Rabies Knowledge, Attitudes and Preventive Practices Among Dog Owners in Abuja Municipal Area Council, Nigeria: Evidence of a Gap Between Awareness and Preventive Action

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ABSTRACT

Rabies remains an important zoonotic disease in Nigeria, with domestic dogs serving as a major source of human exposure. Dog owners play an important role in rabies prevention through dog management, vaccination decisions and responses to animal bites. Understanding their knowledge, attitudes and reported practices can help identify areas requiring targeted public health education. This study assessed knowledge, attitudes and reported preventive practices relating to rabies among dog owners in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria. A descriptive cross-sectional study was conducted among 254 dog owners selected through convenience sampling between November 2022 and April 2023. Data were collected using a structured questionnaire developed by the researcher. The questionnaire assessed sociodemographic characteristics and respondents' knowledge, attitudes and reported practices relating to rabies prevention and control. Data were summarised using descriptive statistics, with categorical responses presented as frequencies and percentages. Almost all respondents (99.0%) had heard about rabies, while 93.4% identified bites from rabid dogs as a route of transmission and 90.9% recognised vaccination as a preventive measure. However, only 36.1% selected the response that rabies cannot be cured after clinical signs develop. Approximately 56% believed that rabies could be cured after symptoms appeared. Regarding attitudes, 96.0% indicated that they would request a rabies vaccination record when obtaining a new puppy, while 80.9% would report a puppy bite. However, only 46.6% indicated that they would report a bite from an unfamiliar puppy. For reported practices, 85.8% indicated that their dogs were vaccinated against diseases other than rabies, while 57.3% reported using veterinary clinics for vaccination. In addition, 53.8% expressed willingness to house a stray puppy, and 71.9% considered playing with a puppy encountered anywhere acceptable or not a major concern. The findings indicate widespread awareness of basic rabies-related information among participating dog owners, alongside specific gaps in responses concerning the outcome of clinical rabies, puppies, vaccination and appropriate action following animal bites. Targeted public health education, improved access to professional veterinary services and coordinated One Health interventions are important for strengthening rabies prevention among dog-owning communities.

Keywords: *Rabies, dog owners, knowledge, attitudes, preventive practices, Abuja, Nigeria*



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INTRODUCTION

Rabies is a deadly viral neurological disorder in mammals. Caused by the Rabies virus, a member of the genus Lyssavirus and family Rhabdoviridae (Wunner and Conzelmann, 2020). The virus is primarily spread when an infected animal bites a person. Transmission can also occur when infected saliva comes into contact with broken skin or mucous membranes (Riccardi *et al*., 2021). After onset of clinical symptoms, rabies is nearly always fatal (Khairullah *et al*., 2023). This makes rabies an important public health concern, particularly in settings where prevention and timely access to post-exposure care are limited.

Rabies is most prevalent in developing countries. More than 99% of human rabies deaths occur in these settings (Haselbeck *et al*., 2021). The true burden may also be higher than reported figures suggest. Many cases may go undiagnosed and unreported due to inadequate access to healthcare, insufficient laboratory confirmation, and underreporting (Yang *et al*., 2025). This underestimation can compromise public health planning efforts, as the number of reported cases might not be true to the level of transmission. Rabies control, therefore, needs to be directed at both the prevention of the disease and the system for the detection and reporting of cases.

In developing countries, dogs are a major reservoir for rabies transmission and are the main source of human infection in these settings (Mulipukwa *et al*., 2017). Unvaccinated dogs can contract the virus and transmit it to humans and other animals through bites or scratches (Ghasemzadeh and Namazi, 2015). Dog vaccination is therefore a central component of rabies prevention because it reduces transmission from dogs to people (Zhu and Guo, 2016). However, vaccination programmes may be less effective where access to veterinary services is limited. Community education, outreach, and engagement are also important because the actions of dog owners and communities can influence vaccination decisions, dog management, and responses to animal bites (Tidman *et al*., 2022).

Nigeria continues to face this public health challenge. Mshelbwala *et al*. (2021) and Adesola *et al*. (2023) reported human rabies as a major public health burden in the country. Evidence from different parts of Nigeria confirms that human deaths continue to occur. Adamu and Audu (2012) reported 78 rabies fatalities in 10 Nigerian states, but no laboratory confirmation. Eke *et al*. (2015) reported six laboratory-confirmed rabies cases among 149 dog-bite cases recorded over 10 years. All six confirmed cases were fatal (Eke *et al*., 2015). Additional surveillance information also indicates that the reported burden may underestimate the issue. According to Abubakar *et al*. (2024), only 998 suspected human rabies cases were reported nationally from 2017 to 2022. Mshelbwala *et al*. (2021) reported prevalence estimates of 3% and 28% in Nigeria and observed that available studies were more concentrated in the northern part of Nigeria. When combined with suboptimal surveillance and diagnostic capacity, the uneven distribution of available evidence presents challenges to accurately define the national burden. This concern is particularly important given the substantial number of dog-bite cases reported among children in Nigeria (Mshelbwala *et al*., 2021).

The epidemiological challenges make the community level of prevention more important. Owners of dogs play a significant role especially in decisions that can affect dog vaccination, handling, keeping, and reaction to dog bites (Mshelbwala *et al*., 2024). Knowledge, attitudes and practices can thus influence the likelihood of exposure and the adoption of suitable preventive measures. The use of KAP surveys to measure these factors in target populations is useful (Jaiyesimi *et al*., 2024; Okonkwo *et al*., 2025). They can also detect knowledge deficits and inappropriate practices prior to the implementation of health education and intervention programmes (Andrade *et al*., 2020; Maulana *et al*., 2025).

Despite the acknowledged burden of rabies in Nigeria, it is clear that there is a need for local evidence to inform the understanding and reactions of dog owners to rabies prevention. National figures and hospital-based reporting can give good information on the occurrence of the disease, but less information on the knowledge, attitudes and practices that can influence exposure and prevention at the household level. The relevance of the evidence provided from the Abuja Municipal Area Council is especially significant, as the area has a very large population of dog owners in the Federal Capital Territory. Knowledge, Attitudes, and Practices can be used to determine specific misconceptions and behaviours that may hinder rabies prevention.

The present study therefore assessed the knowledge, attitudes and practices of dog owners regarding rabies prevention in Abuja Municipal Area Council, Nigeria, and examined factors associated with good knowledge, good attitudes and good practices. The findings provide local evidence to inform targeted health education, responsible dog ownership, improved vaccination coverage, and community-based approaches to rabies prevention in Nigeria.

MATERIALS AND METHODS

Study design and population

A descriptive cross-sectional study was conducted among dog owners in Abuja Municipal Area Council (AMAC), Federal Capital Territory (FCT), Nigeria (Figure 1). The study population comprised individuals who owned dogs within the study area. A total of 254 dog owners were recruited using convenience sampling. Data collection was carried out between November 2022 and April 2023.

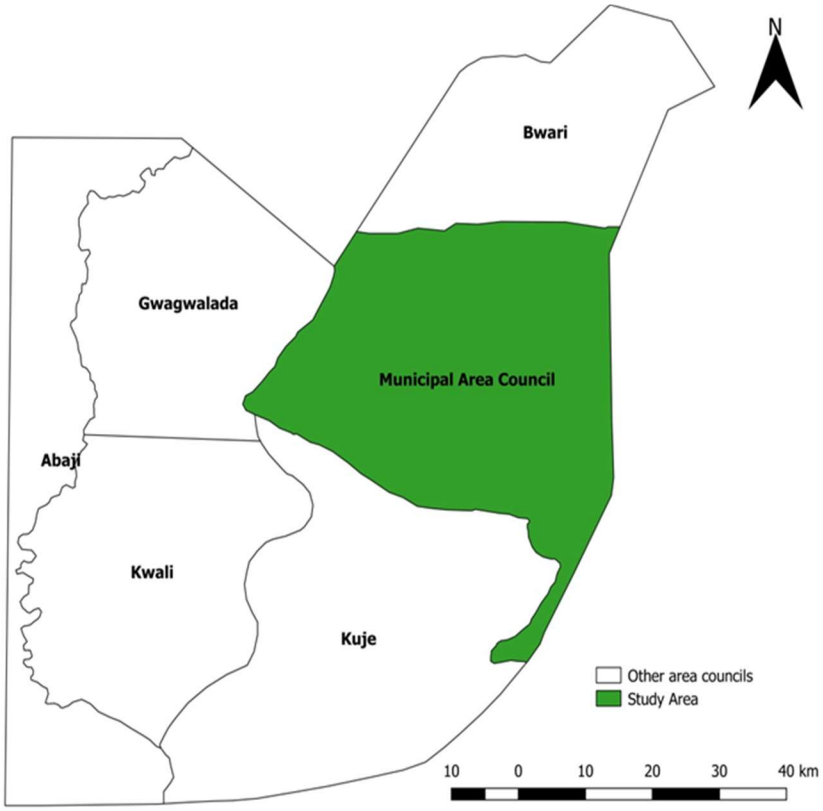

Figure 1: Map of the Federal Capital Territory, Nigeria, showing the Municipal Area Council.

Data collection instrument

Data were collected using a structured questionnaire developed by the researcher to obtain information on respondents' sociodemographic characteristics and their knowledge, attitudes and reported practices relating to rabies prevention and control. The questionnaire comprised sections addressing rabies awareness, modes of transmission, clinical signs, prevention and control, as well as respondents' attitudes and reported practices concerning dog vaccination and potential exposure to rabies. The knowledge section comprised 13 questions covering awareness of rabies, modes of transmission, the main reservoir of rabies in Nigeria, clinical signs, the occurrence of rabies in puppies, the outcome of clinical rabies, vaccination, vaccination timing and frequency, maternal immunity, responses to puppy bites, rabies control measures and vaccination of confined dogs. The attitude section comprised five items assessing respondents' responses to puppy bites, willingness to keep puppies from unknown sources, willingness to request rabies vaccination records when acquiring a new puppy, responses to bites from unfamiliar puppies and intended actions when their own puppies bite other people.The practice section assessed reported dog vaccination arrangements and interactions with stray or unfamiliar puppies. The items covered vaccination against diseases other than rabies, methods of dog vaccination, willingness to house stray puppies and responses concerning interactions with puppies in unfamiliar locations.

Data management and statistical analysis

The collected data were entered, checked and cleaned using Microsoft Excel. Statistical analysis was performed using R statistical software, version 4.2.2. Descriptive statistics were used to summarise respondents' sociodemographic characteristics and their responses to the knowledge, attitude and practice questions. Categorical variables were presented as frequencies and percentages. No composite KAP score or good/poor classification was applied in the present analysis. Some respondents did not provide answers to all questionnaire items, resulting in variations in the number of valid responses across the KAP sections. The available denominators for the knowledge, attitude and practice summaries were 241, 247 and 253, respectively, compared with the overall sample of 254 respondents. Percentages were calculated using the corresponding denominators available in the original analysis.

Ethical considerations

Ethical approval was obtained from the Ethical Committee of the Ministry of Agriculture and Rural Development Services, Federal Capital Development Authority. Informed consent was obtained from participants before data collection. Participants were assured that the information they provided would be treated confidentially.

RESULTS

Sociodemographic characteristics of respondents

A total of 254 dog owners participated in the study. As presented in (Table 1), males constituted 60.6% (154/254) of the respondents, while females accounted for 39.4% (100/254). Respondents aged 10–30 years represented the largest age group (34.3%), followed by those aged 31–40 years (26.8%) and 41–50 years (20.9%). Respondents aged 51–60 years and 61–70 years accounted for 11.4% and 6.7%, respectively. Most respondents had tertiary education (75.6%), while 9.8% had secondary education, 8.7% had no formal education and 5.9% had primary education. Regarding duration of dog ownership, 65.4% had kept dogs for less than five years, 18.5% for 6–10 years and 16.1% for 11–50 years.

Table 1. Sociodemographic and dog ownership characteristics of respondents (N = 254)

Characteristic	n (%)
Sex	
Female	100 (39.4)
Male	154 (60.6)
Age (years)	
10–30	87 (34.3)
31–40	68 (26.8)
41–50	53 (20.9)
51–60	29 (11.4)
61–70	17 (6.7)
Education	
No formal education	22 (8.7)
Primary	15 (5.9)
Secondary	25 (9.8)
Tertiary	192 (75.6)
Duration of keeping dogs (years)	
<5	166 (65.4)
6–10	47 (18.5)
11–50	41 (16.1)

Knowledge of rabies among respondents

The responses indicated widespread awareness of rabies among the respondents. Of the 241 respondents included in the knowledge summary, 238 (99.0%) had heard about rabies. A total of 225 (93.4%) identified a bite from a rabid dog as a route of transmission, while 227 (94.2%) identified dogs as the main rabies reservoir in Nigeria. Biting of people and objects was identified as a sign of rabies in dogs by 230 respondents (95.4%). Regarding rabies in puppies, 187 respondents (77.6%) indicated that puppies could have rabies. A total of 87 (36.1%) selected the response indicating that clinical rabies cannot be cured once symptoms develop. Although 219 respondents (90.9%) recognised vaccination as a preventive measure, only 87 (36.1%) selected annual vaccination as the vaccination frequency. Furthermore, 209 respondents (86.7%) selected three months as the appropriate age for first vaccination. Knowledge gaps were also evident in responses concerning maternal immunity and rabies control. Only 24 respondents (10.0%) selected the response previously coded as correct for the maternal immunity question. In addition, 199 respondents (82.6%) expressed concern about puppy bites, while only 29% selected regular vaccination as the most effective method of rabies control. Restriction of dog movement was selected by 43% of respondents.

Attitudes towards rabies prevention

A total of 247 respondents contributed to the attitude summary. Most respondents (198; 80.9%) indicated that they would report a puppy bite to a veterinary clinic, health facility or police authority. A large proportion (237; 96.0%) stated that they would request a rabies vaccination record when acquiring a new puppy. Similarly, 215 respondents (87.0%) indicated that they would take a person to hospital if their puppy bit someone. However, responses to other potential exposure situations were less favourable. Only 115 respondents (46.6%) indicated that they would report a bite from an unfamiliar puppy. Approximately half (49.8%) expressed willingness to keep a puppy from an unknown source, while about 30% were uncertain about doing so. Some respondents indicated that they would take no action if the biting dog had been vaccinated, while others indicated that they would kill the dog if its vaccination status was unknown.

Reported practices and responses concerning dog vaccination and puppy interactions

The practice section had 253 valid responses. A total of 217 respondents (85.8%) reported that their dogs were vaccinated against diseases other than rabies. Regarding the reported method or location of vaccination, 145 respondents (57.3%) used veterinary clinics, 51 (20.2%) reported vaccination at home by a veterinarian, 46 (18.2%) reported vaccination at home by another person able to vaccinate, and 11 (4.3%) reported vaccinating their dogs themselves.

With respect to interactions with unfamiliar puppies, 136 respondents (53.8%) indicated that they would be willing to house a stray puppy. Furthermore, 182 respondents (71.9%) considered playing with a cute puppy

Table 2: Selected knowledge, attitude and practice indicators regarding rabies among dog owners in Abuja Municipal Area Council, Nigeria.

Domain	Indicator	n (%)
Knowledge (N=241)	Had heard about rabies	238(99.0)
	Identified bite from a rabid dog as a transmission route	225 (93.4)
	Identified dog as the main rabies reservoir in Nigeria	227 (94.2)
	Identified biting of objects and people as a sign of rabies in dogs	230 (95.4)
	Knew that puppies can have rabies	187 (77.6)
	Selected that clinical rabies cannot be cured after symptoms develop	87 (36.1)
	Recognised vaccination as a method of rabies prevention	219 (90.9)
	Selected three months as the first vaccination age	209 (86.7)
	Selected annual vaccination frequency	87 (36.1)
	Selected the response coded for maternal immunity	24 (10.0)
	Expressed concern about puppy bites	199 (82.6)
Attitude (N=247)		
	Would report a puppy bite	198 (80.9)
	Would request a vaccination record for a new puppy	237 (96.0)
	Would report a bite from an unfamiliar puppy	115 (46.6)
	Would take a person to hospital after their puppy bites them	215 (87.0)
Practice (N=253)		
	Reported vaccination of dogs against diseases other than rabies	217 (85.8)
	Reported vaccination at a veterinary clinic	145 (57.3)
	Would be willing to house a stray puppy	136 (53.8)
	Considered playing with a cute puppy anywhere acceptable	182 (71.9)

anywhere to be acceptable or not a major concern. These responses indicate that interactions with puppies of unknown origin or vaccination status were common considerations among respondents. The distribution of selected knowledge, attitude and practice responses is presented in (Table 2).

DISCUSSION

The study assessed knowledge, attitudes and reported preventive practices relating to rabies among dog owners in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria. The findings revealed high awareness of some basic aspects of rabies, particularly its transmission through dog bites and the role of vaccination in prevention. However, responses to other questions indicated areas requiring further attention, particularly beliefs about the outcome of clinical rabies, the potential risk associated with puppies, dog vaccination, and appropriate responses to animal bites. The findings also showed differences between respondents' answers to general rabies-related questions and their stated intentions or reported practices concerning dog management and potential exposure. The findings are comparable with a 2024 study among dog owners in Sabon Gari Local Government Area, Kaduna State, Nigeria, which also reported high general awareness of rabies alongside important gaps in understanding disease transmission, fatality and vaccination (Ibrahim *et al*., 2024) . The similarity in these findings suggests that awareness of rabies does not necessarily translate into comprehensive understanding of the disease. This reinforces the need for public health education that goes beyond general awareness to address specific misconceptions relevant to rabies prevention. Almost all respondents (99.0%) had heard about rabies, while 93.4% identified bites from rabid dogs as a route of transmission. Similarly, 94.2% identified dogs as the main reservoir of rabies in Nigeria, and 95.4% recognised biting of people and objects as a possible sign of rabies in dogs. These responses indicate that basic awareness of rabies was widespread among the participating dog owners. Such awareness is important because dog owners influence decisions concerning dog vaccination, handling and management, all of which are relevant to rabies prevention (Awuni *et al*., 2019; Mshelbwala *et al*., 2024). Nevertheless, awareness of the disease and its transmission do not necessarily mean that dog owners are adequately informed about all aspects of prevention and exposure management. One important finding concerned respondents' understanding of the outcome of clinical rabies. Only 36.1% selected the response that rabies cannot be cured after clinical signs develop, while approximately 56% believed that the disease could be cured after symptoms appeared. This response pattern is concerning because clinical rabies is almost invariably fatal once symptoms develop (Khairullah *et al*., 2023). The finding highlights the need for clear public health messages explaining the fatal nature of clinical rabies and the importance of seeking prompt medical attention following a potentially infectious animal bite. Previous studies in Nigeria have reported the use of traditional remedies in place of prompt medical care following dog bites (Apeh *et al*., 2021; Mshelbwala *et al*., 2025). Although the present study did not establish whether respondents

who held this belief were more likely to delay seeking care, the responses identify an important subject for targeted health education. Responses concerning puppies and maternal immunity also deserve attention. Although 77.6% of respondents indicated that puppies could have rabies, approximately 60% believed that puppies from vaccinated dams cannot transmit rabies, while about 30% were unsure. These findings suggest that respondents held differing views about the potential rabies risk associated with puppies. Previous studies have documented rabies in young puppies in Nigeria, demonstrating that young age should not be assumed to exclude the possibility of infection (Maurice *et al*., 2018; Konzing *et al*., 2025). Maternal antibodies may provide passive protection to puppies, but this protection declines over time and does not remove the need for appropriate vaccination (Niewiesk, 2014; Pimburage *et al*., 2017). The responses therefore reinforce the importance of providing dog owners with practical information on puppy health, vaccination and safe handling.

Most respondents (90.9%) recognized vaccination as a preventive measure against rabies. However, responses concerning vaccination frequency varied: 36.1% selected annual vaccination, while approximately half selected monthly vaccination. Vaccination schedules should be communicated clearly to dog owners, with advice based on the applicable vaccine product and national veterinary recommendations. Dog vaccination remains a central component of dog-mediated rabies control (Wallace *et al*., 2020). The findings therefore support the need for accessible and consistent information on rabies vaccination, including the importance of maintaining appropriate vaccination records. Their findings highlighted the influence of rabies knowledge, access to veterinary services, vaccination costs and vaccine hesitancy on dog vaccination decisions. Similarly, Vakuru and Kwaghe (2024) identified low recorded antirabies vaccination prevalence and operational challenges affecting rabies vaccination programmes in Nigeria. These findings emphasize that improving vaccination requires not only educating dog owners but also addressing practical barriers to accessing reliable veterinary services.

The attitude responses showed that many respondents expressed willingness to take certain preventive actions. For example, 80.9% indicated that they would report a puppy bite, 96.0% would request a rabies vaccination record when obtaining a new puppy, and 87.0% stated that they would take a person to hospital if their own puppy bit someone. These responses are encouraging because reporting animal bites, verifying vaccination history and obtaining appropriate medical assessment are important components of rabies prevention and exposure management (Charniga *et al*., 2023). However, only 46.6% indicated that they would report a bite from an unfamiliar puppy. This difference suggests that respondents stated intentions varied according to the circumstances of the bite. The findings highlight the importance of communicating that any potential animal bite requires prompt assessment, regardless of whether the animal is familiar or reportedly vaccinated. Previous Nigerian studies have also described situations in which traditional remedies were used following dog bites instead of prompt medical care (Apeh *et al*., 2021; Mshelbwala *et al*., 2025). Recent studies from other African settings have also highlighted the importance of translating rabies awareness into appropriate preventive responses. A study among pastoralist communities in Kenya, (Gitonga *et al*., 2025) reported relatively high rabies knowledge but low levels of responsible dog ownership and rabies vaccination.

A total of 85.8% of respondents reported that their dogs were vaccinated against diseases other than rabies. Veterinary clinics were the most frequently reported vaccination location or arrangement (57.3%), followed by vaccination at home by a veterinarian (20.2%). However, 18.2% reported vaccination at home by another person able to vaccinate, while 4.3% reported vaccinating their dogs themselves. Nevertheless, the reported reliance on vaccination arrangements outside veterinary clinics highlights the value of improving access to qualified veterinary services and encouraging appropriate vaccination practices and record keeping.

More than half of the respondents (53.8%) indicated that they would be willing to house a stray puppy, while 71.9% regarded playing with a cute puppy encountered anywhere as acceptable or not a major concern. These responses represent stated willingness and perceptions rather than directly observed behaviour. However, they identify opportunities for public health education on responsible dog ownership, safe interaction with unfamiliar animals and the importance of establishing the vaccination and health status of dogs before handling them. Such education is particularly relevant in settings where dogs may have unknown vaccination histories.

The findings have implications for rabies prevention and control in Nigeria. Although basic awareness of rabies was widespread among the respondents, the responses also identified specific areas where additional information may be needed. These include the fatal outcome of clinical rabies, the potential risk associated with puppies, appropriate dog vaccination, and the actions to take following bites from familiar or unfamiliar animals. Educational messages should be practical and delivered through channels that dog owners regularly access, including veterinary clinics, dog registration and vaccination services, animal adoption activities and community outreach programmes. The fact that 65.4% of respondents had kept dogs for fewer than five years also provides an opportunity to incorporate rabies education into routine guidance for new dog owners. A coordinated One Health approach would further strengthen these interventions. Veterinary services can support professional

dog vaccination, vaccination record keeping and responsible dog ownership, while human health facilities can reinforce the importance of prompt wound management and post-exposure assessment. Community-based education and collaboration between veterinary and public health authorities can help ensure that dog owners receive consistent information on rabies prevention and the appropriate response to animal bites (Tidman *et al*., 2022). Such collaboration is important for improving awareness, strengthening preventive practices and supporting wider efforts towards rabies control. The relevance of a coordinated One Health approach is also reflected in recent research from Ghana. Dwaah *et al*. (2026) reported limitations in community knowledge, dog vaccination and appropriate health-seeking behavior following suspected rabies exposure.

Limitations

This study has some limitations. The cross-sectional design provides information on respondents' answers at the time of data collection but does not establish causal relationships or determine whether knowledge influenced attitudes or practices. Convenience sampling may also limit the generalisability of the findings to all dog owners in AMAC, the Federal Capital Territory or Nigeria. In addition, the study relied on self-reported information, which may have been affected by recall and social desirability biases. The questionnaire was developed by the researcher to obtain information on respondents' sociodemographic characteristics and their knowledge, attitudes and reported practices relating to rabies prevention and control. Consequently, the findings should be interpreted as descriptive responses to the questions administered rather than definitive measurements of overall knowledge, attitudes or practices. Furthermore, some respondents did not provide answers to all questionnaire items, resulting in different denominators across the knowledge, attitude and practice sections. Despite these limitations, the study provides descriptive information on rabies-related knowledge, attitudes and reported practices among participating dog owners in AMAC, identifying areas that may benefit from targeted education and improved access to veterinary and public health services.

Conclusion

This study provides descriptive information on knowledge, attitudes and reported preventive practices relating to rabies among dog owners in Abuja Municipal Area Council, Nigeria. Although awareness of rabies transmission and vaccination as a preventive measure was widespread among respondents, important gaps were observed in responses concerning the outcome of clinical rabies, the potential risk associated with puppies, vaccination and appropriate responses to animal bites. The findings also identified stated intentions and reported practices relating to dog vaccination arrangements and interactions with unfamiliar puppies that warrant further public health attention. Rabies prevention programmes should therefore combine general awareness campaigns with practical education on the fatal nature of clinical rabies, appropriate dog vaccination, safe handling of unfamiliar animals and prompt medical assessment following animal bites. Strengthening access to qualified veterinary services, encouraging appropriate vaccination and record keeping, and improving collaboration between veterinary and human health sectors through a One Health approach are recommended. These interventions may help address the specific information needs identified among the participating dog owners and contribute to broader efforts to prevent dog-mediated rabies.

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