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#### AN APPRAISAL OF RABIES OCCURRENCE AND CONTROL IN KISUMU MUNICIPALITY, KENYA

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### ABSTRACT

**Background:** Rabies is a serious neglected disease which occurs worldwide. In urban areas, the control of the disease is expected to be hampered by several unique constraints.

**Objective:** To appraise the occurrence and control of rabies.

**Study Design:** The tools used in the study included key informant interviews with senior veterinary and medical officers and a questionnaire survey on 15 veterinary officers and 9 human physicians. The occurrence of animal bites and costs involved in treatment was also investigated using retrospective hospital data for the year 2007.

**Setting:** Kisumu Municipality, Kenya.

**Results:** The control of rabies was under the Veterinary Department through dog vaccinations and baiting, and also under the Department of Public Health (DPH) through people vaccinations and post exposure treatments. The constraints observed were poor coordination in rabies control efforts, understaffing and limited resources. Animal bites were common with 1270 cases reported during 2007. The post-bite rabies vaccines were mainly purchased from local chemists at KES 7,500 per full dose. This amounted to an annual total cost of KES 9,525,000 (136,071 USD). The bites were mainly from domestic dogs (89%) and occurred commonly in highly populated areas. The mean age of people with bites was 21 (2.5 - 78) years, showing that young people had a higher risk. Males (59%) were at higher risk of bites than females (41%).

**Conclusions:** It would be important for the relevant departments to harmonise their rabies control strategies and also address the prevalent constraints by using local networks. The incidence of rabies and the associated epidemiology needs proper updated documentation with a view of carrying out mass vaccination of dogs at times free of cost to the economically disadvantaged owners.

### INTRODUCTION

Rabies is viral zoonotic disease that is nearly always fatal and is associated with a large animal reservoir. Most of the human rabies cases are transmitted by the bites of infected dogs, although cats and wild dogs also play a significant role. Every year, 55 000 humans die from rabies, mostly in Africa and Asia and most cases occur in children aged below 15 years (<http://www.who.int/mediacentre/factsheets/fs09/en/>). By using the incidence of dog-bite injuries and rabies post-exposure prophylaxis (PEP), it is estimated that incidence in Africa is about 100 times higher than officially reported, with over 24,000 deaths in Africa each year (1). Rabies continues to increase across Africa as a result of the low priority given to its control, arising from lack of awareness of the true scale and magnitude of the disease burden (2).

In Kenya, only a few studies have documented the existence of rabies (3,4,5). However, little is known about rabies and its control in many parts of the country. The current study was undertaken to document the occurrence of dog bites as a marker for existence of rabies in Kisumu Municipality, the third largest town in Kenya. Due to lack of data on occurrence of rabies, dog bites have been suggested as good indicators for rabies occurrence in Africa (1,2). Further, an appraisal of the current rabies control in Kisumu Municipality was undertaken with a view of determining the constraints and possible solutions for effective control of rabies.

### MATERIALS AND METHODS

**Study area:** The study was undertaken in Kisumu Municipality which is the third largest town in

Kenya, located along the Lake Victoria shores. The Municipality covers an area of approximately 417 Km<sup>2</sup>, of which 297 Km<sup>2</sup> is dry land and approximately 120 Km<sup>2</sup> is under water. It is at latitude: 0° -35' 0 N and a Longitude: 34° 28' 0 E. It has an estimated population of nearly 500,000 persons. Keeping of pets is common in the Municipality. Sixty percent of the population in the municipality lives in highly populated low income areas including Nyalenda, Obunga and Manyatta (6).

*Key informant interviews and questionnaires:* The methods used in obtaining information on rabies control were key informant interviews and questionnaires. The key informant interview was conducted with the veterinary personnel represented by the District Veterinary Officer and his assistant and the District Public Health Officer. A questionnaire on the importance of rabies in local health and veterinary practices was administered to 9 registered human physicians (medical) and 15 veterinary surgeons along with animal health assistants respectively.

*Occurrence of animal bites:* Data on the occurrence of animal bites were obtained from the records kept at the District Public Health office in Kisumu. The office files data on rabies cases from various hospitals and dispensaries in the Municipality. The data collected included the following: number of bites, biting host (domestic or wild dog, cats and others), sex and age of the bitten person, prophylaxis treatment and cost of treatment.

*Data management and analysis:* Data were entered into Ms Excel (Microsoft, USA) and then exported to Statview® statistical package which was used to calculate descriptive statistics.

## RESULTS

*Departments involved in rabies control and their relationships:* Rabies control in dogs is a mandate of the Veterinary Department (VD) under Ministry of Livestock and Fisheries Development. Private veterinarians also play a minor role through vaccinations of dogs owned by a few affluent clients. There are several government departments which can also be directly or indirectly involved in the 'chain' of rabies control and management including Departments of Public Health under the Ministries of Public Health and Sanitation and Local Government.

Following dog bites, patients usually reported to dispensaries where the wounds were treated and then they were referred to the Department of Public Health (DPH) at the District Hospital for rabies vaccinations. A few patients also reported to the veterinary office from where they are referred to the DPH for treatment

and vaccination. Since the rabies vaccines provided by Kenya Medical Supplies Agency (KEMSA) were only 50 doses per year, the patients were advised to buy the vaccine from the local chemists where a full dose was sold at KSh. 7,500. Apart from the low supply of vaccines other constraints at the DPH included lack of enough personnel and poor facilitation during rabies control campaigns. However, the DPH has an elaborate structure to facilitate reportage from the village to the district level.

The Veterinary Department (VD) is involved in the control of livestock diseases and public health services. As regards rabies control, the department also received complaints from people who had been bitten by dogs and these patients were then referred to the DPH for treatment and vaccination. The VD was also involved in baiting the rabid dogs and assisting in prosecution of owners of the stray and rabid dogs. The VD is also expected to receive communication from DPH regarding areas with high numbers of dog bites. However, it emerged that the communication between these two departments was quite minimal and this hampered the rabies control efforts in the Municipality. The main constraints at VD included: limited staff, vaccine doses and infrastructure in terms of office and laboratory space, equipments and reliable vehicles.

Another department which was involved in rabies control was the Department of Public Health under the Ministry of Local Government. The mandate of the department was the management of all public health matters in the Municipality including advancing licenses to various public service facilities such as hotels, butcheries as well as inspection of public eating places and running of local dispensaries. In terms of rabies control, the department was expected to collect solid waste including dead dogs following baiting by the Veterinary Department. However, at the time of the study, the department was not functional due to the low numbers of staff members. Thus most of their work was carried out by the DPH under Ministry of Public Health.

From the above it is clear that rabies control in dogs was mainly carried out by VD through vaccination and baiting of stray dogs. Vaccination of dogs appeared passive, with dog owners requesting the VD personnel to vaccinate their dogs. The VD was also expected to regularly advise the public to vaccinate their dogs, though this was hampered by the lack of resources and poor public health education strategies. Dogs were rarely restrained and it was common to see many roaming dogs in the urban and peri-urban areas. During the interviews, it was also clear that there was lack of coordination among the various departments during dog baiting. The VD was expected to liaise with the District Commissioner (DC), who then advised and warned the public of the intention to bait roaming dogs.

The Department of Public Health at the Municipal office was to collect the baited dogs. Previous cases of miscommunications between the departments resulted in occasions where carcasses of baited dogs were never collected and this resulted in public outcry from the repulsive sight and foul smell from dog carcasses.

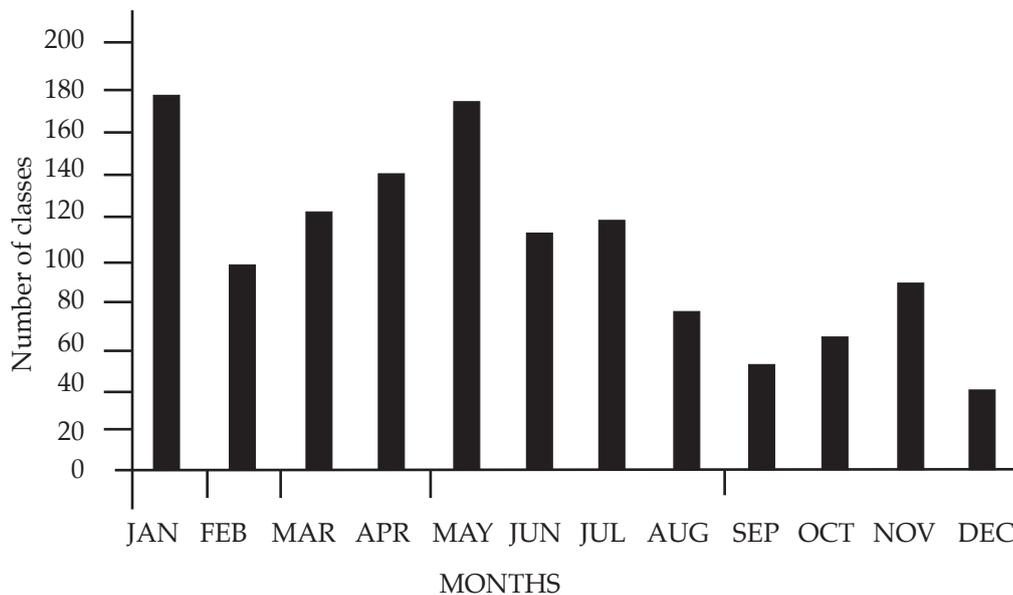
Of the human physicians, 44% noted that rabies was a common zoonosis in their practice and that veterinary personnel should play the main role in its control. All (100%) the veterinary personnel indicated that they had seen rabies cases and dog bites in their practice and veterinary personnel should play a lead role in rabies control.

*Animal bites:* In the year 2007, a total of 1270 cases of animal bites were recorded in the whole of Kisumu District and majority of the cases were from Winam Division. Since the cost of full dose of post-bite prophylactic vaccine was Ksh 7,500 (USD\$ 107), the total annual cost was estimated at Ksh. 9,525,000 (136,071 USD). As shown in Figure 1, the months with the highest number of cases were January and

May. There was consistent increase in number dog bites starting February and peaking in May and this was followed by a decline until September. The cause for this pattern was not ascertained. In terms of magnitude (number of cases attended), dog bites were ranked at number 24 out of the 38 cases/diseases attended in the district hospitals.

The source of bites was mainly from domestic dogs (89%), wild dogs (4.9%), domestic cats (3.1%) and wild cats (2.2%). The domestic dogs and cats were the stray and roaming ones. In descending order, the majority of the people with bites originated from areas with high human population density which included Nyalenda, Obunga and Manyatta. There were more males (59%) than females (41%) with the dog bites. The average age of people bitten by dogs was 21.6 (range=2.5-78) years and in descending order the proportion of age categories affected included: <20 years (59%), >20-40 (25%) and >40 (16%). A histogram showing age distribution of people with bites is presented in Figure 2.

**Figure 1**  
*Seasonal distribution of animal bites in Kisumu District in 2007*



**Figure 2**  
*Graphic representation of age related cases of dog bites reported at Kisumu District Hospital*

## DISCUSSION

This study has shown that rabies diagnosis and control in Kisumu Municipality is passive and the government departments played varied roles. As in other countries, the veterinary department was expected to vaccinate and bait roaming stray dogs, while the public health departments were involved in treatment of wounds and vaccination of people (1,7). Although there was some form of communication between the relevant departments, it was minimal and irregular and this could be a major constraint in the rabies control. This was complicated further by existence of two public health departments in two different government ministries. This seems like a duplication of roles and could also curtail rabies control. It is recommended that key personnel of the relevant departments should regularly meet with an aim of coming up with strategies for rabies control. Such meetings should identify and harmonize the responsibilities of respective departments. As observed for other diseases, under-staffing and lack of resources is a serious constraint in delivery of services to urban communities in Africa and this is often due to high population density and poor funding. As suggested by Lembo *et al*, control of rabies can be well achieved through development of joint financing schemes for rabies prevention and control across medical and veterinary sectors.

The VD could not ascertain the vaccination coverage, although studies in other African countries have shown that it is minimal (<20%) (7) and in Nairobi City it was put at 4% (4). Most authorities recommend that to control rabies, between 60-70% of the dogs need to be vaccinated (2,8). In Kisumu, vaccination of dogs for rabies needs to be enhanced through increased public health education and this can be done through collaboration of VD and DPH. In a recent extensive analysis, (2) it has been recommended that for vaccination to be effective, the dogs need to be vaccinated either at reduced charge or free of charge. There is also an urgent need to conduct a dog census in the municipalities as this will help in rabies vaccination logistics and procurement of vaccines. This study has also shown that the provision of free or low cost post-treatment rabies vaccine to local hospitals was limited and thus the government should consider increasing the number of doses of vaccine to the municipality. The per capita available for health care in Kenya is 6.5 USD (9) and thus the government might not afford the high cost of the rabies vaccine. The vaccine cost was higher than the total costs for treatment of rabies cases reported in other countries (range USD 40-49) (10).

From the hospital records, it was clear that dog bites were highly prevalent in Kisumu and this concurred with the information obtained from the

VD and DPH interviews. The percentage of dog bites which could be rabid was not ascertained. However, studies done in Tanzania have shown that dog bites are a sensitive indicator of occurrence of rabies in a population (1). In Africa, and elsewhere in developing countries, only limited data on rabies incidence exists. In Machakos Kenya, (5), it was estimated that there were 8.6 rabid dogs per 1000 while others (7) showed that the annual incidence of canine rabies was 1.4 per 1000 unvaccinated dogs in Ndjamena, the capital city of Niger. Although annual incidence of rabies death in Africa has been indicated as 204, this is an underestimation of up to 100 times (1) as the reporting system is lacking in most countries. It would be important to devise a sustainable method of collection of data on rabies cases in the Kisumu Municipality and Kenya in general. The data can then be used in not only guiding and motivating policy makers in allocating more resources for rabies control, but can also be used as a benchmark for evaluation of control efforts. As observed in other studies in other parts of Africa, most of the dogs in the study area were indigenous and rarely housed (2). Thus, according to the study, most of the biting dogs were domestic, although several cases of wild dogs and cats were also mentioned. Previous studies have shown that of the 413,450 people in Africa who received post-exposure treatment in 1998, 94.4% had been exposed by a domestic dog (11) and in Kenya over 65% of confirmed rabies cases are due to dog bites (3).

The presence of free-roaming dogs, some lacking owners is a serious concern in cities worldwide (12). The owners should be educated to house them and those without owners should be baited to reduce cases of dog bites and rabies. The presence of wild dogs from neighbouring wildlife parks in Kisumu Municipality and which could be acting as a reservoirs for rabies also needs to be ascertained.

The sex and distribution of people with bites reported in this study is similar to that reported elsewhere. In most cases, the young people (mostly children) are at higher risk (13, 7). Males were also at higher risk possibly because of their social behaviour such as aggressiveness and their higher numbers in the town. The occurrence of high number of dog bites in slums and high density suburbs such as Nyalenda, Obunga and Manyatta is due to high dog densities resulting in high dog-to-dog contact rates and that the transmission intensity of rabies could be high. As suggested by Perry *et al.* (4), dog vaccination campaigns in such impoverished communities might require specific logistical strategies including use of several mobile vaccination teams, door to door campaigns, and carrying out the exercise during holidays where children can help in identification of households with dogs. The vaccine for rabies in dogs is relatively cheap at KES 30-50/dose.

Thus, the Veterinary Department should consider providing free dog vaccination for the high density of impoverished populations.

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