

## The role of veterinary and medical personnel in the control of zoonoses in urban settlements on the shores of Lake Victoria, Kenya

John M. Kagira<sup>1</sup>, Paul W. N. Kanyari<sup>2</sup>✉

1 – Institute of Primate Research, PO Box 24481-00502, Nairobi, Kenya; Kenya Agricultural Research Institute, PO Box 362, Kikuyu, Kenya.

2 – University of Nairobi, Faculty of Veterinary Medicine, Department of Veterinary Pathology, Microbiology and Parasitology, PO Box 29053, Kabete via Nairobi, Kenya.

Correspondence: Tel. +254 02 0722 714284; Fax +254 02 631007; E-mail kanyari@uonbi.ac.ke

**Abstract.** Rapid urbanization and livestock keeping in urban and periurban areas especially in the developing countries pose great challenges to the management of human and animal health. The role played by relevant stakeholders in the control of zoonoses in urban areas has not been well evaluated. A questionnaire survey was undertaken in Kisumu municipality, Kenya, to assess the common zoonoses encountered, their management and role played by veterinary and medical personnel in zoonoses control. Fifteen veterinary and nine medical personnel participated in the study. The main zoonoses encountered by the personnel included rabies, brucellosis, hydatidosis, cysticercosis and toxoplasmosis. A significantly ( $p < 0.05$ ) higher number of veterinary than medical personnel reported hydatidosis, cysticercosis and rabies as being more common. The opposite was true for toxoplasmosis. The animals with the highest zoonoses risks according to the veterinary and medical personnel were dogs (71%) and cattle (78%) respectively. There were a significantly higher ( $p < 0.05$ ) proportion of medical (88%) than veterinary personnel (73%) who gave advice to immune-compromised patients regarding the zoonotic risks. Minimal communication existed between the two professions regarding zoonoses occurrence and control. In conclusion, the study found that there were differences on the perception on the occurrence and control of zoonoses in the municipality. It is recommended that an inter-disciplinary approach should be used for the control of zoonoses in the study area.

**Keywords:** Kisumu; Questionnaire survey; Physicians; Veterinarians; Zoonoses.

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### Introduction

Zoonoses are defined as those diseases and infections naturally transmitted between people and vertebrate animals (WHO, 2006).

These diseases can be transmitted either directly as is the case with rabies and anthrax, or indirectly, via vectors, food, water and the environment, as in the case of bovine tuberculosis and cysticercosis. The increased

interaction of man and animals, especially in cities, has been implicated in the emergence and spread of zoonoses (Belevi and Baumgartner, 2003). However, the true prevalence of zoonoses is not known in most countries, and this often leads to neglecting, due to a lack of evidence for government and donor decision-makers on the importance of these diseases (WHO, 2006).

In developing countries, the occurrence of zoonoses is expected to be high among the poor people living in urban and rural areas. In the former, this is due to increased livestock keeping activities in areas with high concentration of people such as in the slums. The people living in such areas have poor sanitation and lack medical facilities for disease diagnosis and treatment. Another serious complication is lack of interaction between the veterinary and medical personnel in control of the zoonoses (WHO, 2006). In most of the cases, knowledge of zoonoses diagnosis and management are lacking amongst the medical and veterinary personnel (WHO, 2007; John et al., 2008). As a step towards identifying the role played by urban veterinary and medical personnel in control of zoonoses, the following study was carried out in Kisumu municipality in Kenya.

## Materials and methods

### *Study area*

The study was conducted in Kisumu municipality which is the third largest town in Kenya. The town is a rapidly growing commercial centre serving the East African countries and is located along the shores of Lake Victoria. It has a population of 500,000 people (UNDP, 2005).

The municipality is diverse in its features of the economic status, so that there are upper, middle and lower class estates. According to the UNEP report, 60% of the people live in slum dwellings and have a low human development index characterized by poor sanitation, poor infrastructure and health facilities, and high level of poverty (UNDP, 2005).

Urban and periurban farming encompassing both livestock keeping and crop farming is common in the municipality (Mireri et al., 2007). The types of animals kept by the town dwellers include ruminants (cattle, sheep and goats), pigs, donkeys, cats, dogs and poultry.

### *Study design*

A questionnaire survey was undertaken in Kisumu municipality to assess the common zoonoses encountered, their management and role played by veterinary and medical personnel in zoonoses control. The questionnaire was a modification of previous studies done elsewhere (Grant and Olsen, 1999; John et al., 2008). The veterinary personnel who sampled population was drawn from lists provided by the district veterinary office and consisted of government and private veterinary service providers working within the municipality. Since the graduate veterinarians were few, animal health assistants were also included in the study. The medical personnel sampling population was obtained from practicing medical physicians who are members of Kenya Medical Association working within the municipality. The questionnaire consisted of questions on frequency and types of zoonoses encountered, treatment administered, animals with the highest risks, advice offered to patients and farmers, perception of the role played by different disciplines and communication across the disciplines.

### *Data analysis*

Data was entered into Microsoft Excel ® data sheets and then exported to Statview ® for analysis. Frequency data were analyzed using likelihood ratio chi-square to compare responses of the two types of personnel. A p-value of less than 0.05 was considered to be significant.

## Results

The number of the veterinary personnel who participated in the study was 15 and consisted of one private veterinary surgeon and 14 animal/livestock health assistants (9 employed

by the government and 5 in private practice). The personnel involved who worked with large animals (cattle, sheep, goats and donkeys) was 100%, pets (dogs and cats) 93%, poultry (chicken, ducks) 33% and meat inspection 60%. The mean age of the participants was 42.6 years (range=30-51) while there were more males (n=13) than females (n=2). Nine human physicians who were University graduates participated in the study. Few (n=2) worked in government hospitals, while others (n=7) had a combined private practice and consulted in the leading private hospitals in the Municipality. The average age of the physicians was 46 years (range=28-60) and the number of males (n=5) was nearly equal to that of females (n=4).

The zoonoses observed by the veterinary and medical personnel are shown in table 1. The veterinary personnel listed the following zoonoses as being the most common: hydatidosis, brucellosis, rabies and cysticercosis. According to the veterinarians, the zoonoses reported in cattle were cysticercosis (10/15), hydatidosis (8/15), rabies (10/15), brucellosis (6/15), anthrax (2/15), tetanus (1/15), dermatophytosis (1/15), colibacillosis (1/15) and salmonellosis (1/15). For small ruminants, the zoonoses mentioned by the veterinary personnel included hydatidosis (3/15), rabies (2/15), tapeworms (2/15), mycobacteriosis (1/15), tetanus (1/15), and colibacillosis (1/15). For pigs, anthrax was the only zoonoses recorded as having been observed by the veterinarians (3/15). All the veterinarians indicated that the most common zoonosis in dogs was rabies. Other zoonoses in dogs, which were mentioned by one veterinarian, were dermatophytosis, tapeworms, hookworms, colibacillosis and salmonellosis.

In comparison, the physicians observed the following zoonoses in human patients in the last five years: hydatidosis (2/9), brucellosis (5/9), toxoplasmosis (3/9), rabies (4/9), anthrax (1/9), ticks (2/9), hookworms (1/9), *Pneumocystis carinii* pneumonia (1/9), bronchitis (1/9). The physicians were of the opinion that the following diseases originated from dogs: hydatidosis, rabies, hookworms, ticks; from cats: toxoplasmosis, rabies,

*Pneumocystis carinii* pneumonia, ticks; from cattle, brucellosis, anthrax; from chicken bronchitis. There was a significantly higher (p<0.05) proportion of veterinary personnel than medical physicians who indicated to have observed hydatidosis, cysticercosis and rabies in the last five years. However, a significantly higher (p<0.05) proportion of physicians had handled cases of toxoplasmosis than veterinarians. Overall, the veterinary personnel significantly (p=0.04) encountered the zoonoses cases compared to the human physicians.

**Table 1.** Zoonoses and relative risks attributed to animals as indicated by the veterinary and medical personnel

Variable	Proportion (%) of personnel		P
	Veterinary (n=15)	Medical (n=9)	
<b>Main zoonoses</b>			
Hydatid	67	22	0.04
Brucellosis	4	55	0.46
Cysticercosis	67	0	0.00
Rabies	100	44	0.01
Toxoplasmosis	0	33	0.00
<b>Animals with high zoonoses risk</b>			
Cattle	29	78	0.02
Sheep/goats	21	33	0.53
Dogs	71	67	0.81
Cats	64	56	0.67
Chicken	7	44	0.03

The animals were ranked according to their potential in spreading zoonoses as seen in table 1. The animals with the highest risks according to the veterinarians and physicians were dogs and cattle, respectively. Although chicken were considered to be of high risk by physicians, only a few veterinary personnel considered this to be so. There was a significant difference (p<0.05) in the proportion of veterinary and medical personnel who considered the cattle and chicken to be of high risks.

There was a significantly higher (p<0.05) proportion of physicians (88%) than veterinary personnel (73%) who gave advice to immune-compromised patients regarding the zoonoses risks associated with keeping of animals. Most physicians (56%) indicated that

there should be equal responsibility regarding advising of clients on the potential of contracting zoonoses from animals. Other physicians indicated that either veterinary (22%) or medical (22%) personnel should have primary responsibility on zoonoses education. The areas which the physicians highlighted as important responsibilities for veterinary personnel included: general maintenance of animal health, screening for zoonoses in animals, zoonoses education for patients and consulting physicians. However, the veterinary personnel either sought or gave advice to human physicians on rare occasions (47%). The human physicians had sought (11%) or rarely given (22%) advice to veterinary personnel. Further, only the veterinary personnel (47%) were aware of existence of official communication between veterinary and medical offices; and this was only in cases of rabies control.

According to the physicians, the zoonoses were treated as follows: hydatidosis with albendazole or surgery, brucellosis with streptomycin, ciprofloxacin, doxycycline, rifampicin, tetracycline; toxoplasmosis with pyrimethamine, clarithromycin; for rabies, post bite prophylaxis vaccine was given; anthrax was treated with tetracycline and *Pneumocystis carinii* pneumonia with sulfamethoxazole/trimethoprim combination. Bronchitis was treated with doxycycline.

The veterinary personnel controlled rabies through vaccination and baiting of dogs. However, the vaccination was irregular and passive while baiting was also rare and occurred when there was significant upsurge of rabies in a given locality within the Municipality.

## Discussion

The study has for the first time documented the veterinary and medical perceptions on the occurrence and control of zoonoses in an urban locality in Kenya. The targeted population showed that there was a lower number of practicing graduate veterinarians when compared to the higher number of human physicians. Considering the importance of

urban livestock keeping in this town (Mireri et al., 2007), and the critical role played by veterinarians in animal and public health, the government should consider deploying a higher number of veterinarians. The veterinary and medical personnel involved in this study were well versed with zoonoses occurrence and management, and gave a varied response to various questions owing to the different nature of their professions. For example, the veterinary personnel were widely involved in meat inspection and thus were more familiar with diseases such as bovine cysticercosis and hydatidosis than the physicians. The zoonoses caused by parasites in the class Cestoda are common in Kenya with high prevalence of cysticercosis and hydatidosis being reported in rural areas in Narok and Turkana (Onyango-Abuje et al., 1996). However, livestock for slaughter are sourced from these endemic areas and poor disposal of infected organs has been shown to create foci of zoonoses in urban areas in Kenya (Wachira et al., 1994). In the current study, at least two physicians had encountered cases of hydatidosis in Kisumu Municipality. In the current study, more veterinary personnel were aware of rabies than physicians, possibly due their primary role in rabies control. It would be important to undertake a comprehensive survey of these zoonoses with a view of recommending effective control measures.

On the other hand, there were more physicians aware of diseases such as brucellosis and toxoplasmosis than veterinarians. The clinical signs of these diseases in animals are neither dramatic nor pathognomonic and might as well be asymptomatic, and thus the veterinary personnel could have missed their diagnosis during regular practice. In recent years, zoonoses such as toxoplasmosis and *Pneumocystis carinii* pneumonia have emerged as significant in patients whose immune systems are not competent (Dubey et al., 2005). Toxoplasmosis was also previously observed to occur in animals in Kisumu (Dubey et al., 2005) and high prevalence has been reported in Kenya (Brindle et al., 1991). With the high prevalence of HIV/AIDS in Kisumu and other towns in Kenya (UNDP, 2005), the role of zoonoses has gained importance. Brucellosis has been widely reported to occur in East

Africa, and this is due to consumption of raw or improperly prepared milk (McDermott and Arimi, 2002). It would be important to not only quantify the occurrence of these zoonoses but also determine the epidemiology of this disease in Kisumu town. This would help in devising effective disease strategies.

The physicians ranked cattle as being of highest zoonoses risks, possibly because they were presumed be main reservoirs of brucellosis. Due to the high occurrence of dog bites, and possibly rabies in Kisumu, dogs were also ranked high by both the veterinary and medical personnel. In contrast to a significant proportion of physicians who indicated that chicken could be of high zoonoses risk, all the veterinarians indicated that these animals were of low risk. Chicken have been associated with zoonoses such as toxoplasmosis, salmonellosis and bronchitis pneumonia (Dubey et al., 2005; Trevejo et al., 2005).

The high proportion of medical personnel who gave advice to immune-compromised patients was credible and this could be associated with high prevalence of HIV/AIDS in the locality and the associated education by various disease control and non-governmental agencies. It also shows that the patients could trust both the veterinarians and physicians. This can be contrasted to a previous study in USA, where only 21% of the patients felt comfortable asking advice from the veterinarians (Grant and Olsen, 1999). In spite of the fact that, either personnel indicated that there should be shared responsibility in the control of zoonoses, there was little professional communication between the two types of personnel. This is quite common, even in developed countries (Grant and Olsen, 1999), and this is attributed to neglected status of zoonoses. Measures to enhance such communication including regular joint meetings amongst others could help prevent transmission of zoonotic agents. In recent years, there have been calls for inter-disciplinary discussions and collaborative ventures in control of zoonoses through the "One health, One medicine" approach (Cripps, 2000; WHO, 2007). The findings of this study further support this call which should be

emphasized and up-scaled for wider appreciation.

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