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Dog-associated husbandry practices favouring the spread of zoonotic pathogens with reference to helminth parasites in Yaounde, Cameroon

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ABSTRACT

Dogs are the most common animal species kept around households and are also known to be source of diseases of importance to human health. The aim of this study was to determine some characteristics of dog population and husbandry practices that favour the spread of zoonotic parasites in Yaounde, Cameroon. Three hundred and twenty-two households owning at least one dog were recruited into the study. Information on dog and household characteristics as well as potential risk factors for the transmission of dog-related zoonotic parasites was collected using self-administered questionnaires. Over three-quarters of the households (76%) owned one dog each with 62% (200/322) kept dogs strictly for security reasons. Eighty four per cent ()270/322) of the dogs owned were of local breed type and dominated by male dogs (64%). Twenty five per cent (80/320) of households left their dogs permanently free while 84% (240/320) declared negligence in disposing dog's faeces, respectively. Dogs in 35.5% (114/320) of the households rarely or have never been consulted by a veterinarian. Although 242 (75%) respondents were aware of zoonotic diseases, only 51 (21%) of these knew parasites from dogs may infect human beings. The provision of a defecation site for dogs and access to living quarters were associated with household head's level of education and care taker

category, respectively. The current dog husbandry practices in Yaounde are likely to favour the spread of dog-related zoonotic diseases. Further investigations to determine the prevalence of zoonotic parasites, routine educational intervention as well as routine veterinary care are necessary to reduce the risk exposures to zoonotic parasites from dogs.

1. Introduction

Dogs are the most common animal species kept in households around the world. In many industrialised countries, dogs are of significant importance to humans as pets or considered as part of the family (McNicholas et al., 2005; Westgarth et al., 2008; Chomel and Sun, 2011). These animals are kept for various reasons such as companionship, security, pleasure, protection and comfort (Podberscek, 2006). In many developing countries including Cameroon, data on dog ownership and population is scarce. However, it is believed that most dogs are kept for companionship, security and breeding purposes (Awah-Ndukum et al., 2004; Pfukenyi et al., 2010). In addition, these animals are kept under different husbandry systems with free ranging dogs dominating in some countries such as Malawi (Åsbjer, 2010). Although dogs play diversified and beneficiary roles in human society, they are also known to be source infectious and parasitic organisms of importance to human health (Robertson et al., 2000; Podberscek, 2006).

It is believed that 26.4% of all pathogens causing diseases in man are common to man and domestic carnivores (Cleaveland et al., 2001). Close contact between humans and infected dogs has been pointed out as an important risk factor for the occurrence of many zoonotic diseases. Various situations such as improper handling of dog's faeces, soil contamination by dog's faeces, sharing of a common living or recreational area, unsatisfactory veterinary care, poor sanitary habits, increased interaction between dogs, man and other animals and lack of proper care of dogs have been reported to favour the transmission of dog-related zoonoses (Thompson et al., 2003; Westgarth et al., 2008; Maikai et al., 2008; Kołłątaj et al., 2012).

Previous reports reveals the presence of zoonotic helminths in dogs including nematodes (*Trichinella vulpis*), protozoa (*Toxoplasma gondii*, *Toxocaracanis*) and cestodes (*Teanea*s pp and *Echinococcus granulosus*) from dogs in Cameroon (Awah-Ndukum et al., 2004; Komtangi et al., 2006). Pet-related zoonotic diseases such as toxoplasmosis have also been documented in humans (Ndumbe et al., 1992; Njunda et al., 2011). However, information on the risk of exposure which is necessary for proper preventive measures to be taken is still lacking and warrants further evaluation. This paper presents some characteristics of dog population and husbandry practices that could favour the spread of zoonotic parasites from dogs to humans in Yaounde, Cameroon.

2. Materials and methods

2.1. Study area and design

The study was carried out in the Mfoundi division within the Centre Region of Cameroon from January through April, 2012. The Mfoundi division is the administrative capital of Cameroon and the second most populous in Cameroon and is made up of 7 districts.

Households in two main quarters in each of the seven districts of Mfoundi division were included in the study. A random house-to-house survey using a pre-tested questionnaire consisting of two parts was conducted. The first part captured information on household and dog characteristics such as household's location, level of education of household head, family size, number of dogs owned. The second part focused on practices identified elsewhere to favour the spread of zoonotic parasite transmission such as dog's living space, defecation areas, faeces disposal method and veterinary care (Robertson et al., 2000 ; Deplazes et al., 2011;Ugbomoiko et al., 2008; Lefebvre et al., 2011).

2.2. Statistical analysis

Data obtained were entered into Microsoft Excel 2007 (Microsoft Corp) and analysed using R statistical software (R Development Core Team, 2011). Association between potential husbandry practices and household as well as dog's characteristics were investigated using Chi-squared test.

3. Results

3.1. Characteristics of dogs population

Three hundred and twenty two households owning 420 dogs were included in this study. Some characteristics of dog population in the study area are presented on table 1. Most of the households kept local breed of dogs (84%), male dogs (64%) and own a dog each (76%). Out of the 322 households surveyed, 322 (62.1%) kept dogs strictly for security reasons.

Table 1
Characteristics of 420 dog population owned by 322 households in Yaounde, Cameroon.

Variables	Number (%)
Breed per household	
Exotic	45 (14.0)
Local	271 (84.2)
Cross /Mixed breeds	6 (1.9)
Sex of dogs	
Male	269 (64.0)
Female	151 (36.0)
Number of dogs per household	
1	245(76.1)
>1	77 (23.9)
Reason for dog-ownership per household	
Security	200 (62.1)
companionship	11 (3.4)
Companionship and Security	107 (33.2)
Other reasons	4 (1.2)

3.2. Husbandry practices in relation to the spread of parasitic zoonoses

Twenty five per cent of the households allowed dogs into living quarters such as bedroom living room and kitchen while 25.2% allowed dogs to spend all of their time roaming outdoors unattended. Most households (87%) declared that dogs did not have a specific area to defecate. The most common means of disposal of dog's faeces was in the garbage bin (Fig. 1).

Provision of a fixed defecation area for dogs in the household was associated ($p<0.05$) with the household head's level of education. Dog's access to living quarters in the home was associated ($p<0.05$) with different care taker groups studied. Dogs tend to have access to human living quarters in larger households and in households in which the household head had lower level of formal education (Table 2). Seventy-five per cent (242/322) respondents know or have heard of zoonoses while 21.1% (51) knew parasites from their pets are a potential source of zoonotic infections. Most (68.2%) of the households reported to have dewormed their dogs at least once in the previous year while 35% indicated that their pet rarely or never have been consulted by a veterinarian (Table 3).

4. Discussion

As shown by the results of the present study, dog demographics observed are consistent with the findings from other sub-Saharan African countries. The predominance of male dogs and dogs of local breeds as well as a

mean of number of dogs (1.3 dogs per household) owned per household agrees with dog population parameters reported Kenya and Zimbabwe (Kitala et al., 2001; Pfukenyi et al., 2010). Moreover, a majority of the dogs were kept strictly for security reasons. Male dogs appear to be better guards (Kitala et al., 2001) and might be connected with the predominance of male dogs noted in this study area.

Previous studies have reported dog-related zoonotic diseases in human beings as well as detection of zoonotic intestinal parasites from faeces collected from dogs in Cameroon (Awah-Ndukum, 2004; Awah-Ndukum et al., 2004; Komtangi et al., 2006 ; Njunda et al., 2011). However, there has been little attention given to husbandry practices as potential risk factors for the spread of zoonoses in the country.

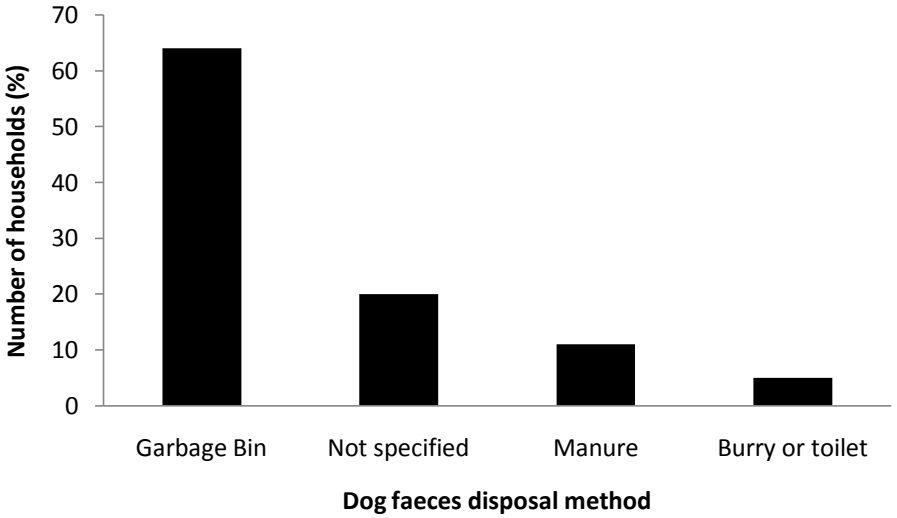

Fig. 1. Household's dog faeces disposal method.

Dog husbandry practices noted in this study are likely to favour the spread of dog-related zoonotic diseases to humans. Most households allowed their dogs to roam freely especially during the nights. It was also observed that four out of every five household paid little attention to proper disposal of dog's faeces. A number of studies reported scavenging in garbage bins and left-over food in households as well as detection of potential zoonotic *helminth* parasites from dog faeces and faeces collected from soils in areas commonly used by dogs and Man in similar dog populations (Kitala et al., 2001; Awah-Ndukum, 2004; Komtangi et al., 2006 ; Ugbomoiko et al., 2008). Given this, the potential for the spread of zoonotic infection due to uncontrolled movement and improper handling of faeces from pets cannot be ruled out.

In addition to the risk transmission of zoonoses to humans, these practices could increase the chances of dogs to be in contact with other dogs and animal species around garbage bins, playgrounds and other public places thereby increasing the risk of disease spread. Increased contact between man and animals including dogs as well as pet ownership as has been reported as a major risk factor favouring the transmission of zoonotic pathogens (Robertson et al., 2000 ; Chomel and Sun, 2011; Kołłątaj et al., 2012 ;Lefebvre et al., 2011; Ekong et al., 2012). Although few (3.4%) households indicated that they kept their pets strictly for companionship, it was noted that one out of every four households allowed access to their human living quarters as well other areas out of the family home thus increasing the potential risk of spread of zoonotic parasites to humans. This risk of exposure may be higher in households with people in vulnerable groups such as creeping babies, pregnant women and those with various forms of immune suppression.

Table 2
Association between husbandry practices related to zoonotic helminth transmission, household and dog characteristics.

Variable	Dogs have access to living quarters		Dogs go out of household residence unguarded		Dog has a fixed defecations area		Dog was dewormed during the last 12 months	
	n(%)	P value	n(%)	P value	n(%)	P value	n(%)	P value
Education of household head, years		0.08		0.52		0.01		0.39
<7	18 (56.3)		10 (31.3)		0 (0.0)		19 (59.4)	
7 to 10	60 (44.8)		35 (26.3)		25 (18.7)		90 (67.2)	
>10	57 (36.5)		35 (22.6)		17 (11.0)		111 (71.6)	
Number of people in the HH		0.09		0.70		0.19		0.31
<6	42 (44.7)		22 (23.7)		14 (14.9)		70 (74.5)	
6 to 10	56 (36.1)		37 (24.0)		15 (9.7)		102 (65.8)	
>10	37 (50.7)		21 (28.8)		13 (17.8)		48 (65.8)	
Primary care taker of the dog		0.01		0.52		0.06		0.29
Owner or family member	127 (43.8)		71 (25.6)		36 (12.4)		197 (67.9)	
Paid labour	0 (0.0)		1 (10.0)		0 (0.0)		9 (9.0)	
No specific care taker	8 (36.4)		5 (19.3)		6 (27.3)		14 (63.6)	
Breed of dog per HH		0.27		0.32		0.09		0.64
Local	118 (43.5)		10 (22.3)		32 (11.8)		183 (67.5)	
Pure Exotic or cross breeds	14 (31.1)		70 (25.9)		10 (22.2)		32 (71.1)	
Mixed breeds	3 (100.0)		0 (0.0)		0 (0.0)		5 (83.3)	
Dogs role in the household		0.52		0.46		0.24		0.42
Guard	80 (39.6)		47 (23.5)		24 (11.9)		143 (70.8)	
Companionship	5 (100.0)		4 (40.0)		3 (30.0)		7 (70.0)	
Guard and companion	50 (45.5)		29 (8.1)		15 (13.6)		70 (63.6)	

Table 3
Duration since last veterinary visits by dog-owning households.

Duration since previous veterinary visit	Number of households (%)
≤ 6 months	116 (36.0)
≥ 6 months	92 (28.6)
Never or rarely	114 (35.4)

Previous studies indicated there is lack of awareness zoonotic diseases by pet owners (Ugbomoiko et al., 2008 ; Pfukenyi et al., 2010; Kołłątaj et al., 2012). In this study, more respondents had heard or know dog-related and named rabies as a major zoonotic disease compared to parasitic zoonoses (75.2% vs 21.1%). The low level awareness of parasitic zoonoses observed may be a promising argument for the negligence in handling of waste from these pets. The low level of awareness noted may also explain the association of owner's level of formal education and socio-economic status as well as dogs' access to living quarters. Further, the low level of awareness may also have spilt over on the negligence in veterinary health care received by pets.

Although more than half the number of household (68%) indicated that they had dewormed their dogs at least once in the previous 12 months, it may be worrying that 35.4 % of the respondents confirmed that they never or rarely seek veterinary care for their pets. Veterinary records to keep track of pets' health were rarely available and most worm treatment was reported to be done by dog owners themselves. Negligence of veterinary care to pets may also be linked to financial difficulties as some households complained of high cost of veterinary services and medications. Given this, it is most likely that the health care given to dogs will be worse in rural areas where levels of education, levels of income, standard and quality of life is generally lower, thus reducing chances of incurring any extra-expenses on medication of dogs by the rural poor.

5. Conclusion

Based on the fore running discussion, it is most likely that dog husbandry practices in Yaounde, could increase the spread of dog-related zoonotic infections to humans. Studies to determine the burden of specific zoonotic helminth and arthropod parasite infections in dogs and their public health implications are recommended. Additionally, consultative efforts between veterinary and medical practitioners, as well as the role of health-based NGOs in the education of dog owners would be necessary in order to reduce the risk of spread of dog-related zoonoses.

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Conflict of interest

The authors declare that they have no conflict of interest.

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