

Involvement of communities in the control of dog-related public health hazards in the Western Highlands of Cameroon

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ABSTRACT

A survey was carried out in four communities in the Western Highlands of Cameroon (LN 5 – 7° and LE 8 – 10°) between May 2000 and September 2001, to obtain data on dog management, control programmes against rabies as well as other dog-related public health diseases and the level of involvement of these communities in the control against these diseases. Dog keeping was widely accepted in the region but a non-negligible 24 – 45% of the whole community complained of the presence of stray, biting, polluting and / or annoying dogs in their neighbourhoods. These negative attributes of dogs contribute largely to serious environmental pollution and dog-related community disease hazards. This paper critically reviews the available facts and concludes that integrating communities of the Western Highlands of Cameroon in dog-related zoonoses campaigns is extremely important and will contribute to the effective control of rabies and the other dog-related public health problems in the region. The results also suggest that knowledge of rabies epidemiology and level of its control as well as dog (owned and stray) density data for Cameroon should be updated in the near future.

Key words: Community, dog, public health, control, Western highlands of Cameroon.

RESUME

Une enquête menée de mai 2000 à septembre 2001 dans 4 communautés des Hauts Plateaux de l'Ouest Cameroun (LN 5 – 7° and LE 8 – 10°), avait pour but de collecter des données relatives à la détention des chiens, aux programmes de lutte contre la rage, aux zoonoses transmises par des chiens ainsi qu'à l'implication de ces communautés dans leur contrôle. La détention des chiens est largement répandue dans la région, bien qu'une proportion non négligeable (24 – 45%) de la communauté déplore la présence des chiens errants, les morsures des chiens, la pollution et autres désagréments dont sont responsable les chiens dans leurs voisinages. Tous ces désagréments et nuisances contribuent amplement à la pollution de l'environnement et à l'augmentation de risques de zoonoses transmises par les chiens. Cette étude propose une revue critique de faits et conclut à l'extrême importance de la participation des communautés des Hauts Plateaux de l'Ouest Cameroun à la campagne contre les zoonoses transmises par les chiens ; ce qui, à terme, contribuera au contrôle effectif de la rage et des autres problèmes de santé publique dus aux chiens. L'enquête suggère que les études pour une meilleure connaissance de la densité de population des chiens aussi que de l'épidémiologie de la rage soient entre prises en vue de la mise en place d'un système plus efficace de contrôle dans un proche avenir.

Mots clés : Communauté, chien, santé publique, contrôle, Hauts Plateaux de l'Ouest Cameroun.

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INTRODUCTION

Many Cameroonians are keeping dogs for protection and security of their houses and business premises, but like in many other African cultures, dogs are also kept as pets and companions, for hunting, as guarding animals, for food or for commercial purposes (Tong, 1992). However, others reject dogs because they may be unclean, bite or serve as vectors of diseases, constitute pests or nuisance.

Dogs harbour a number of parasites, which can represent hazards for human and farm animal health (Soulsby, 1982; Symth, 1996). Responsible ownership of this domesticated animal has become an increasing concern for veterinary / medical professionals and community officials in Cameroon. These concerns include the environmental impact of animal pollution with *solid* and *liquid* wastes, as well as the effects of dog overpopulation and stray animals on community health. A high "dog-to-man" contact rate has been recorded in parts of the country, particularly in urban areas (Tong, 1992; Awah-Ndukum, 2003). A knowledge of the number of owned dogs and abundance of stray dogs in an area is, therefore, important for dog population management, planning of antirabies campaigns and the control of other associated environmental / community health problems (Collins, 1976; Selby *et al*, 1979; Kelly, 1980; Nasser and Mosier, 1980; Schnurrenberger *et al*, 1981; Beran, 1984; Okoh, 1986; WHO, 1988).

Investations have been carried out on owned dog population management in relation to rabies control in the North-West and West parts of Cameroon (Tchoumboue *et al*, 2002; Awah-Ndukum, 2003), which have high human population densities ranging 200 – 250 hab/km². Rabies consciousness was found to be high and dog-keeping also widely accepted in these regions, suggesting that a large number of dogs could be presented for antirabies vaccination. Unfortunately, there was a high degree of irresponsible dog ownership attitude as many unwanted dog activities including biting, free roaming; environmental pollution and poor antirabies vaccination practice were reported.

Although the main factors limiting antirabies campaign in parts of Cameroon have already been studied (Tong, 1992; Tchoumboue *et al*, 2002; Awah-Ndukum *et al*, 2002), the level of integration of the communities in the existing rabies control programmes was not considered. This investigation was therefore carried out in

the Western Highlands of Cameroon to better appreciate the importance of integrating dog owning communities in the effective control of rabies and other dog-related community health hazards.

MATERIALS AND METHODS

A total of 724 households owning 905 dogs in 4 localities (Bamenda, Wum, Bafoussam and Dschang) of the Western Highlands of Cameroon (LN 5 – 7° and LE 8 – 10°) were surveyed in relation to dog management and their involvement in the control of dog-related public diseases. During the period of May – November 2000 in Bamenda and Wum, and April – September 2001 in Bafoussam and Dschang, a modified WHO (1984a) guidelines for dog rabies control was distributed as questionnaire to collect information on dog ownership status, level of antirabies vaccination and importance of dogs as nuisance, environmental pollutants and / or zoonotic disease transmitters.

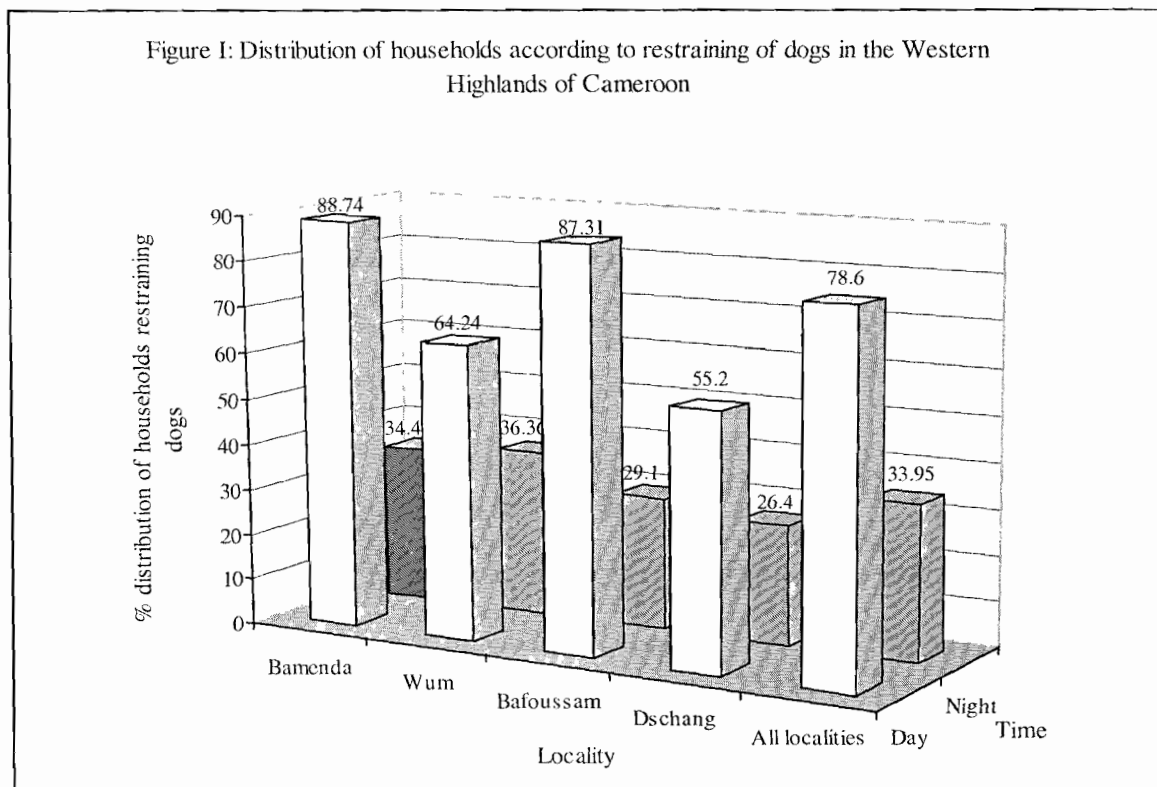
During the study period in Dschang area, 120 fresh dog faeces were collected for the examination and identification of intestinal parasites as described by MAFF (1971) and Thienpont (1979) and 75 blood samples for detection of antibodies against rabies by the sand-witch ELISA technique. Also, fresh human faecal samples from households (504 humans aged 3 months to 68 years) owning dogs were collected for parasitological study as described for the dog faeces.

The proportions and means of the various parameters were calculated and reduced into tables and figures. The data obtained were compared and the level of significant differences determined using Chi-square test and normal distribution (Z-formula) techniques (Nie *et al*, 1970).

RESULTS AND DISCUSSION

Dog ownership and Management:

In this study most "owned-dogs" were properly restrained (78.6% by day and 33.95% by night) either in houses, cages or on chains (Figure 1). Although their owners fed the restrained dogs, most owned dogs were also loose and free to roam or scavenge around houses or neighbourhoods at night. Tong (1992) had observed that the majority of partially or totally free roaming dogs find food at homes, eat cabbage and receive handouts. They also habitually find and frequently ingest human faeces, rodents and insects in their respective environments. The widespread keeping of



dogs in the region is, therefore, being perceived to be due to increased food availability to feed them, coupled with the need of additional protection of *owner's* belongings.

Although a significantly ($P < 0.05$) higher proportion of the Bafoussam community kept dogs, dogs keeping was observed to be widely accepted in the Western Highlands of Cameroon with up to 74.85% of

the studied households keeping dogs (Table 1). However, the rejection of dogs was related to negative attributes such as biting (24.44%), noise, odour, waste pollution (34.39%) and free roaming nuisance (44.20%) (Figure II), which affects a community's health at different levels of importance (e.g.: transmission of rabies, parasites). The proportion of the communities that complained varied from one negative dog attribute to the other and the complains were more ($P < 0.05$)

Table 1: Distribution (%) of households keeping dogs, general rabies awareness, dog owners who vaccinate their dogs against rabies and dogs vaccinated against rabies in the Western highlands of Cameroon.

Localities	% of dog owners	General rabies awareness	Dog owners who vaccinate their dogs against rabies	% of dogs vaccinated against rabies
Bamenda	70.56a (214)*	81.30a (214)*	81.46a (151)§	75.21a (242)#
Wum	70.51a (234)	61.54b (234)	41.21bA (165)	30.62b (307)
Bafoussam	88.74b (151)	74.83aA (151)	54.48cA (134)	52.91c (206)
Dschang	73.60a (125)	60.80bA (125)	48.91bc (92)	32.67b (150)
Total	74.86B (724)	70.03B (724)	57.01C (542)	47.96D (905)

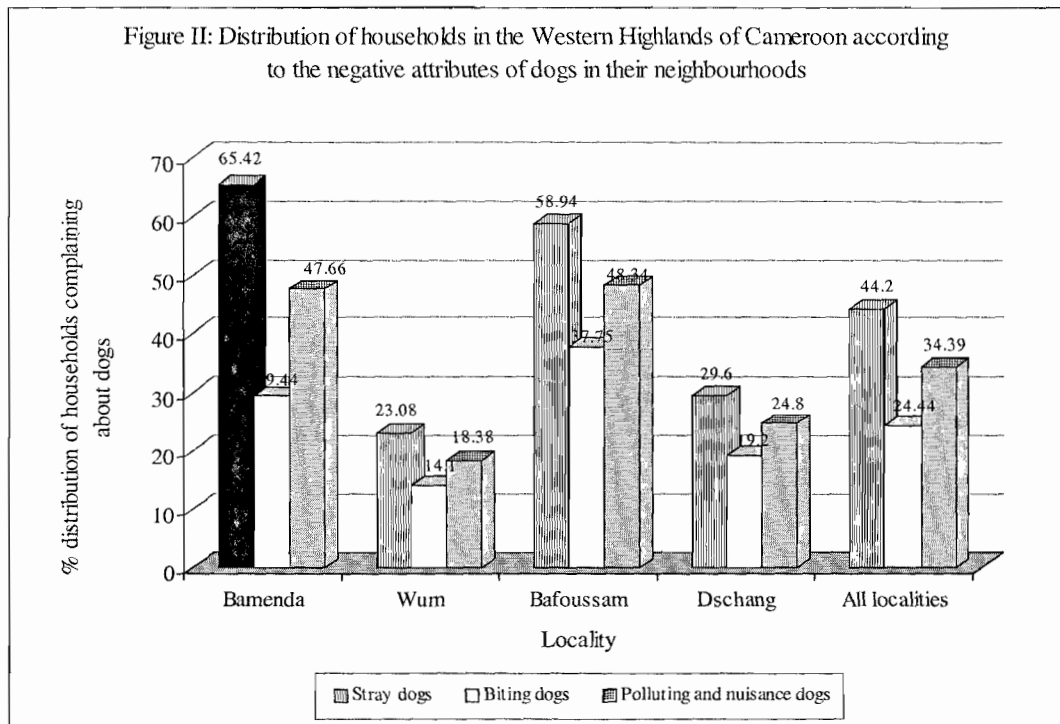
Values in a column with the same letter {a, b, c ($P > 0.05$) and A ($P > 0.01$)} are not different

Values in a row with the same letter {B, C, D ($P > 0.05$)} are not different

*: Total number of households interviewed

#: Total number of owned dogs

§: Dog owners



amongst the more urban (Bafoussam and Bamenda) than rural (Dschang and Wum) communities. Contrary to the widespread dog acceptance and high dog ownership in these communities, dog owners also complained of the negative attributes of dogs and have been reported to suffer directly from some of these attributes (Tong, 1992; Awah-Ndukum *et al*, 2002; Awah-Ndukum, 2003). The habitats of dogs were also observed to depend on the abundance, distribution and predictability of resources while the economic status and density of human population largely determined the availability of shelter. These findings agree with those of Tong (1992) who also reported that dog densities in different parts of the country were related to different epidemiological situations, cultural areas, rural / urban habitat and social strata of human rural / urban populations. However, a proper knowledge of dog keeping and management by the communities was lacking as dogs were mainly kept for protection and security purposes, especially in urban areas (Tong, 1992; Awah-Ndukum, 2003). The negative attributes recorded in this study, therefore, complicate the already high risk of environmental pollution and transmission of zoonotic infections by dogs (owned and abandoned).

Diseases common to Dogs and Humans:

(i) Gastrointestinal parasite infections

Although only *Ascaris lumbricoides* and hookworm parasites, mainly *Ancylostoma spp*, were observed to infect

both dogs (8.33% & 71.67%) and dog owners (15.28% & 6.35%), respectively, during the study period in Dschang area, relatively high prevalence rates of *Toxocara canis* (34.17%), *Strongyloides stercoralis* (11.67%), *Uncinaria stenocephala* (42.50%), *Mesocostoides lineatus* (4.17%) and *Dipylidium caninum* (6.67%) were all identified in owned dog faeces in the area (Table 2), all of which can cause serious disease conditions in humans (Soulsby, 1982; Smyth, 1996). Man acquires these infections by playing with dogs (puppies) and from food, water and / or environments contaminated by dog faeces. Poor hygienic conditions therefore favour spread of these infections. However, Mpoame *et al* (personal communications) had recorded 98 – 100% clearance of these parasites from dogs in Dschang area four days after treating the animals with a single dose of stromiten® (levamisole / niclosamide combination drug).

In this study the intensity and rate of *Ascaris lumbricoides* infection were higher in children less than 12 years old (23.81%) than were the other parasites in children and older humans (Table 3) accordingly. Also, *Ascaris lumbricoides* was observed only in young dogs. Although the rates of the parasitic infections varied between pups and adult dogs, the intensity of infections was always higher, except *Strongyloides stercoralis* infection, in pups than adult dogs. This finding is in conformity with those of Soulsby (1982) and Smyth (1996) who reported that children, especially those aged between 6 and 12 years, and young animals usually suffer high

Table 2: Prevalence of zoonotic gastrointestinal parasites of dogs and humans in Dschang

Parasites	D ogs (n = 120)		Humans		
	Prevalence of infection (%)	Mean Egg count \pm SD (g/ faeces)	D og owners (n = 504)		Hospital patients ¹
			Prevalence of infection (%)	Mean Egg count \pm SD (g/ faeces)	Mean Egg count \pm SD (g/ faeces)
Hookworm*					
- <i>Uncinaria stenocephala</i>	42.50b (51)	1030.39 \pm 685.00	-	-	-
- <i>Ancylostoma and other spp</i>	71.67a (86)	1705.81 \pm 2417.33	6.35aA (32)	285.10 \pm 92.02	368.80 \pm 98.60 (9)
<i>Toxocara canis*</i>	34.17b (41)	7601.22 \pm 4990.30	-	-	-
<i>Trichuris trichiura</i>	-	-	8.53bA (43)	424.10 \pm 527.10	515.00 \pm 382.10 (24)
<i>Trichuris vulpis</i>	8.33c (10)	120.00 \pm 82.32	-	-	-
<i>Strongyloides stercoralis*</i>	11.67c (14)	1414.29 \pm 480.31	-	-	-
<i>Ascaris lumbricoides*</i>	8.33c (10)	190.00 \pm 44.91	15.28b (77)	1200.00 \pm 187.10	1400.00 \pm 886.73 (56)
<i>Capillaria sp</i>	4.17c (5)	1110.00 \pm 980.66	-	-	-
<i>Dipylidium caninum*</i>	6.67 (8)	-	-	-	-
<i>Mesocestoides lineatus*</i>	4.17 (5)	-	-	-	-
Total	85.83 (103)	-	37.10 (187)	-	-

Values in a column with the same letter {a, b, c (P>0.05) and A (P>0.01)} are not different
 () : number infected
 1 : Government District Hospital Dschang, Cameroon (sick persons during the study period)
 *: parasites that can infect humans (Soulsby, 1982; Symth, 1996)

Table 3: Prevalence of zoonotic gastrointestinal parasites of dogs and dog owners according to age in Dschang area.

Parasites	% of Dogs infected (n = 120)		% of Dogs owners infected (n = 395)		
	Young dogs (less than 6 months old n = 48)	Adult dogs (n = 72)	6 – 12 years old (n = 101)	13 – 25 years old (n = 173)	Above 26 years old (n = 121)
Hookworm*					
- <i>Uncinaria stenocephala</i>	27.08b 1792.31 \pm 2286.72	52.78d 769.74 \pm 1366.42	-	-	-
- <i>Ancylostoma and other spp</i>	62.50a 2216.67 \pm 2821.14#	77.78a 1432.14 \pm 2148.43	7.90b 493.80 \pm 559.30	8.67bcD 299.98 \pm 156.58	11.57b 400.00 \pm 151.10
<i>Toxocara canis*</i>	47.92a 11847.83 \pm 18909.41	25.00b 2175.00 \pm 2734.60	-	-	-
<i>Trichuris trichiura</i>	-	-	14.90abA 823.30 \pm 458.00	9.25acB 360.58 \pm 257014	7.44cdA 316.00 \pm 547.20
<i>Trichuris vulpis</i>	-	13.89b 120 \pm 82.33	-	-	-
<i>Strongyloides stercoralis*</i>	12.50c 883.33 \pm 907.56	11.11c 1812.50 \pm 1748.83	-	-	-
<i>Ascaris lumbricoides*</i>	20.83de 190.00 \pm 144.91	-	23.80adC 1883.30 \pm 1559	17.34dB 710.00 \pm 226.10	12.40bcC 1057.78 \pm 709.05
<i>Capillaria sp</i>	10.42c 1110.00 \pm 1980.67	-	-	-	-
<i>Dipylidium caninum*</i>	8.33	5.56	-	-	-
<i>Mesocestoides lineatus*</i>	4.17	4.17	-	-	-
Total	83.33f	87.50f	41.58gD	31.79gh	28.93hD

a, b, c, d, e, f, g, h: values with the same letter in a row and column are not different (P>0.05)
 A, B, C, D: values with the same letter in a row and column are not different (P>0.01)
 *: parasites that can infect humans (Soulsby, 1982; Symth, 1996)
 #: mean egg count \pm SD

infection levels of gastrointestinal parasites. The hookworm infection in humans could have resulted from the high level in the dogs while the source of *Ascaris lumbricoides* in dogs may be associated with human faecal contamination of dog environments or food. Drastic reduction in the occurrence of these parasitic health hazards can, therefore, be achieved if control strategies emphasize parameters such as proper hygiene and education of the communities, elimination of unwanted and stray dogs, dog surveillance and regular chemotherapy programmes and socio-economic development.

(ii) Rabies: Awareness and antirabies vaccination

Although in this study, up to 74.86% or 70.03% of the whole community kept dogs or were conscious of the dangers of rabies respectively, by contrast only 47.96% of owned dogs were vaccinated against rabies. Also, only 57.01% of dog owners vaccinated their animals against rabies (Table 1). These observations agree with previous report by Tong (1992), Tchoumboue *et al* (2002) and Awah-Ndukum (2003). These authors cited irresponsible dog ownership, abundance of stray dogs, ignorance of rabies and the need to vaccinate, poor economy of households and lack of veterinary services as the main limiting factors to antirabies vaccination. Furthermore, rabies antibodies were detected in only 12.00% of sampled dogs (9 out of 75) and which had valid certificate of rabies vaccination in Dschang area. The results confirm the poor antirabies campaign earlier recorded (Tchoumboue *et al*, 2002; Awah-Ndukum *et al*, 2002) and is also clearly indicative of the absence of protective immunity against rabies in the region.

Antirabies vaccination practice was poor but general rabies awareness was significantly higher ($P < 0.05$) in the study areas when compared to dog owners who vaccinate their animals. However, both distributions of general rabies awareness and dog owners who vaccinate their dogs against rabies appear to be related in the region. Generally, there was no significant indication of any influence of rabies awareness on dog ownership nor antirabies vaccination of dogs and dog ownership did not necessarily imply that the "owned dogs" would be vaccinated against rabies. This confirms the fact that these dog-keeping communities were more interested in the protection and security offered by the dogs than on observing and maintaining a responsible dog – human welfare. However, a very strong positive relationship was observed in Bamenda between rabies awareness, dog ownership and antira-

bies vaccination of dogs, which explains the elevated level of antirabies practice recorded in Bamenda during the study period (Table 1). Nonetheless, this was expected because high prevalence rates of canine and human rabies had occurred between 1986 and mid 1988 in the area (Ministry of Livestock's Provincial Delegation – Bamenda; personal communications) which provoked a generalised fear.

Involvement of communities in dog-related zoonoses control programmes

Accurate information on stray dog population was not obtained in the study but the communities in the Western Highlands of Cameroon generally accepted dog keeping and were also highly aware of the dangers of dog-related zoonoses (especially rabies). However, antirabies vaccination was disappointingly poor. Although the factors that affect the control of rabies and other dog-related zoonoses are directly related to the socio-cultural nature and mentality of the exposed communities, there was no evidence, in this study, of the involvement of these communities in control programmes against these diseases. Therefore, if these obstacles are properly tackled and the communities integrated in these diseases control programmes, the results could become even better. The dog is the main domesticated carnivore in Cameroon but there is limited reliable information on their habitat, disease transmission and management status all of which hamper responsible ownership of this animal. However, the dog, and to a minor extend the cat, have been implicated as the main vectors of rabies in Cameroon. The existence of rabies is also well established in the country, and recent reviews show that the disease is still prevalent (Tong, 1992; Awah-Ndukum *et al*, 2002), with humans and animals being affected. Irrespective of the advantage or disadvantage of keeping dogs, their public health importance, particularly with respect to the diseases they transmit, is underestimated in Cameroon.

The need to improve on the existing but weakly applied rabies and other dog-related zoonoses control measures, by also involving the dog-friendly public in these campaigns in Cameroon cannot be over emphasised. This could be achieved through specific implementation of control measures that also integrate affected communities such as those recommended by WHO and other expert committees on rabies (WHO, 1984b; 1998) through the registration and taxation of dogs, elimination of stray dogs and dog habitat control, improving public attitude towards dog keeping and the elimination of irresponsible dog ownership,

providing antirabies vaccines at subsidised rates, restraining of dogs while the control campaign is underway, providing adequate diagnostic facilities and training of personnel, improving accessibility to laboratories and education of the community about rabies through energetic campaigns. Reliable and complete epidemiological data on rabies and other dog-related zoonoses should be obtained and made available to all sectors concerned. Also, the exchange of information between veterinary / medical officials and these sectors in the evaluation of epidemiological situation, definition of the role of each sector and implementation of control measures needs to be strengthened and improved.

Communities exposed to dog-related public diseases should, therefore, have a role in the planning of these diseases control programmes and should endorse them by participating actively (Selby *et al*, 1979; WHO, 1988; 1998). The surveillance of these diseases in exposed regions should be established and strengthened as a prerequisite to policy formulation and elaboration of guidelines on control measures. Control campaigns should also be preceded by well planned health education programme to ensure full participation of the communities. The implementation of these basic principles and the integration of the various regions of Cameroon in rabies and other dog-related zoonoses control campaigns is possible but like many poor developing countries, it is limited by poor interregional co-operation, poor economic state, lack of reliable knowledge of the epidemiology of the diseases, inadequate country animal disease control policy, lengthy bureaucratic procedures at the central administration and / or lack of good will by the central authorities who themselves may not be exposed to the problems.

CONCLUSION

Dog keeping and restraining is widely practised in the Western Highlands of Cameroon and the communities are very aware of the many negative attributes of dogs, which can result in environmental pollution and community health hazards. A positive correlation between dog and human parasitism has been observed to exist in the region. Also, the reasons for poor anti-rabies vaccination in this part of Cameroon are all directly related to the socio-economic structure and mentality of the various communities in the area. Therefore, if these obstacles are properly considered and tackled the accessibility of dogs for antirabies vaccination programme and control of other dog / human diseases could be higher than previously observed.

In order to determine control strategies for rabies and / or other dog-related disease outbreaks in Cameroon or for regular control of these hazards, the models used must be dependent on having sufficient up-to-date data on dog density and the effective integration of exposed communities in the control programmes. Also, deliberate destruction of unwanted and stray dogs; dog surveillance and antirabies vaccination, regular dosing programmes against parasites, continuous screening of control measures applied, introduction of public health education and energetic publicity campaign and socio-economic development are very important practical steps towards effective control and eradication of these dog-related conditions from the communities of Cameroon.

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