

Seroprevalence and Risk Factors of Brucellosis in Dogs in Buea Municipality, Cameroon: A Cross-Sectional Study

Tamdjo Moyopo Sharon Siegfried

Department of Veterinary Medicine, Faculty of Agriculture and Veterinary Medicine, University of Buea

Elvis Asangbeng Tanue

Department of Public Health, Faculty of Health Sciences, University of Buea

Nkemnyi Bertha Anyizi

Department of Veterinary Medicine, Faculty of Agriculture and Veterinary Medicine, University of Buea

Tanyi Kingsley Manchang

Department of Veterinary Medicine, Faculty of Agriculture and Veterinary Medicine, University of Buea

Lucy Mande Ndip

Laboratory for Emerging Infectious Diseases, University of Buea

Abdul Rahman Yakubu

School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology

Prince Nana Takyi

School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology

Sampson Yeboah

School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology

Esther Amemor

School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology

Benjamin Obukowho Emikpe

benemikpegwac@gmail.com

School of Veterinary Medicine, Kwame Nkrumah University of Science and Technology

Research Article

Keywords: Brucellosis, Dog, Seroprevalence, Cameroon, One Health

Posted Date: March 2nd, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-8811209/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Brucellosis remains a serious public health concern in Cameroon because of intimate human-dog interactions, unrestricted consumption of dog meat, and an overall weak veterinary infrastructure. Because the size of the dog population in Buea Municipality is unknown, the study was designed to estimate the sample seroprevalence of brucellosis in dogs and assess the various associated risk factors for the disease.

Methods

This research used a cross-sectional study design in which a total of 134 dogs were sampled from six communities, with 99 dog owners being interviewed to assess potential risk factors. Blood was collected from the animals and initially screened for *Brucella* antibodies using RBPT. Later testing was done with iELISA. For data analysis, SPSS version 25 was used and chi-square at a 95% confidence level was employed.

Results

The estimated sample seroprevalence of brucellosis in dogs by RBPT was 17.9% (24/134), while by iELISA it was 11.9% (16/134), thus indicating exposure to *Brucella* transmission amongst the dog population in the study area. Dogs owned by people who consume dog meat had higher rates of seropositivity, indicating exposure risks associated with behaviour and culture.

Conclusion

The present study documents the first evidence of *Brucella* antibody exposure and provides an estimated sample seroprevalence of brucellosis in dogs from Buea Municipality. Dog-related characteristics, including sex, local breeds, and free-roaming behavior, were explored for their potential risk association with *Brucella* seropositivity, but they were not significantly associated with *Brucella* antibody detection by either RBPT or iELISA in the study area. Enhanced veterinary surveillance, public health education, regulating dog-meat practices, and molecular identification of circulating strains are important for effective One Health control of brucellosis in Cameroon.

Introduction

Brucellosis is a widely spread zoonotic disease throughout the world, involving animals and humans, and is associated with substantial socioeconomic and public health impacts, especially in Low- and Middle-Income Countries (LMICs) [1][2]. The etiological agent is bacteria belonging to the genus *Brucella*; they are spread by direct interaction with diseased animals or by consuming animal products tainted with the pathogen [3]. Although historically, the epidemiology of brucellosis has been studied in livestock such as goats, cattle, and sheep, evidence is growing that dogs also have an important epidemiological role as spillover hosts and reservoirs, especially in settings with high levels of human-animal contact [4][5][6]. Poorly developed surveillance systems, low public awareness, and a lack of veterinary facilities are factors contributing to brucellosis being a neglected zoonotic disease in West Africa that often remains undiagnosed [7][8].

In West African countries like Nigeria, Ghana, and Sierra Leone, the seroprevalence rate of brucellosis in livestock and humans has been found to be variable across these areas [9][10][11][12]. These studies identified risk factors that include consuming raw animal products, which facilitate the spread of *Brucella* species [13]. However, despite these findings, research efforts in much of Central Africa, including Cameroon, have largely concentrated on brucellosis in small ruminants and bovines, with comparatively little attention given to brucellosis in dogs [14][15][16].

Brucellosis in dogs in Africa remains particularly poorly characterized, largely due to the limited availability of diagnostic tools specifically designed to detect *Brucella canis* [17]. As a result, many studies rely on general serological assays originally developed for *Brucella abortus* and *Brucella melitensis*. These limitations have contributed to the underrecognition of dog infections and an incomplete understanding of the role dogs may play in the epidemiology of brucellosis [18][19].

While consumption of dog meat, uncontrolled breeding practices, and the presence of free-roaming dogs are factors of an ecological and cultural nature that increase the risk of zoonotic transmission in Cameroon, especially in the Southwest Region [20][21], their potential role in maintaining brucellosis transmission cycles has been less discussed. *Brucella* seropositivity in cattle and abattoir workers was, however, confirmed in previous studies done in other regions of the country [15], but there is very limited information on the risk factors and seroprevalence of brucellosis in dogs in Cameroon.

The present study, therefore, assesses estimated sample seroprevalence and associated risk factors of brucellosis in dogs in Buea Municipality, an area experiencing rapid urbanisation with rising dog ownership and close human-animal interactions due to dog meat consumption. The findings aim to contribute preliminary evidence on dog exposure to *Brucella* spp. and to inform future species-specific studies, surveillance strategies, and One Health interventions in Buea municipality. In this study, commercially available serological kits and Rose Bengal reagents targeting *B. abortus* and *B. melitensis* were therefore used to assess exposure to *Brucella* spp. among dogs in Buea Municipality, providing preliminary evidence of dog involvement in brucellosis transmission cycles.

Materials and Methods

Study area

This research investigated dogs in Buea municipality, the Southwest region of Cameroon (Fig. 1). With an estimated 200,000 residents, Buea is a semi-urban area with a high concentration of domestic dogs [22]. Dogs are usually kept in the municipality's rural and peri-urban neighbourhoods for hunting, security, and companionship. The dog population consists of local, mixed, and increasingly imported dog breeds. Dog ownership practices vary according to socioeconomic status and access to veterinary services. This area also has an informal dog meat market, with limited public awareness regarding zoonotic diseases such as brucellosis.

Study Design and Sampling

A cross-sectional study was conducted from March to June 2025 in Buea Municipality, Cameroon, combining the serological screening of dogs to estimate exposure to *Brucella* spp. with the assessment of risk factors associated with dog owners.

Data on dog ownership practices were collected to identify behaviors and management conditions that may increase the likelihood of *Brucella* exposure among dogs, and to highlight potential zoonotic transmission pathways to humans. However, the study did not assess human infection directly; therefore, risk factors were evaluated only in relation to seropositivity in dogs.

Buea Municipality was used because there is no evidence of brucellosis in dogs in this region. Sampling was from dogs of both sexes aged 3 months and above. A total of 134 dogs were sampled, stratified by age, breed, housing status, site, and sex.

Since this was a cross-sectional descriptive study, the minimum sample size was calculated using the formula provided by [23], assuming a population size that is unlimited.

$$\text{Sample size (n)} = \frac{z^2 x p(1-p)}{d^2} \approx 88 \text{ dogs}$$

In this context, d represents the absolute error or precision, estimated at 5%. The variable z denotes the z-score of 1.96, corresponding to a 95% confidence interval. Finally, p signifies the anticipated proportion within the population, as derived from past studies (6.06%) [24]. The minimum required sample size was estimated at approximately 88 dogs; however, 134 dogs were ultimately sampled to improve the precision and robustness of the prevalence estimates.

Questionnaire Survey

The study adopted the questionnaire from a published article by [38]. The questionnaire was then modified to take into account the specifics of our study in Buea, Cameroon.

The structured questionnaire included a specific section designed to capture information on dog-meat consumption and associated practices among dog owners. Respondents were asked whether they consumed dog meat, the frequency of consumption, and the primary reasons for consumption. Additional questions assessed involvement in the sale of dogs or dog meat, the perceived economic importance of this activity, and slaughtering practices, including the location and hygiene conditions under which dogs were slaughtered.

Participants were also asked whether dog-meat consumption was linked to cultural beliefs or driven by other motivations. These variables were included to identify behaviors that may increase the risk of exposure to *Brucella* spp. and to explore potential zoonotic transmission pathways.

Serum Sample Collection

Five millilitres (5ml) of blood was drawn from the cephalic vein of each dog into a dry tube that was allowed to clot. Each was clearly marked and packed carefully in avoidance of any sort of contamination. Before being transferred to the laboratory, the blood sample was held at 4°C in a field thermo-cooler. To separate the serum from the blood cells, each clotted sample was centrifuged for 10 minutes at 3500 rpm. About 2ml of serum was pipetted and transferred into sterile, labelled cryotubes. The sera were stored at -20°C until they were analysed.

Serological Sample Analysis

The Rose Bengal Plate Test (RBPT)

The Rose Bengal Plate Test (RBPT) was carried out in accordance with [25]. Before being used, the serum and antigen were at room temperature. Equal volumes (30 µl) of the standardised *B. abortus* antigen Weybridge strain 99 and test serum were dispensed onto a clean glass plate and gently mixed using a disposable applicator stick. Thereafter, the mixture was spread, and rocked the plate for four minutes. The presence of agglutination, noted as positive, and the lack of agglutination within four minutes were considered negative.

Indirect Enzyme-Linked Immunosorbent Assay (iELISA)

Indirect Enzyme-Linked Immunosorbent Assay was carried out using the ID Vet kit (Innovative Diagnostics, Grabels, France) following the manufacturer's protocol without any alterations. This assay was done on a 96-well polystyrene plate precoated with purified *Brucella abortus* LPS antigen. According to [26], in this reaction, the multi-species HRP conjugate was used. After the removal of the unbound conjugate by washing, the substrate solution was added (TMB + DMSO + H₂O₂). The intensity of colour developed for the antigen-antibody conjugate-peroxidase complex depended on the of anti-*Brucella* antibodies level in the specimen being tested. Thus, presence of antibodies showed a blue solution, and it became yellow after the addition of the Stop Solution, and no colouration appeared when no antibodies were present. Measuring the optical density of each well was performed with an automated ELISA reader at a wavelength of 450 nm.

$$S/P\% = \frac{(OD_{\text{sample}} - OD_{\text{nc}})}{(OD_{\text{pc}} - OD_{\text{nc}})} \times 100, (1)$$

The optical density of the sample is represented by OD_{sample}, OD_{nc} denotes the negative control measurement, and OD_{pc} signifies the positive control reading. If the *S/P%* was equal to or greater than 120%, the samples were considered positive. If it was equal to or less than 110%, the samples were considered negative. If it was between 110% and 120%, the samples were considered doubtful. The test was also working correctly because OD_{pc} was greater than 0.350 and OD_{pc}/OD_{nc} was greater than 3.

Data analysis

The data collected was analysed using Microsoft Excel and SPSS statistical software (Version 25). To determine the degree of correlation between gender, age range, breed, and sampling site, the chi-square test was employed. A value of *p* < 0.05 was considered statistically significant.

Results

The detection of antibodies using both iELISA and RBPT confirms that dogs in the study area have been exposed to *Brucella* antigens, suggesting the presence of brucellosis in the dog population.

While these findings do not allow for species-specific identification, they demonstrate that dogs can harbor *Brucella* infections potentially attributable to *B. abortus* or *B. melitensis*. This supports the notion that dogs may play an underappreciated role in the epidemiology of brucellosis caused by these species, particularly in settings where dogs have close contact with livestock, humans, and contaminated

animal products. Importantly, the detection of *Brucella* antibodies in dogs highlights the potential zoonotic risk to humans, especially in communities where dog meat is consumed or where dogs are handled without appropriate protective measures.

Prevalence of *Brucella* antibodies in dogs

134 dogs were tested for *Brucella* antibodies using RBPT and iELISA. Based on the iELISA, which served as the confirmatory test, the overall estimated sample seroprevalence of brucellosis in dogs in Buea Municipality was 11.9% (16/134). The RBPT detected a higher seropositivity of 17.9% (24/134) (Tables 1 and 2) (Fig. 2).

Table 1
RBPT Prevalence

RBPT Results					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	110	82.1	82.1	82.1
	Positive	24	17.9	17.9	100.0
	Total	134	100.0	100.0	

Table 2
iELISA Confirmatory Test

iELISA Results					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	118	88.1	88.1	88.1
	Positive	16	11.9	11.9	100.0
	Total	134	100.0	100.0	

Diagnostic Performance of RBPT Compared with iELISA

The performance of RBPT was evaluated using iELISA as the reference standard. 10 true positives and 104 true negatives, with 14 false positives and 6 false negatives, RBT were identified. From the results, the sensitivity was 62.5%, and the specificity was 88.1%. The positive predictive value (PPV) was 41.7%, and the negative predictive value (NPV) was 94.5%. The overall diagnostic accuracy of RBPT relative to iELISA was 85.1% (Table 3).

Table 3
Contingency table comparing RBPT and iELISA results

RBPT result	iELISA Positive	iELISA Negative	Total
Positive	10 (True positive)	14 (False positive)	24
Negative	6 (False negative)	104 (True negative)	110
Total	16	118	134

Association Between Dog Demographics and *Brucella* Seropositivity

Analysis of demographic characteristics revealed no statistically significant associations between *Brucella* antibody prevalence and the dogs' sex ($p = 0.7823$), age group ($p = 0.2137$), breed ($p = 0.9705$), or sampling location ($p = 0.1130$). Although not significant, some descriptive patterns were noted. Dogs aged 37 + months had the highest seroprevalence (16.7%), while female dogs showed slightly higher positivity rates (12.5%) compared to other groups (Table 4 and Table 5).

Table 4

Seroprevalence of canine brucellosis in Buea communities based on RBPT and iELISA results layered by dog demographics

RBPT				iELISA				
Dog Characteristics	Negative (%)	Positive (%)	N	χ^2 -test	Negative (%)	Positive (%)	N	χ^2 -test
Sex								
Female (n = 88)	84.1	15.9	100	$\chi^2 = 0.6984$ $df = 1$	87.5	12.5	100	$\chi^2 = 0.07637$ $df = 1$
Male (n = 46)	78.3	21.7	100		89.1	10.9	100	
Grand Total	110	24	134	$P = 0.4033$	118	16	134	$P = 0.7823$
Age group (months)								
3–12 (n = 70)	85.7	14.3	100	$\chi^2 = 1.408$ $df = 2$	84.3	15.7	100	$\chi^2 = 3.087$ $df = 2$
13–36 (n = 52)	78.8	21.2	100		94.2	5.8	100	
37+ (n = 12)	75.0	25.0	100	$P = 0.4946$	83.3	16.7	100	$P = 0.2137$
Grand Total	110	24	134		118	16	134	
Breed								
Cane Corso (n = 5)	80	20	100	$\chi^2 = 31.49$ $df = 5$ $P = < 0.0001$	80	20	100	$\chi^2 = 0.8958$ $df = 5$ $P = 0.9705$
Cross (n = 22)	86.4	13.6	100		90.9	9.1	100	
German Sheperd (n = 11)	54.5	45.5	100		90.9	9.1	100	
Maltese (n = 1)	100	0	100		100	0	100	
Mongrel (n = 94)	84	16	100		87.2	12.8	100	
Rottweiler (n = 1)	100	0	100		100	0	100	
Grand Total	110	24	134		118	16	134	

Table 5
Seroprevalence of canine brucellosis in Buea communities based on RBPT and iELISA results, based on sampling site

RBPT				iELISA				
Sampling sites	Negative (%)	Positive (%)	N	χ^2 -test	Negative (%)	Positive (%)	N	χ^2 -test
Bomaka (n = 20)	85	15	100	$\chi^2 = 1.248$ $df = 5$ $P = 0.9402$	75	25	100	$\chi^2 = 8.903$ $df = 5$ $P = 0.1130$
Bosta Junction (n = 8)	75	25	100		100	0	100	
Great Soppo (n = 12)	91.7	8.3	100		100	0	100	
Mile 15/16 (n = 58)	81	19	100		84.5	15.5	100	
Molyko (n = 16)	81.3	18.8	100		100	0	100	
Tole (n = 20)	80	20	100		90	10	100	
Grand Total	110	24	134		118	16	134	

Seroprevalence of *Brucella* antibodies according to sampling sites

Seroprevalence varied across the six sampled communities, though the findings revealed no statistically significant ($p = 0.1130$) differences in *Brucella* antibody prevalence across the six sampling sites. However, dogs sampled from Bomaka had the highest seropositivity (25%), followed by Mile 15/16 (15.5%) and Tole (10%), while no positive cases were detected in Bosta Junction, Great Soppo, and Molyko. Despite these observed variations, they did not reach statistical significance (Table 5).

Findings from questionnaires: Assessing dog meat consumption

Only 99 dog owners were included because the questionnaire component targeted owners of the sampled dogs who were available and consented to participate. Among the 99 dog owners surveyed, only a small number 32 (32.3%) of participants consumed dog meat. Among those who consumed dog meat, most participants consumed it a few times in a month, 17 (53.1%). The primary reason for dog consumption was that it was tasty and enjoyable, 28 (87.5%). Most participants out of the 99 dog owners, 67 (67.7%), sold dog meat or dogs alive, and over half of the 32 dog owners, 17 (51.12%) reported that the income derived was very significant. Slaughtering practices were largely informal, with 87.5% of dog-meat consumers indicating that dogs were slaughtered at non-designated locations. Furthermore, half of the respondents 16 (50%) disagreed that dog-meat consumption is rooted in cultural traditions, suggesting that the practice is driven mainly by economic benefits and personal preference rather than by cultural beliefs. (Table 6).

Table 6
Assessing dog meat consumption among dog owners in Buea municipality

Variable	Category	Frequency	Percentage (%)
Dog meat consumption	No	67	67.7
	Yes	32	32.3
	Total	99	100
Frequency of consumption	Several times a week	7	21.8
	A few times a month	17	53.1
	Rarely	8	25
	Total	32	100
Reason for dog consumption	Tasty and enjoyable	28	87.5
	Express a sense of belonging	2	6.2
	Comparatively affordable protein source	2	6.2
	Total	32	100
Sell a dog alive or dog meat	No	32	32.3
	Yes	67	67.7
	Total	99	100
Significance of income	Very significant	17	51.125
	Somewhat significant	14	43.75
	Not very significant	1	3.125
	Total	32	100
Dog slaughter point	At home	2	6.25
	Non-applicable	1	3.125
	In the bush	1	3.125
	Anywhere possible	28	87.5
	Total	32	100
Dog meat and cultural belief	Strongly Disagree	4	12.5
	Disagree	16	50
	Neutral	7	21.9
	Agree	3	9.4
	Strongly agree	2	6.3
	Total	32	100

Discussion

This study evaluated the seroprevalence and potential associated risk factors of brucellosis in dogs by detecting the presence of *Brucella* antibodies in dogs. The RBPT, a screening technique, and iELISA were employed in this study as they are standard serological assays commonly suggested for epidemiological investigations of brucellosis Leuenberger *et al.* [27].

According to iELISA testing and RBPT results, the current study found that the estimated sample seroprevalence of brucellosis in dogs in Buea Municipality, Cameroon, was 11.9% and 17.9%, respectively, suggesting ongoing transmission within the dog population. Workers reported that this prevalence shows that *Brucella* is endemic in the region and may go unnoticed, causing a zoonotic risk to people. This

also depicts the active circulation of *Brucella* antibodies among dogs Darbaz *et al.* [28]. This agrees with the only earlier study that detected *Brucella* antibodies in dogs in southern Cameroon, Kamga *et al.* [24], who found a prevalence of 6.06% in domestic dogs in Nadougare using the iELISA test. The higher seroprevalence observed in Buea may be explained by management and behavioral factors that increase dogs' exposure to *Brucella* organisms Oosthuizen *et al.* [29]. Free movement of dogs allows frequent contact with contaminated environments, aborted animal materials, and livestock waste, all of which can harbor *Brucella* spp [30][31]. In addition, dog-meat consumption practices often involve informal slaughter and handling of animals without veterinary inspection, creating opportunities for dogs to ingest infected tissues or come into contact with contaminated blood and reproductive fluids. Close human–dog interactions further facilitate indirect exposure through shared environments and poor hygiene practices. Similar transmission pathways have been described in settings with unregulated dog movement and animal product handling [31][32], supporting the likelihood that these behaviors contribute to increased seroprevalence in dogs.

Compared to iELISA, RBPT proved to have a moderate sensitivity of 62.5% and a high specificity of 88.1%, hence being more reliable for ruling out the infection rather than definitely identifying all the infected animals. These results agree with a previous study by Sanogo *et al.* [33], which reported an RBPT sensitivity of 54.9% and a high specificity of 97.7% in the Ivory Coast's bovine brucellosis. The observed lower sensitivity in the current study may be attributed to variations in antibody titres at the early stages of the infection, antigen quality, and test conditions. Comparing the estimated seroprevalence in this study to other prevalence studies in livestock, this 11.9% is significantly higher than the 3.1% and 5.5% reported in cattle from Buea and Douala, Cameroon, respectively, using ELISA and PCR assays. The lower values in livestock, as compared to those from unofficial dog meat markets we found in our study, could be a result of regular veterinary inspections. Variations in geographical areas of study, sample sizes, diagnostic techniques, and sensitivity of the technique or dog management practices may reflect the differences [34][35]. The abundant free-roaming dogs, unregulated breeding, and limited veterinary care in Buea probably expose dogs to the infection.

These findings of the study corroborate observations by Hensel *et al.* [31] and Wareth *et al.* [36] that dogs could be exposed to *Brucella* spp. and act as reservoirs of infection cited in the statements of de Oliveira *et al.* [37].

In this study, several dog-related characteristics, including sex, local breeds, and free-roaming behavior, were explored for their potential association with *Brucella* seropositivity. However, the findings from the analysis showed that none of these variables were significantly associated with *Brucella* antibody detection by either RBPT or iELISA in the study area. Although higher seropositivity was observed descriptively among male dogs, older age groups, local breed, and free-roaming dogs. These findings are opposite to the report on seroprevalence and risk factors of brucellosis in dogs in Nigeria by Anyaoha *et al.* [38], where there was a significant association ($P < 0.05$) between the presence of *Brucella canis* antibodies and free-roaming dogs. Infection related to free-roaming dogs depicts a pattern similar to that observed in pastoral livestock, where animal movement and intermixing enhance transmission [15][24], and other factors such as scavenging, wildlife contact, and uncontrolled mating by Wilson-Aggarwal *et al.* [39].

The association of dog-meat consumption and infection risk constitutes an example of cultural and economic drivers of zoonotic transmission in Cameroon. Similarly, Barbosa *et al.* [20] described the same practices, citing poverty and cultural habits as driving factors for dog ownership and meat consumption. A total of 32.3% of all respondents acknowledged the consumption of dog meat, which normally occurs under unsanitary and unregulated conditions. This attitude may increase the risk of *Brucella* spillover to humans. Similar public health concerns have been raised in earlier studies stating the zoonotic threat of unregulated animal product consumption in Cameroon (Barbosa *et al.* [20] and Nigeria (Adesokan *et al.*, [7]).

In the current study, iELISA demonstrated a sufficient level of sensitivity in the detection of *Brucella* antibodies. According to Kamga *et al.* [24], there was a high concordance between RBPT and iELISA for cattle. However, unlike the livestock-focused studies that find *B. abortus* as the dominant species (Eko *et al.*, [40]), this study did not find evidence of the infecting species, which calls for molecular characterization in canine populations. The inability of the study to provide species identification is a limitation that the study shares with previous serological surveys conducted in Cameroon (Kamga *et al.*, [24], which observed that confirmation using PCR-based methods is important to clarify the diversity and movement of *Brucella* strains in Cameroon.

The detection of *Brucella* antibodies from urban dogs, as identified in Buea, signifies that brucellosis in dogs is a public health concern. The close contact between dogs and humans, especially at home, at slaughter slabs, or at unofficial dog-meat markets, poses a great risk for the zoonotic transmission of this infection. Thus, the results support the calls by Kamga *et al.* [24] and Ahmed *et al.* [41] for targeted control programs that consider multi-host species and local cultural practices. Regulating animal trade, ensuring slaughter hygiene, and incorporating veterinary services with public health education would go a long way in reducing transmission risks.

Conclusion and Recommendations

For the first time, the study reports the serological confirmation of *Brucella* infection in dogs within Buea Municipality. Estimated sample seroprevalences of 17.9% and 11.9% emphasize a neglected zoonotic reservoir that needs attention. In the cultural context of dog-meat consumption, unregulated animal movement, and low public knowledge, brucellosis in dogs is a health menace toward which One Health interventions and intersectoral monitoring are called for in order to protect human and animal health. The detection of antibodies against *Brucella* among free-roaming and mongrel dogs indicates that poor management of dogs, inadequate veterinary control, and unregulated activities in dog meat contribute to the perpetuation of the transmission.

These findings have far-reaching implications for animal health. Dog brucellosis is of concern to public health, with urgent attention needed in an urban and peri-urban setting where human-canine interaction is high. This would be of critical importance in mitigating this risk, with a unified One Health approach that incorporates veterinary medicine, human health screening, and community education. Indeed, the most basic ways of preventing such a disease are routine serological checking of dogs, controlling dog meat slaughter and trade, and targeted public awareness about zoonotic transmission.

In addressing these issues, the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA) should encourage regular serological testing among dogs, especially around high-risk settings like dog-meat markets and slaughterhouses, to help in the early detection and monitoring of *Brucella* infections. It is thus important that the Ministry of Public Health, MISANTE, undertakes community-based sensitization campaigns to make people aware of brucellosis, its zoonotic status, and prevention measures through good hygiene at the abattoir level, wearing protective clothes, and avoiding meat that is raw or undercooked.

Slaughtering, processing, and sales for consumption at the retail level of dog meat must fall under national policies or municipal policies designed and implemented by the Ministry of Public Health-MISANTE. Establish inspection criteria, as with livestock, to maintain the cleanliness of the practices that minimize public exposure. Encourage interagency coordination of veterinary, medical, and environmental health officers in establishing a uniform plan of action related to the surveillance, reporting, and management of zoonotic diseases. Future studies should prioritize the use of *B. canis*-specific serological and molecular diagnostics to determine the true burden of canine brucellosis and to clarify the role of *B. canis* in zoonotic transmission. Additionally, further investigation is required to assess the risk of human infection associated with dog handling and dog-meat consumption, thereby strengthening understanding of the public health implications of canine brucellosis within a One Health framework.

Limitations

- The serological assays used in this study were general *Brucella* tests designed primarily to detect antibodies against *Brucella abortus* and *Brucella melitensis* and were not specific for *Brucella canis*. Consequently, the study could not determine the exact *Brucella* species responsible for seropositivity in dogs.
- The sample size might not represent the large population of free-roaming dogs in Buea, and selection bias may apply.
- Questionnaire responses were self-reported by dog owners and may perhaps be prone to recall bias or social desirability bias, particularly in relation to sensitive activities such as the killing and consumption of dog meat.

Abbreviations

RBPT
Rose Bengal Plate Test
iELISA
Indirect Enzyme-Linked Immunosorbent Assay
LMICs
Low-and Middle-Income Countries
ID
Innovative Diagnostics
NPV
Negative Predictive Value
PCR
Polymerase Chain Reaction
MINEPIA

Declarations

Ethical considerations and consent to participate

The Research Foundation for Tropical Diseases and the Environment (REFOTDE) Institutional Animal Ethics Committee issued ethical clearance with reference number 001/RIAEC/2025 to carry out this study on dogs. Interacting with dog owners falls under a human participatory aspect of the research, and the ethical principles of the Declaration of Helsinki was observed. In addition, an informed verbal consent was sought from individual dog owners before data collection. Respondents' confidentiality was also maintained by coding the collected data.

Consent for publication

N/A

Competing interests

The authors declare that they have no competing of interest.

Funding

This work received no external funding.

Author Contribution

Tamdjo Moyopo Sharon Siegfried, Tanue Elvis Asangbeng , Anyizi Nkemnyi Bertha, Manchang Tanyi Kingsley, Lucy Mande Ndip, Benjamin Obukowho Emikpe : conceptualization or design of the work, methodology, data collection, and data analysis, writing – original draft. Abdul Rahman Yakubu, Prince Nana Takyi, Sampson Yeboah, Amemor Esther : methodology, investigation, manuscript writing, review, and editing. Benjamin Obukowho Emikpe : manuscript writing, review and editing, supervision

Acknowledgement

The authors would like to acknowledge Innovative Diagnostics (ID) Vet, Grabels, France, for their support with reagents, and the Laboratory for Emerging Infectious Diseases, University of Buea, Cameroon, for the facilities put at their disposal for the realization of this research project.

Data Availability

All data generated or analyzed during this study are available on a reasonable request from the corresponding author.

References

1. Franc KA, Krecek RC, Häsler BN, Arenas-Gamboa AM. Brucellosis remains a neglected disease in the developing world: a call for interdisciplinary action. BMC Public Health. 2018;18(1):125. 10.1186/s12889-017-5016-y. <https://link.springer.com/article/>.
2. Samadi A, Amiri M, Hailat N. The reasons behind long-term endemicity of brucellosis in low and middle-income countries: challenges and future perspectives. Curr Microbiol. 2024;81(3):82. <https://www.academia.edu/download/64560143/483.Brucella.pdf>.

3. Pal M, Kerorsa GB, Desalegn C, Kandi V. Human and animal brucellosis: a comprehensive review of biology, pathogenesis, epidemiology, risk factors, clinical signs, laboratory diagnosis. *Am J Infect Dis.* 2020;8(4):118–26. <https://www.academia.edu/download/64560143/483.Brucella.pdf>.
4. Dadar M, Alamian S. Investigation of small ruminant brucellosis among smallholder farms: the missing link in control programmes of endemic areas. *Zoonoses and Public Health.* 2021;68(5):376 – 83. https://onlinelibrary.wiley.com/doi/abs/10.1111/zph.12796?casa_token=7RrUd_2Os2UAAAAA:RkRLazdw_4mU8cPULdce9M9j-qFAO472H_kKbehLuhos1f93dIl60Tf9lv2v20LI1J6CgNdVBBQ1VNQ
5. Khurana SK, Sehrawat A, Tiwari R, Prasad M, Gulati B, Shabbir MZ, Chhabra R, Karthik K, Patel SK, Pathak M, Iqbal Yattoo M. Bovine brucellosis—a comprehensive review. *Veterinary Q.* 2021;41(1):61–88. 10.1080/01652176.2020.1868616. <https://www.tandfonline.com/doi/abs/>.
6. Gado DA, Ehizibolo DO, Meseko CA, Anderson NE, Lurz PW. Review of emerging and re-emerging zoonotic pathogens of dogs in Nigeria: Missing link in one health approach. *Zoonotic Diseases.* 2023;3(2):134 – 61. <https://www.mdpi.com/2813-0227/3/2/12>
7. Adesokan HK, Alabi PI, Ogundipe MA. Prevalence and predictors of risk factors for Brucellosis transmission by meat handlers and traditional healers' risk practices in Ibadan, Nigeria. *J Prev Med Hyg.* 2016;57(3):E164. <https://pmc.ncbi.nlm.nih.gov/articles/PMC5139612/>.
8. Aworh MK, Okolocha EC, Awosanya EJ, Fasina FO. Sero-prevalence and intrinsic factors associated with Brucella infection in food animals slaughtered at abattoirs in Abuja, Nigeria. *BMC Res Notes.* 2017;10(1):499. 10.1186/s13104-017-2827-y. <https://link.springer.com/article/>.
9. Cadmus SI, Alabi PI, Adesokan HK, Dale EJ, Stack JA. Serological investigation of bovine brucellosis in three cattle production systems in Yewa Division, south-western Nigeria. *J S Afr Vet Assoc.* 2013;84(1):1–6. 10.4102/jsava.v84i1.217. <https://journals.co.za/doi/abs/>.
10. Kaltungo BY, Saidu SN, Sackey AK, Kazeem HM. Sero-prevalence of brucellosis in sheep in North Senatorial District of Kaduna State, Nigeria. *Asian Pac J Trop Disease.* 2015;5(2):163–8. <https://www.sciencedirect.com/science/article/pii/S2222180814606460>.
11. Amegashie EA, Owusu-Dabo E, Salifu SP, Awuah AA, Baffour-Awuah S, Addofoh N, Annan A, Winter CH. Seroprevalence and occupational risk factors for Brucella infection among slaughterhouse workers and butchers in Kumasi, Ghana. *J Epidemiol Res.* 2017;3(1). <https://www.academia.edu/download/84090005/6240.pdf>
12. Kanu S. The Socio-Economic Impact of Brucellosis Outbreaks among Large and Small Ruminant under Extensive Nomadic Management System in Sierra Leone. In *Current Topics in Zoonoses* 2024 Jun 26. IntechOpen. <https://www.intechopen.com/chapters/89373>
13. Kauffman LK, Petersen CA. Canine brucellosis: old foe and reemerging scourge. *Veterinary Clinics: Small Animal Practice.* 2019;49(4):763 – 79. [https://www.vetsmall.theclinics.com/article/S0195-5616\(19\)30043-9/abstract](https://www.vetsmall.theclinics.com/article/S0195-5616(19)30043-9/abstract)
14. Bayemi PH, Mah GD, Ndamukong K, Nsongka VM, Leinyuy I, Unger H, Ndoumbe NM, Webb EC, Achukwi MD, Hakoue F, Luogbou ND. Bovine brucellosis in cattle production Systems in the Western Highlands of Cameroon. *Int J Anim Biology.* 2015;1(2):38–44. <https://www.academia.edu/download/76397557/70050038.pdf>.
15. Awah-Ndukum J, Mouiche MM, Kouonmo-Ngnoyem L, Bayang HN, Manchang TK, Poueme RS, Kouamo J, Ngu-Ngwa V, Assana E, Feussom KJ, Zoli AP. Seroprevalence and risk factors of brucellosis among slaughtered indigenous cattle, abattoir personnel and pregnant women in Ngaoundéré, Cameroon. *BMC Infect Dis.* 2018;18(1):611. 10.1186/s12879-018-3522-x. <https://link.springer.com/article/>.
16. Laine CG, Wade A, Scott HM, Krecek RC, Arenas-Gamboa AM. Scoping review of brucellosis in Cameroon: Where do we stand, and where are we going? *PLoS ONE.* 2020;15(9):e0239854. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0239854>.
17. Djokic V, Freddi L, de Massis F, Lahti E, van den Esker MH, Whatmore A, Haughey A, Ferreira AC, Garofolo G, Melzer F, Sacchini F. The emergence of Brucella canis as a public health threat in Europe: what we know and what we need to learn. *Emerg microbes infections.* 2023;12(2):2249126. 10.1080/22221751.2023.2249126. <https://www.tandfonline.com/doi/abs/>.
18. Godfroid J, Al Dahouk S, Pappas G, Roth F, Matope G, Muma J, Marcotty T, Pfeiffer D, Skjerve E. A One Health surveillance and control of brucellosis in developing countries: moving away from improvisation. *Comp Immunol Microbiol Infect Dis.* 2013;36(3):241–8. <https://www.sciencedirect.com/science/article/pii/S0147957112001014>.
19. Santos RL, Souza TD, Mol JP, Eckstein C, Paixão TA. Canine brucellosis: an update. *Front veterinary Sci.* 2021;8:594291. 10.3389/fvets.2021.594291/full. <https://www.frontiersin.org/articles/>.
20. Barbosa Costa G, Gilbert A, Monroe B, Blanton J, Ngam Ngam S, Recuenco S, Wallace R. The influence of poverty and rabies knowledge on healthcare seeking behaviors and dog ownership, Cameroon. *PLoS ONE.* 2018;13(6):e0197330.

- <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0197330>.
21. Fokeng AN, Voundi EV, Bediang G. Zoonotic risk practices in rural households: an analytical cross-sectional study in the Penka-Michel Health District, West Cameroon Region. *Pan Afr Med J One Health*. 2023;12. <https://www.ajol.info/index.php/pamjoh/article/view/277102/261416>
 22. Nkoke C, Jingi AM, Noubiap JJ, Teuwafeu D, Nkouonlack C, Gobina R, Djibrilla S, Abas A, Dzudie A. Gender differences in cardiovascular risk factors, clinical presentation, and outcome of patients admitted with a hypertensive crisis at the Buea Regional Hospital, Cameroon. *Int J Hypertens*. 2022;2022(1):3062526. 10.1155/2022/3062526. <https://onlinelibrary.wiley.com/doi/abs/>.
 23. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med*. 2013;35(2):121–6. 10.4103/0253-7176.116232. <https://journals.sagepub.com/doi/abs/>.
 24. Kamga RM, Silatsa BA, Farikou O, Kuiaite JR, Simo G. Detection of *Brucella* antibodies in domestic animals of southern Cameroon: Implications for the control of brucellosis. *Veterinary Med Sci*. 2020;6(3):410–20. 10.1002/vms3.264. <https://onlinelibrary.wiley.com/doi/abs/>.
 25. Alton GG, Jones LM, Angus RD, Verger JM. Techniques for the brucellosis laboratory. 1988. <https://www.cabidigitallibrary.org/doi/full/10.5555/19892297928>
 26. Saegerman C, De Waele L, Gilson D, Godfroid J, Thiange P, Michel P, Limbourg B, Vo TO, Limet J, Letesson JJ, Berkvens D. Evaluation of three serum i-ELISAs using monoclonal antibodies and protein G as peroxidase conjugate for the diagnosis of bovine brucellosis. *Vet Microbiol*. 2004;100(1–2):91–105. <https://www.sciencedirect.com/science/article/pii/S0378113504000537>.
 27. Leuenberger R, Boujon P, Thür B, Miserez R, Garin-Bastuji B, Rüfenacht J, Stärk KD. Prevalence of classical swine fever, Aujeszky's disease and brucellosis in a population of wild boar in Switzerland. *Vet Rec*. 2007;160(11):362–8. 10.1136/vr.160.11.362. <https://bvajournals.onlinelibrary.wiley.com/doi/abs/>.
 28. Darbaz İ, Ergene O. *Brucella canis* and Public Health Risk. *Cyprus J Med Sci*. 2019;4(1):52–7. https://www.researchgate.net/profile/Isfendiyar-Darbaz/publication/332737086_Brucella_canis_and_Public_Health_Risk/links/5cd2858b92851c4eab899689/Brucella-canis-and-Public-Health-Risk.pdf.
 29. Oosthuizen J, Oguttu JW, Etsebeth C, Gouws WF, Fasina FO. Risk factors associated with the occurrence of *Brucella canis* seropositivity in dogs within selected provinces of South Africa. *J S Afr Vet Assoc*. 2019;90(1):1–8. https://www.scielo.org.za/scielo.php?pid=S1019-91282019000100010&script=sci_arttext.
 30. Coelho AC, Díez JG, Coelho AM. Risk factors for *Brucella* spp. in domestic and wild animals. In *Updates on brucellosis 2015 Nov 19*. IntechOpen. <https://www.intechopen.com/chapters/49295>
 31. Hensel ME, Negron M, Arenas-Gamboa AM. Brucellosis in dogs and public health risk. *Emerg Infect Dis*. 2018;24(8):1401. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6056133/>.
 32. Marami LM, Gebremedhin EZ, Sarba EJ, Tola GK, Endalew SS, Melkamsew AT, Di Marco Lo Presti V, Vitale M. Seroprevalence and associated risk factors of canine *Leptospira* and *Brucella* species infection in West Shewa Zone, Central Ethiopia. *Veterinary Medicine: Research and Reports*. Feb. 2021;26:33–42. 10.2147/VMRR.S297155. <https://www.tandfonline.com/doi/abs/>.
 33. Sanogo M, Thys E, Achi YL, Fretin D, Michel P, Abatih E, Berkvens D, Saegerman C. Bayesian estimation of the true prevalence, sensitivity and specificity of the Rose Bengal and indirect ELISA tests in the diagnosis of bovine brucellosis. *Vet J*. 2013;195(1):114–20. <https://www.sciencedirect.com/science/article/pii/S1090023312002390>.
 34. Njeru J, Wareth G, Melzer F, Henning K, Pletz MW, Heller R, Neubauer H. Systematic review of brucellosis in Kenya: disease frequency in humans and animals and risk factors for human infection. *BMC Public Health*. 2016;16(1):853. 10.1186/s12889-016-3532-9. <https://link.springer.com/article/>.
 35. Adetunji SA, Ramirez G, Foster MJ, Arenas-Gamboa AM. A systematic review and meta-analysis of the prevalence of osteoarticular brucellosis. *PLoS Negl Trop Dis*. 2019;13(1):e0007112. <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0007112>.
 36. Wareth G, Melzer F, El-Diasty M, Schmoock G, Elbauomy E, Abdel-Hamid N, Sayour A, Neubauer H. Isolation of *Brucella abortus* from a dog and a cat confirms their biological role in re-emergence and dissemination of bovine brucellosis on dairy farms. *Transbound Emerg Dis*. 2017;64(5):e27–30. 10.1111/tbed.12535?casa_token=hKmq4ecZMi4AAAAA:nxfV_3AVyQiimOSmuu2xRB5XzpDazS_RYG_I9aYrEToslDaF39B9AtqS42gffDWQbGkjfpAyyvLFU. <https://onlinelibrary.wiley.com/doi/abs/>.
 37. de Oliveira AL, de Macedo GC, Rosinha GM, Melgarejo JL, Alves AG, Barreto WT, Santos FM, Campos JB, Herrera HM, de Oliveira CE. Detection of *Brucella* spp. in dogs at Pantanal wetlands. *Brazilian J Microbiol*. 2019;50(1):307–12. 10.1007/s42770-018-0006-5. <https://link.springer.com/article/>.

38. Anyaoha CO, Majesty-Alukagberie LO, Ugochukwu IC, Nwanta JA, Anene BM, Oboegbulam SI. Seroprevalence and risk factors of brucellosis in dogs in Enugu and Anambra states, Nigeria. *Revista de Medicina Veterinaria*. 2020 Jun(40):45–59. http://www.scielo.org.co/scielo.php?pid=S0122-93542020000100045&script=sci_arttext
39. Wilson-Aggarwal JK, Ozella L, Tizzoni M, Cattuto C, Swan GJ, Moundai T, Silk MJ, Zingeser JA, McDonald RA. High-resolution contact networks of free-ranging domestic dogs *Canis familiaris* and implications for transmission of infection. *PLoS Negl Trop Dis*. 2019;13(7):e0007565. <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0007565>.
40. Eko SM, Esemu SN, Njouendou AJ, Kfusi AJ, Anong ND, Ndip LM. Identification and Prevalence of *Brucella* Species Circulating among Cattle Slaughtered in the Douala and Buea Municipalities of Cameroon. *Veterinary Med Int*. 2023;2023(1):2068948. 10.1155/2023/2068948. <https://onlinelibrary.wiley.com/doi/abs/>.
41. Ahmed MM, Okesanya OJ, Othman ZK, Ibrahim AM, Adigun OA, Ukoaka BM, Abdi MI, Lucero-Prisno DE III. Holistic Approaches to Zoonoses: Integrating Public Health, Policy, and One Health in a Dynamic Global Context. *Zoonotic Dis*. 2025;5(1):5. <https://www.mdpi.com/2813-0227/5/1/5>.

Figures

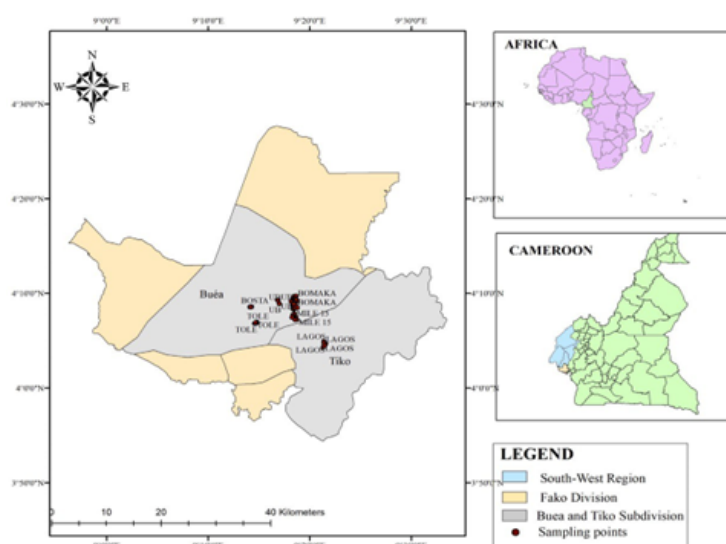


Figure 1

Map of the study area showing Buea Municipality, Southwest Region of Cameroon, and the six sampling communities included in the study



Figure 2

Visual representation of agglutination seen with RBPT

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SeroprevalenceQuestionnaireDogowners.pdf](#)