices</li> </ul>
		<b>Community members</b>
		<ul style="list-style-type: none"> <li>• What would be your conduct in case of a bite by a stray dog</li> </ul>

**Table 2.** Characteristics of community investigators (n = 813).

Parameters	Absolute frequencies (n)	Relative frequencies (%)
<b>Gender</b>		
Female	323	39.7
Male	490	60.3
<b>Religion</b>		
Christian	69	8.5
Muslim	741	91.1
Others	3	0.4
<b>Level of education</b>		
Not in school	144	17.7
Primary	236	29.0
Secondary	360	44.3
Higher	73	9.0
<b>Occupational</b>		
Student	277	34.1
Trading	154	18.9
Agriculture	76	9.3
Official	49	6.0
Other activities	220	27.1
No income-earning activity	37	4.6

than a snake. They were dogs in 67.3% of the cases and donkeys in 18.2%. 28.6% of those surveyed have already witnessed the bite of a third person by an animal other than a snake. It was a dog in 88.4%, a donkey in 6.9%, a horse in 3.9% of the cases. Confronted with an animal bite, 94.1% of the respondents took the bitten person directly to a health facility (**Table 3**).

Good knowledge of rabies was found in 182 people in the community, or 22.4%. The fatal development of symptomatic rabies was known to 43.8% of the respondents. However, only 3.1% were aware of the modes of rabies transmission (all warm-blooded animals), most of which pointed only to the dog (**Table 4**).

### 3.2. At Healthcare Providers

In this study, 38 healthcare providers directly involved in the management of rabies-prone bites were investigated. They were midwives (36.8%), nurses (28.9%) and nursing assistants (34.3%). Apart from the District Chief doctor, the doctor at the health center was not available at the time of the collection phase. Thus, of the 48 targeted providers, a proportion of 79.1% could be questioned.

The average length of service providers surveyed was 7.4 years, with a standard deviation of 5.0 and a median of 7.0 years. The minimum seniority was less than one year and the maximum seniority 28 years.

**Table 3.** Animal bite experiment (n = 813).

Parameters	Absolute frequencies (n)	Relative frequencies (%)
<b>History of personal bite per animal</b>		
Yes	55	6.8
No	758	93.2
<b>Animal bite assistance experience</b>		
Yes	232	28.6
No	581	71.5
<b>Attitude to a dog bite case</b>		
Go directly to the hospital	765	94.1
Go to the traditional healer	48	5.9

**Table 4.** Good knowledge of those surveyed in the community (n = 813).

Parameters	Absolute frequencies (n)	Relative frequencies (%)
Risk of infection following a bite	323	39.7
Symptoms of rabies	80	9.8
Modes of rabies transmission	25	3.1
Evolution of symptomatic rabies	356	43.8
Bite prevention methods	83	10.2

Three providers declared that they had been trained (one for 1 day and two for 2 days) on the management of bites exposed to rabies during the three years preceding the survey.

Only two providers, or 5.3%, had good knowledge on the management of bites and rabies. These were the two providers who received two-day training on the treatment of bites exposed to rabies. The best-known aspects of the providers were the evolution of symptomatic rabies (death) and the type of microbe implicated (virus). The indications for vaccination and post-exposure vaccination protocols were not well known to any of the providers surveyed (Table 5).

Notification forms were available from 73.7% of providers questioned, contrary to contact with veterinarians available only in 26.3% of cases. 42.1% of providers declared that they systematically contact the veterinarian in the event of an animal bite.

#### 4. Discussion and Comments

Rabies is a public health problem, mainly in Asia and Africa. However, it remains neglected still neglected as evidenced by the scantiness of publications on the subject in sub-Saharan Africa [8]. In Senegal, the literature focuses more on rabies symptoms and animal rabies. To our knowledge, this study is the first to assess the knowledge of populations and primary care providers on the subject.

In our study, 6.8% of the respondents declared that they had been bitten by an animal and 28.6% declared that they had already witnessed the bite of a third person by an animal. This indicates an increased risk of contamination of animal zoonoses.

The biting animal was mainly represented by the dog and the cat, which is corroborated by Ndiaye [9] who found that 82.5% of the bites exposed to rabies were of canine origin, this through a series from 2011 to 2015. This high proportion of canine bites constitutes a real danger since more than 90% of cases of human rabies result from the transmission of the disease to humans by a dog

**Table 5.** Good knowledge of health care providers (n = 38).

Parameters	Absolute frequencies (n)	Relative frequencies (%)
Type of microbe incriminated	17	44.7
Reservoirs/vectors	2	5.3
Incubation time	3	7.9
Symptomatology of human rabies	1	2.6
Evolution of symptomatic rabies	20	52.6
Vaccination indications	0	0.0
Post-exposure vaccination protocols	0	0.0
Rabies prevention measures	1	2.6
Bite notification circuit	9	23.7
Cost of a dose of rabies vaccine	6	15.8

[10]. Added to this is the fact that the non-vaccination of companion dogs and the proliferation of stray dogs remains a major problem in the fight against rabies in Senegal [11].

Only 22.4% of the community members interviewed had a good knowledge of rabies and the management of bites exposing them to rabies. This could be due to the rarity of rabies cases in the community. In fact, despite recurrent bites in the Sokone district, the last case of symptomatic rabies dates back to 2012 [12]. This low level of knowledge is also due to the rarity of communication activities on bites exposed to rabies [11], as well as symptomatic rabies. No awareness raising or social mobilization activity is observed outside the celebration of the international rabies day.

The health care providers responsible for caring for and informing communities about rabies prevention actions are poorly trained and have low levels of knowledge. Only 5.3% had good knowledge of rabies. Preventive and post-exposure rabies vaccination are the key elements in preventing the transmission of rabies in humans. However, none of the providers questioned knew the indications for this vaccination and its schedule. This lack of control over vaccination leads to non-compliance with management protocols in the event of exposure [11].

The management of a bite exposed to rabies requires examination, or even observation of the biting animal by the veterinarian. However, only 42.1% of the healthcare providers questioned declared that they systematically called the veterinarian in the event of an animal bite. This stems from the weak relationship between animal health and human health, and the lack of implementation of the concept One health in health policies in Senegal [4].

## 5. Conclusion

Neglect of rabies remains a reality. This study highlighted a lack of training, and as a corollary of knowledge of health care providers in the prevention and management of bites exposed to rabies. Although they behave correctly when bitten, populations exposed to animal bites also have very little knowledge of rabies prevention. There is an urgent need to strengthen the skills of healthcare providers in the Sokone health district in terms of taking care of animal bites and to set up an integrated rabies control system built around the concept One Health.

## Conflicts of Interest

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

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