

Socio-demography, and rabies situation in the Cape Coast and Ledzokuku-Krowor Municipalities of Ghana



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Abstract

Introduction: a retrospective cross-sectional study on dog ecology and rabies was conducted in the Teshie-Nungua Community of the Ledzokuku-Krowor Municipality and the Ola community in the Cape Coast Municipality, from 2005 to 2009. The study investigated socio-demographic parameters, canine anti-rabies vaccination coverage and the management of suspected dog bite cases in selected communities in Ghana. **Methods:** the study used semi-structured questionnaires to interview dog owners and household members and reviewed available records on anti-rabies vaccinations and outbreaks. **Results:** the majority (53.3%) of respondents came from the Cape Coast Municipality, while 46.7% were from the Ledzokuku-Krowor Municipality. The annual anti-rabies vaccination coverage was 13.3% and 39.4% in the Ledzokuku-Krowor and Cape Coast Municipalities, respectively. A total of 157 dog bites cases were reported in the Ledzokuku-Krowor Municipality, while 677 cases were reported in the Cape Coast municipality. Rabies was confirmed in 91.4% and 83.3% of samples submitted from suspected rabid dogs in the Ledzokuku-Krowor and Cape Coast Municipalities, respectively. **Conclusion:** the study concluded that the annual anti-rabies vaccination coverage was very low, while the occurrence of rabies disease was very high. It is recommended to intensify public health awareness on dog ecology and anti-rabies vaccination campaigns.

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Introduction

Rabies virus (Lyssaviruses of the family Rhabdoviridae) causes acute encephalitis in all warm-blooded mammals, including humans, and the outcome is almost always fatal [1]. In Ghana, the rabies virus has been identified in dogs, cats, monkeys, pigs [2], cattle, sheep and goats [3]. Canine rabies, with the domestic dog (*Canines familiaris*) as the principal vector, is responsible for about 99% of all reported human cases [4]. Control methods including dog vaccination and stray dog removal have been intermittent and unsustainable. Rabies control in animals is under the mandate of the Veterinary Services Directorate of the Ministry of Food and Agriculture. Before 1994, free annual anti-rabies vaccinations were conducted throughout the country. However, the situation changed after the privatization of veterinary services in 1994. Anti-rabies vaccination attracted service charges per pet and subsequently led to very low vaccination coverage, especially in rural areas. Analysis of rabies data in Ghana for over thirteen years (2000-2012) show very low canine vaccination coverage between 5% to 30% [5]. This led to an upsurge in rabies among dogs and humans in all the regions, with an average of over ten (10) human cases recorded annually. Within the period 1999 - 2012, 685 suspected dog rabies outbreaks were reported [3]. On the other hand, 147 human rabies deaths were reported between 1998 and 2003, while 16 and 18 human rabies deaths occurred in 2011 and 2012 respectively [6]. The human rabies death burden in Ghana is reported to be high [7].

There is poor surveillance data on rabies in Ghana. Officially recorded figures of laboratory-confirmed cases provide only an indication, but not the true extent of rabies occurrence. Inaccurate reporting of rabies cases has been attributed mainly to, non-presentation/or reporting of suspected cases,

non-availability of local district diagnostic facilities, poor packaging, and transportation of specimens to diagnostic laboratories and general lack of awareness amongst the public [3]. Ghana has accepted the global challenge to eliminate rabies in humans by 2030 and is using the Stepwise Approach towards Rabies Elimination (SARE), an assessment tool for planning, refining and monitoring rabies control programmes [8]. The country has assessed the local epidemiology of rabies and has a short term action plan which falls within SARE stage 1.5 [4]. The country developed a national rabies elimination strategy in 2018. The recent zoonotic disease prioritization in the country puts rabies as the top of 6 prioritized diseases [3]. Rabies data is now shared officially between the Veterinary Services Directorate of the Ministry of Food and Agriculture and Ghana Health Services. An understanding of dog ecology has been recognised as a key factor in designing an effective rabies control programme in rabies endemic countries [9]. This study therefore investigated socio-demographic parameters, canine anti-rabies vaccination coverage and the management of suspected dog bite cases in selected communities in Ghana.

Methods

Study area: the study was conducted in the Ledzokuku-Krowor Municipality in the Greater Accra region and Ola sub-district in the Cape Coast Municipality, Central region of Ghana, from 2005 to 2009.

Study design: a descriptive cross-sectional study and a desktop data review were conducted. Semi-structured questionnaires were administered to dog owners and household members in the study areas. Veterinary and Human Health records on rabies vaccinations and outbreaks

were reviewed for the period, 2005 - 2009. In addition, laboratory results from samples submitted from suspected rabid dogs to the Accra Veterinary Laboratory from the two municipalities were retrieved and analysed. The two districts were selected by the Ghana Veterinary Medical Association for the study due to the high number of dog rabies cases reported during the period and the willingness of the Municipal assembly and the veterinary services to collaborate with the Ghana Veterinary Medical Association and the Veterinary Service Directorate in executing the project.

Data processing and analysis: data collected was checked for accuracy, completeness, and consistency. The data was coded and fed into SPSS statistic version 17.0 software programme. The results obtained were analysed using descriptive statistics.

Ethics: the study was reviewed and approved by the Veterinary Services Directorate and the Ghana Veterinary Medical Association ethics committee. Individual consent was sought from the respondents and participation was voluntary.

Results

Characteristics of households: a total number of seven hundred and fifty-one (751) households were sampled in the study areas. Out of these, 351 (46.7%) households were from Ledzokuku-Krowor Municipality in the Greater Accra Region, and 400 (53.3%) households came from the Cape Coast Municipality in the Central region (Table 1). The mean household size of Ledzokuku-Krowor was 6 and ranged from 4-8 persons, while that for Cape Coast was 5, but ranged from 2-7 persons. About 51% of households were classified as a Modern Single-Family House, 38% as Traditional Single-

Family Home, 6% as Compound house and 5% as multi-apartment building. In 84% of these households, there were no facilities to restrain dogs from entering. This uncontrolled movement of stray dogs and people has the potential of the introduction of zoonotic diseases including rabies.

Age and sex distribution of dogs: the age distribution of dogs are presented in Table 2. The study found that 49% of households, kept dogs aged between two to five years, 27% aged between one to two years, 18% for dogs below one year and 6% for dogs older than five years. About 68% of the households kept male dogs, while 32% kept females. In response to dog reproduction in the past 12 months before the study, the average litter size of nine puppies per bitch was recorded in both study areas. Ninety seven percent of these puppies were either sold out or given away as gifts, while 3% died from various diseases.

Management practices: the study revealed that 78% of dogs were unconfined, while 22% are confined in kennels during the day and released during the night to guard the premises. The majority (54%) of unconfined dogs were stray dogs. The major (70%) source of dog feed came from family waste and left-overs, while 30% of the feed came from chop bars, neighbourhood waste, and commercial dog foods.

Vaccination coverage: the anti-rabies vaccination coverage for the study areas is presented in Table 3. The average annual anti-rabies vaccination was 13.3% and 39.4% in the Ledzokuku-Krowor and Cape Coast Municipalities, respectively. The results show an overall increase in vaccination coverage from 2005-2009. The Ledzokuku-Krowor Municipality recorded the highest coverage (41%) in 2007 and the lowest (1.4%) in 2005, while the Cape Coast Municipality recorded the highest coverage (97%) in 2008 and the lowest (11%) in 2005 and 2006 respectively. In the

Cape Coast Municipality, 677 persons received the post-exposure anti-rabies vaccine during the study period.

Dog bite cases and rabies outbreaks: the number of reported dog bite cases and results of laboratory diagnosis for the rabies virus from samples submitted to the Accra Veterinary laboratory are presented in Table 4. During the study period, 157 dog bite cases were reported in the Ledzokuku-Krowor Municipality. Samples from 35 suspected rabid dogs were submitted to the laboratory, out of which, 32 (91.4%) cases were confirmed as rabies positive. Three suspected human rabies cases were also confirmed rabies positive in this locality by the Veterinary Laboratory. In the Ola community of the Cape Coast Municipality, out of 677 suspected dog bite cases, samples from 12 suspected rabid dogs were submitted to the laboratory for diagnosis. The laboratory confirmed 10 (83.3%) as rabies positive. All human clients with dog bite cases in Cape Coast Municipality received post-exposure treatment. From hospital records reviewed, one human rabies case was recorded.

Medical and veterinary collaboration: documentary records available showed a fairly good collaboration between human practitioners and veterinary practitioners in the fight against the rabies menace. In this respect, human subjects involved in suspected dog bite cases sought medical care at various hospitals, while the suspected rabid dogs were referred to veterinary clinics for expert advice. In the Cape Coast Municipality, there was evidence of a joint seminar on Human and Animal rabies organised by the Central Regional branches of the Ghana Veterinary Medical Association and Ghana Medical Association in 2010.

Discussion

This study found that male dogs were kept by households than females. This finding is similar to a female to male ratio of 1:2.8 in Bamako, Mali [10]. On the contrary, this finding differs from the report by [11], that the female to male ratio was approximately equal in the Indonesian island of Bali. This could be attributed to the fact that most of the respondents kept dogs for guarding their premises in Ghana and considered male dogs to be better guard dogs. One percent of respondents in the Ledzokuku-Krowor Municipality perceived that rabies disease was responsible for the death of some of their dogs. In the study area, a case of suspected human rabies was defined as a person presenting with a dog bite wound and a suspected rabid dog as a pet which showed signs of paralysis of the throat with profuse salivation, hydrophobia, aggressiveness, and change in behavior. Although other causes of nervous disorders in dogs exist, respondents needed to consider rabies to be the most prevalent cause. This supports the opinion, that dog owners with good knowledge on rabies were more likely to vaccinate their dogs against rabies compared to those with poor knowledge [12]. There was a high prevalence of unconfined and scavenging dogs in these communities. This situation was similar to reports of 60.9% and 82% unconfined dogs in the urban and peri-urban areas of Abuja, Nigeria [13]. The majority of the unconfined dogs were stray dogs, which are rarely vaccinated against rabies. This situation is very detrimental since the spread of rabies in an outbreak is likely to be devastating for both animal and human populations. On the contrary, the percentage of unconfined dogs is higher than the 34% reported by [14] in Sri Lanka. The difference may be due to the social background of the households sampled.

The average anti-rabies vaccination coverage for dogs in both municipalities was lower than 48% reported by [14] in Sri Lanka and fell below the recommended WHO standard of 70% [15]. This finding has serious public health implications, since poor vaccination coverage may be associated with a higher risk of occurrence of rabies in the animal and human populations. Vaccination coverage was higher (39.4%) in the Cape Coast Municipality than in the Ledzokuku-Krowor Municipality (13.3%). This difference may be due to the fact that the Cape Coast Municipality is a more urban settlement than the latter. Consequently, the residents were more financially better and could therefore afford to pay service charges for vaccination. The study recorded comparatively higher vaccination coverage for the years 2007 and 2008 in both municipalities. This enhanced vaccination was due to a sponsorship package for the provision of free vaccines and other logistics. On the contrary, the vaccination coverage was higher than 3.3-17.5% reported by [16] at Antananarivo, Madagascar. Although more cases of dog bite cases were reported in the Cape Coast Municipality than in Ledzokuku-Krowor, there was a higher prevalence of confirmed animal rabies in the latter. Additionally, more cases of suspected human rabies reported in Ledzokuku-Krowor were confirmed as rabies positive by the Accra Veterinary Laboratory. This confirms the opinion of [17] that there are discrepancies between rabies surveillance data maintained by the Ghana Health Services and Veterinary Services Directorate.

Conclusion

The annual anti-rabies vaccination coverage was very low, while the occurrence of animal rabies was very high. It is recommended to intensify public health awareness on dog ecology and anti-rabies vaccination campaigns.

What is known about this topic

- Rabies affects all warm blooded mammals;
- Rabies is a vaccine preventable disease.

What this study adds

- Low canine rabies vaccination poses a public health risk to humans;
- Coordinated Rabies disease management by Veterinary and medical personnel is mandatory for reducing its public health burden.

Competing interests

The authors declare no competing interest.

Authors' contributions

Suu-Ire R, Darkwah K, and Aryee M designed the research proposal. Suu-Ire R, Fenteng D and Johnson S.A collected the data. Suu-Ire R, Johnson S.A, and Atawalna J analysed the data and drafted the manuscript. All authors read and approved the final version of the manuscript.

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Tables

Table 1: location of respondents

Table 2: age distribution of dogs kept by house holds

Table 3: anti-rabies vaccination coverage for the period 2005-2009

Table 4: laboratory results on samples submitted for rabies diagnosis

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Table 1: location of respondents

Location	No of households	% household	Mean house hold size
Ledzokuku-Krowor	351	46.7	6
Cape Coast	400	53.3	5
Total	751	100	

Table 2: age distribution of dogs kept by households

Age/Years	No of Households	% Households
< 1	135	18
1-2	203	27
2-5	368	49
>5	45	6
Total	751	100

Table 3: anti-rabies vaccination coverage for the period 2005-2009						
Year/Location	Ledzokuku-	Krowor		Cape		Coast
	Dog Population	No. vaccinated	% vaccinated	Dog Population	No. vaccinated	% vaccinated
2005	4,862	68	1.4	4,159	457	11
2006	5,091	356	7	4,355	479	11
2007	5,331	2,186	41	4,560	2,371	52
2008	5,582	614	11	4,775	4,632	97
2009	5,845	351	6	5,000	1,300	26
Average	5342	715	13.3	4,570	1,848	39.4

Table 4: laboratory results on samples submitted for rabies diagnosis				
Location	No. of Dog bite cases	No. of samples tested for Rabies	No. of samples Rabies positive	% Rabies positive
Ledzokuku-Krowor	157	35	32	91.4
Cape Coast	677	12	10	83.3
Total	834	47	42	