

OCCURRENCE OF RISK FACTORS FOR ZOOSES IN KISUMU CITY, KENYA: A QUESTIONNAIRE SURVEY

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Abstract

Objective: To determine the occurrence of risk factors amongst farmers keeping livestock in Kisumu municipality, Kenya.

Methods: Thirty four contact house-holds involved in livestock keeping constituted the study group. The head of the household was interviewed using a structured questionnaire relating to public health issues affecting water, food and sanitation

Results: The water consumed at the household level originated from the taps (56%), bore holes (18%), local rivers (15%) and wells (15%). The wells were shallow and open to contamination. Forty one percent (41%) of the households consumed water without boiling or any other form of treatment. Farmers had a history of slaughtering cattle (79%) and pigs (66%) at their homes and these animals were not inspected by legalized government officers. During the last five years, porcine cysticercosis and taeniosis (9%) were reported to occur amongst the homesteads. Although toilets were found in most homes, some were overflowing (27%), while children below 4 years (mean) of age defaecated in the bushes/grass within the neighbourhood. Most farmers (62%) disposed the manure next to the animal boma resulting in creation of small manure 'hills' that were a nuisance and breeding ground for vector flies. Other risk factors for disease transmission included consumption of unwashed raw food (48%), dried raw fish (21%) and failure to wash cows' udder before milking (29%).

Conclusion: The study shows that risk factors for transmission of zoonoses are common in house holds keeping livestock in the study area and highlights the need for public health education to raise awareness of these factors. Further studies should be conducted to determine the possibilities of zoonoses occurrences among the human population.

Key words: Kisumu, Kenya, urban livestock keeping, zoonoses risks

Introduction

Kisumu is the third largest city in Kenya and serves as a regional capital and an administrative, commercial and industrial centre for the Lake Victoria Basin. Despite its rich resource base, the city faces several challenges including food insecurity, growing urban poverty and the high prevalence of HIV/AIDS (1). The public health challenges include provision of water and sanitation system unplanned urban farming, amongst others (1). As in other rapidly growing cities in Africa, these issues have been associated with endemic health problems within the population, especially zoonoses (2).

Zoonoses are diseases where the aetiological agents can be transmitted to humans from a reservoir in animals and vice versa. In Kenya, several zoonoses have been observed including brucellosis, cysticercosis, hydatidosis, cryptosporidiosis and rabies amongst others (2,3,4). A combination of climatic, agricultural and socioeconomic, and veterinary infrastructure factors has been indicated as the main cause of zoonoses endemicity in Africa (5). With the high population density and presence of major risk factors for disease occurrence, most African towns (2,6,7) like Kisumu are bound to suffer from zoonoses. Hitherto, no study has been undertaken to evaluate the actual occurrence of these risk factors for zoonoses in Kisumu city. This will be an important step before further determination of prevalence of zoonoses in this town. The current study documents the risk factors for occurrence of zoonoses amongst livestock farmers in Kisumu city.

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Material and methods

Study area

Kisumu municipality is located in the Western Highlands on Lake Victoria and is a rapidly growing administrative, commercial and industrial centre for the Lake Victoria Basin. It has an estimated population of nearly 500,000 persons, majority of Luo origin (1). The municipality covers an area of approximately 417 Km², of which 297 Km² is dry land and approximately 120 Km² is under water. It is located at latitude: 0° -35' 0 N and Longitude: 34° 28' 0 E. The town has a semi-humid tropical climate with high mean temperature of 23°C. The mean annual rainfall is 1300 (range = 1100 – 1500mm) and is marked by long rains in March-May and short rains in November-December. The south-eastern part of the town, towards the lake has poorly drained, flat or depressed land which is subjected to flooding with permanent and seasonal swamps, which covers almost the entire Nyalenda sub-location (slum). Urban agriculture and livestock keeping is a common activity, with livestock production having an economic value of Ksh. 150, 754 per household (1)

Study farmers

The house-holds involved in the study were selected in collaboration with the local extension officers from the Ministry of Livestock and Fisheries. The sites were selected on the basis of having a higher concentration of livestock keeping in the urban and peri-urban set-ups. These sites included: Nyamasaria, Nyalenda, Obunga, Manyatta, Mamboleo and Otonglo. All of these sites are located in the urban and peri-urban area of Kisumu city. In each study site, the farmers were randomly selected from a list supplied by veterinary office from previous vaccination campaigns. In some sites, further communication was also made through the provincial administration, so that farmers could bring the animals in one central area. Out of 150 listed farmers, 40 were

randomly selected. Due to unavailability of some farmers only 34 could be accessed and interviewed.

Questionnaires survey

The questionnaire consisted of semi-structured questions regarding occurrence of risk factors for zoonoses. The questionnaires included questions on water availability, meat inspection and consumption, occurrence of zoonotic diseases, sanitation, manure disposal and milking hygiene. They were administered in a face to face interview by the researchers. During the administration, the researchers translated the questions to Kiswahili, while in some circumstances where the farmer could not understand Kiswahili, services of a local (*dholuo*) translator was utilized.

Data analysis

The responses from the questionnaire were then entered into computer spreadsheet (Ms Excel) and then descriptive analysis undertaken.

Results

The water consumed at the household level mainly came from the taps (56%). Other sources of water included bore holes (18%), local rivers (15%) and wells (15%). Most (3/5) wells were shallow and open (Fig 1). Most (41%) water was consumed without boiling or any other form of treatment. Those who always boiled the water before consumption were (24%), while a few (9%) sometimes boiled the water. Twenty four percent (24%) added the chlorine chemical (Water-guard®, PSI, Kenya) to the water before drinking it.

Pig meat was consumed by 61.8% of the households interviewed. Those farmers who ate the pork at least once a month were eight (24%), while those who ate in a period of more than a month were 13 (38%). The pork was prepared by frying (53%) or boiling (24%). Out of the three farmers who were keeping pigs (majority of pigs in the town had been killed earlier by an African Swine Fever epidemic), two had a history of slaughtering the pigs at home; the meat was not inspected by trained government officers. The three farmers had observed cysticercosis infested pig meat in their herd in the last five years. All (100%) households were consuming beef and those who ate the meat at least once a month were 28 (82%), while those who ate in a period of more than a month were 18%. The farmers prepared the beef by different methods which included boiling (97%), frying (65%) and barbecuing (3%). A majority (79.4%) of the farmers had a history of slaughtering cattle at their homes, mainly during burials and public holidays. A substantial number (35.3%) of the farmers slaughtered the cattle at a period of at least once a year. A low proportion (9%) of the farmers slaughtered cattle more than once a year. In 14 (41%) respondents the meat inspection was never done, while 13 (38%) claimed to have the meat inspected by government meat inspectors.

In the last five years, three (9%) farmers had a history of seeing tapeworm infection in human faeces, while 31 (91%) had not. Among the three farmers, two saw it from a family member and the other saw it both in the family

member and school going children. All the respondents saw it in the human faeces. One farmer did not know its origin while the other thought it was from eating dirt (i.e., unwashed vegetables). The third farmer thought it originated from consuming undercooked beef/pork. All households had toilets, mostly pit latrines which were used by all adults (Fig 2). Most of the toilets were (94%) completely closed by a door, but significant proportion (27%) of them were overflowing. In two cases, it was partially enclosed and human faeces could be accessed by roaming pigs. Only 25 (74%) of the respondents had children. The mean age of children of starting to use the toilets was 4 (2-9) yrs; before then they defaecated in the bushes/grass within the neighbourhood. Majority (71%) of the farmers did not have any activity which involved regular contact with water. The activities which involved regular contact with water were fishing especially in areas where the lake weed is abundant (21%), harvesting of lake weed (12%). One (3%) farmer grazed animals in marshy areas next to the lake (in Nyalenda), and claimed to have been bitten by leeches often.

Most farmers (62%) disposed the manure next to the animal boma resulting in creation of small manure 'hills' (Fig 3). Seventeen (50%) farmers poured the manure to areas in the neighborhood especially next to the roads and in open spaces. This was especially common in households which did not have any crop farming. However, 24% of the farmers used the manure for planting crops. The possibility of manure mixing with water for consumption was reported amongst 8 (24%) households.

Farmers also consumed raw food which included carrots, sweet-potatoes, ground nuts and fruits. Of the 25 farmers who responded that they had consumed this raw food, majority (52%) of the farmers washed the food, although 48% did not wash before consumption. Families with a history of individuals consuming raw fish were seven (21%). The raw fish was *Omema* and was mainly consumed by women, fish mongers and children.

At household level, milking was undertaken by the fathers (41%), workers (35%), mothers (21%), children, and (15%). Most (79%) farmers were washing the hands and udders before milking, while 7/24 (29%) farmers were not.

Discussion

The water consumed by the farmers came from diverse sources including tap water, bore-holes and local rivers. A recent UN-Habitat report (1) indicates that Kisumu is faced with acute water shortages and only 40% of its population has access to piped water. Further, in slums where a substantial number of livestock farmers were sampled, most dwellers obtain their water from unsafe sources, resulting in high rates of water- and sanitation-related disease and morbidity (1). The water problem is ironic as Kisumu is located adjacent to Lake Victoria, one of the largest fresh water lakes in the world. Most farmers did not administer any form of treatment to the water and this could be related to ignorance and may lead to high incidences of water-borne illnesses. Unsafe-water supply, and inadequate sanitation and hygiene have been indicated to cause 88% of the diarrhea diseases in the world (8).

Pigs slaughtered in Kisumu municipality originated

from within the town and neighboring districts. The pigs raised in these areas are free-range and are allowed to graze and scavenge for food. The presence of this system of production has been linked to occurrence of zoonoses such as cysticercosis (9). Indeed, the three pig farmers indicated that they had seen cysticercotic meat within the last five years in their herds. Another three farmers had observed, within the last five years, tapeworm infections amongst the family members. Majority of the farmers were consumers of the meat and thus if the meat is infected the risk zoonoses transmission could be high. Similarly, the ruminants grazing in the city are constantly exposed to these zoonoses and thus consumption of their meat could be a possible risk to zoonoses transmission. Some farmers slaughtered the animals at home especially during ceremonies and burials. Most of this type of meat was not inspected and thus could increase the risks to human health. However, the method of meat preparation was either frying or boiling, which can be able to sterilize the meat from any infectious pathogens if done adequately.

The presence of toilets and their use in the town was higher than that reported for rural Busia and Teso District (58%) in Kenya (9, 10). In the current study, it was observed that the majority of slum dwellers rely on pit latrines that are overused and not adequately maintained (direct investigator observation). Further, the defaecation of children in the bushes and grass could be a potential risk for spread of zoonoses (11). In Teso and Busia District in Kenya, absence of latrines at homestead level has been associated with increased cases of porcine cysticercosis (10). The discharge of faecal material to Lake Victoria has been linked to increase in number of snails (1, 12) and occurrence of high prevalence of snails infected with multiple genotypes of *Schistosoma mansoni* (13).

A substantial (29%) number of farmers were engaged in activities which involved regular contact with water. These activities have been linked to occurrence of diseases such as schistosomiasis, whose prevalence can reach up to 80% in school children in areas around Lake Victoria (14). It would be important to investigate whether this disease is common amongst the human population in Kisumu town, especially where flooding occurs in Nyalenda sub-location. A recent survey in Tilapia beach and Car wash (in Kisumu town) indicated that the snails were infected with *Schistosoma mansoni* at a prevalence of 0.4% and 2.6% respectively (13). Harvesting of water hyacinth and fishing within areas with thick vegetation (of hyacinth) and water-logged areas exposes human beings to schistosomes (13, 15, 16).

The disposal of manure in neighborhood where the people density is high is a major source of pollution in Kisumu Town and has been reported in other cities in Africa (17, 18). These manure 'hills' creates are a source of nuisance in terms of creating smell and breeding grounds of disease vectors such as houseflies which can transmitters of diseases (17, 19). Recently, flies were shown to be involved in transmission of intestinal helminthes and protozoa in a slum in Ethiopia (17). The mixing of the manure with water and food consumption has been reported to be a problem in most slums in Africa (1). There is a need for an environmental awareness campaign educating the residents to take more

responsibility for their own waste, as well as to develop broad-based partnerships for waste management. An important advantage of using animal manure is its relative availability, low cost and allows urban food production thereby increasing urban food security (18).

Consumption of raw vegetables was common amongst the surveyed farmers and this was accompanied by lack of washing of this type of food. Such kind of practices could be a major source of zoonoses and other pathogens (20). The consumption of raw dried fish was not as common in the study area, although the practice was reported amongst some fish-sellers and children. It has been observed in Asia that consumption of raw fish is responsible for transmission of parasitic diseases such as zoonotic trematodes (21), while a cholera outbreak in Tanzania was associated with consumption of poorly cooked fish (22). It would be important to investigate whether there is any significant association between poor processing of fish and recent occurrences of cholera in Kisumu and other western parts of the country (23). Other modes of zoonoses transmission which could occur amongst the farmers was through milking, where lack of washing of hands and udders when milking was evident in some families. It would be important to educate these farmers on proper milk handling procedures.

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