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Assessment of Perception of Rabies Infection Risk among Dog Handlers and Dog Meat Consumers in Plateau State, Nigeria

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ABSTRACT

The risk of rabies exposure via atypical means such as handling dogs that have uncertain vaccination status, handling/processing and eating dog meat make public enlightenment inevitable. A cross-sectional study was conducted among dog handlers, dog meat handlers, and consumers at dog sales/slaughter locations and sales points of dog meat in the three major dog markets in Plateau State, Nigeria. Structured questionnaires were randomly administered to 150 respondents via face-to-face interviews or self-administered. Data collected were analyzed using IBM® SPSS® statistics version 23.0. Chi-squared test of association was conducted to determine the relationship between socio-demographic characteristics and perceived risk of rabies exposure among respondents. Binary logistic regression models were used to determine the strength of the association. Logistic regression models were statistically significant for the combination of sex and tertiary educational background to predict likelihood that respondents would eat all parts of dog meat, $\chi 2$ (2) = 7.023, P-value = 0.03. The effect size was between 6.2% (Cox and Snell R^2) and 8.4% (Nagelkerke R^2) of the variance in likelihood to eat all parts of dog meat and correctly classified as 60.9% of cases. Educational background was the only statistically significant predictor variable (p-value=0.016; 95% CI: 0.16– 0.83), as respondents in the higher educational cadre (tertiary) have a better perception of risk of rabies and are not likely to eat all parts of the dog meat nor a rabid dog. The study reveals the significance of taking appropriate actions to ensure rabies control and prevention, rather than having mere head knowledge of the disease. Strict policies against indiscriminate dog trade, uninspected slaughter, and improper processing of dog meat, are necessary steps to prevent disease incursions via atypical means.

Keywords: Rabies, risk perception, non-bite exposure, dog meat, Nigeria

INTRODUCTION

Despite control efforts by stakeholders, the incidence of rabies is on the increase in most developing countries of the world. Studies have shown that the frequency of dog bites with attendant rabies infection is high in Nigeria (Garba *et al.*, 2005; Tekki *et al.*, 2016; Iwuozo *et al.*, 2022). This is attributed to an increase in the population of dogs that have not been immunized against rabies (Odita *et al.*, 2019), increase risk of transmission of rabies from domestic dogs to in-contact humans (Odita *et al.*, 2021) who live in communities where stray dogs abound, in addition to a preponderance of live-dog markets (Ajayi *et al.*, 2006). Consumption of dog meat is documented in 15 countries (https://taazakhabarnews.com/dogs-in-the-pot/); and accordi ng to the research by the National Institute of Hygiene and Epidemiology (NIHE) 2007-2009, man-dog close association via the dog meat markets and consumption of dog meat in Vietnam were additional means of human exposure to rabies (Nguyen *et al.*, 2011).

In Nigeria, consumption of dog meat is particularly common in 13 of the 36 States of the Federation, (Cross River, Akwa Ibom, Ondo, Osun, Kaduna, Plateau, Taraba, Gombe, Adamawa, Niger, Bauchi, Kebbi and Abia States) as well as the FCT Abuja (Ajayi *et al.*, 2006; Ekanem *et al.*, 2013; Odeh *et al.*, 2013). Despite evidence that suggest possibilities of atypical means of rabies virus transmission to humans other than a bite from a rabid dog (Tasiame *et al.*, 2022), little or no efforts have been made to evaluate the perception of risk of rabies transmission through dog slaughter, processing and dog meat consumption among the

concerned communities. This study examines the perception of the risk of rabies virus infection among a population of dog meat handlers/ butchers or processors and dog meat consumers in Plateau State, Nigeria.

MATERIALS AND METHODS

Study Area

Plateau state, with Jos as the Capital City, is in the North-central zone of Nigeria. It is located between latitude 8°24' N & 10°30' N and longitude 8°32' E & 10°38' E. The state is bordered to the north by Bauchi state, to the northwest by Kaduna state, to the northeast by Taraba state, and the south by Nasarawa state.

Study Design

A cross-sectional study was conducted at dog sales/slaughter locations and sales points of dog meat in *Kasuwan kare* dog market, Bwandang community in Jos south LGA, *Dawaki* and *Ampare* dog markets in *Kanke* LGA, Plateau State.

Study Population

The study population included live-dog handlers, dog meat handlers and consumers at dog sales/slaughter locations and sales points of dog meat in *Kasuwan kare*, *Dawaki* and *Ampere* dog markets in Plateau state.

Eligibility Criteria

Inclusion criteria

A respondent qualified for inclusion in the study if they were live-dog handlers, dog meat handlers and consumers at study locations.

Exclusion criteria

Respondents were excluded from the study if they were not seen participating in the dog meat business at study locations

Questionnaire Administration and Management

Oral consent was obtained and structured questionnaires were randomly administered to 150 respondents based on convenience as study locations were difficult terrains. Questionnaire administration was via face-to-face interviews or self-administered. Interviews were conducted in *Hausa* and English languages, being the common languages of communication in the study locations. The questionnaire was divided into four sections. **'Section A'** covered the demographic characteristics of the study population (name, gender, age, marital status, educational level, and occupation). **'Section B'** investigated dog ownership among respondents. **'Section C'** assessed dog meat eating habits while **'section D'** assessed respondents' knowledge about rabies and the mode of transmission of the disease.

Data Analysis

Data collected were analyzed using **IBM® SPSS®** statistics 23 (New York: Routledge, 2016 ©2016). Educational background was categorized into two viz-: higher cadre (tertiary) and lower cadre (informal, primary and secondary). Chi-squared test of association was conducted to determine the relationship between socio-demographic characteristics and perceived risk of rabies exposure among respondents. Binary logistic regression models were then used to determine the strength of the association. P-values were considered significant at $p < 0.05$. The results were presented in tables, maps, and pictures.

RESULTS

The Demographics, Ownership Status, and Assessment of rabies Knowledge among Respondents in the Study Locations are shown on Tables 1-4

Socio-Demographic Characteristics of the Respondents

Of the 150 questionnaires administered, only 120 were recovered. Out of the 120 respondents, 91 (75.8%) were males, mostly between the ages of 31-40 years (42.9%), and married 78 (85.7%). Many of the male respondents 39 (42.9%) were government workers with a tertiary form of education 44 (48.4%). Female respondents were mostly between the ages of 20-30 years (41.4%), predominantly self-employed 13 (44.8%) and mostly married 25 (86.2%) with primary and secondary level of education (55.2%) (Table 1).

Table 1: Demographic Characteristics of Respondents in Study Location

Variable	Status	Respondents n = 120 (%)	Male [n = 91 (%)]	Female [n = 29 (%)
Age (Years)	20 -30	35 (29.2)	30 (32.9)	5 (17.2)
	31– 40	52 (43.3)	39 (42.9)	13 (44.8)
	> 40	33 (27.5)	22 (24.2)	11 (38)
Marital status	Single	14 (11.7)	11 (12.1)	3 (10.3)
	Married	103 (85.8)	78 (85.7)	25 (86.2)
	Divorced	0 (0)	0 (0)	0 (0)
	Widowed	3 (2.5)	2 (2.2)	1 (3.5)
Level of education	Informal	16 (13.3)	10 (10.9)	6 (20.7)
	Primary	20 (16.7)	12 (13.2)	8 (27.6)
	Secondary	33 (27.5)	25 (27.5)	8 (27.6)
	Tertiary	51 (42.5)	44 (48.4)	7 (24.1)
Occupation	Unemployed	15 (12.5)	6 (6.6)	9 (31)
	Civil servant	45 (37.5)	39 (42.9)	6 (20.7)
	Self-employed	38 (31.7)	25 (27.5)	13 (44.8)
	Farmer	21 (17.5)	20 (21.9)	1 (3.5)
	Driver	1 (0.8)	1 (1.1)	0.0(0)

Dog Ownership Status

The dog ownership status variable presents respondents' answers to questions regarding their reasons for keeping dogs, and their Veterinary Health-seeking practice. Majority 82 (68.3%) of respondents keep dogs primarily for security reasons. Local breed of dogs was owned by 94 (78.3%) and more respondents (68.4%) consult Veterinary Care for treatment of sicknesses and other conditions in their dogs more than for anti-rabies vaccination (31.6%). This may not be unconnected to the effect of sickness on the market value of their dogs (Table 2)

Table 2: Dog Ownership Status among Respondents

Variable	Frequency [N=120 (%)]
Do you keep a dog(s)?	
Yes	97 (80.8)
No	23 (19.2)
Reasons for keeping dog(s)	
Pet	2 (1.7)
Food	6 (5.0)
Trade	8 (6.7)
Security	82 (68.3)
Hunting	0 (0.0)
Others	22 (18.3)
Type (breed) of dog owned	
Local	94 (78.3)
Exotic	0 (0.0)
Mixed	5 (4.2)
Don't know	21 (17.5)
Veterinary care for a dog	
Yes	79 (65.8)
No	17 (14.2)
Prefer not to answer	24 (20.0)
Type of Veterinary care	
Vaccination	38 (31.6)
Treatment for sickness	41 (34.2)
Others	41 (34.2)

Respondents' Knowledge of Rabies

One hundred and fifteen (95.8%) respondents had heard of rabies, out of which 105 (87.5%) could identify the disease. Over 80.0% of the respondents had seen a rabid dog and also know that humans can contract rabies. Seventy-two (60.0%) respondents had seen at least a case of rabies in humans, 92 (76.7%) know how rabies is contracted, 34.0% of respondents have eaten rabid dog meat while 11 (9.2%) know that rabies can be contracted via consumption of dog meat (Table 3).

Table 3: Knowledge Assessment of Risk of Rabies

Variable	Number of Respondents [N=120 (%)]
Have you heard of rabies?	
Yes	115 (95.8)
No/ I don't know	5 (4.2)
Have you seen rabid dog before?	
Yes	98 (81.7)
No/ I don't know	22 (18.3)
Can you identify a rabid dog?	
Yes	105 (87.5)
No/ I don't know	15 (12.5)
Signs seen	
Barking	7 (5.8)
Salivation	47 (40.0)
Biting	34 (29.2)
Abnormally quiet	10 (10.8)
Others	7 (14.2)
Have you seen signs of rabies in other animals?	
Yes	58 (48.3)
No/ I don't know	62 (51.7)
Can humans contract rabies?	
Yes	103 (85.8)
No/ I don't know	17 (14.2)
Do you know how rabies is contracted?	
Yes	92 (76.7)
No/ I don't know	28 (23.3)
Have you seen a human case of rabies?	
Yes	72 (60.0)
No/ I don't know	48 (40.0)
Can eating dogs cause rabies?	
Yes	11 (9.2)
No/I don't know	109 (90.8)
Have you eaten rabid dog meat before?	
Yes	41 (34.2)
No	70 (58.3)
Not sure	9 (7.5)

Risk of Rabies Exposure among Respondents

Of all respondents, more than 90.0% had eaten dog meat at some point, 58.3% of them purchase dog meat from the market, 29.2% eat dogs freshly killed and processed at home while the remaining respondents make purchases from food joints, hawkers, and other sources. Dog meat processing is mostly by cooking, about 60.0% eat all parts of the meat including the head. Forty-eight (40.0%) of respondents had

sustained bite or scratch injuries during handling or processing dog, of which only 15.0% sought appropriate medical interventions. Others either self medicated, visited herbalists, Veterinary Doctors or did nothing. The respondents who sought after Veterinary Doctors might have gotten enlightenment on appropriate post-exposure prophylaxis (PEP) to prevent infection (Table 4)

Table 4: Assessment of Rabies Risk among Respondents

Variable	Frequency [N=120 (%)]
Do you eat dog meat?	
Yes	112 (93.3)
No	6 (5.0)
Prefer not to answer	2 (1.7)
What is the source of dog meat you eat?	
Freshly killed at home	35 (29.2)
Market	70 (58.3)
Food joint	2 (1.7)
Hawker	1 (0.8)
Others	12 (10.0)
Do you process the meat yourself?	
Yes	44 (36.7)
No	60 (50.0)
Prefer not to answer	16 (13.3)
Method of processing	
Cooking	68 (56.7)
Roasting	10 (8.3)
Frying	4 (3.3)
Flaying	0 (0.0)
Others	38 (36.7)
Do you eat all parts of the meat?	
Yes	70 (58.3)
No	39 93.5)
Prefer not to answer	11 (9.2)
Do you sustain bite or scratch injuries while handling dogs?	
Yes	48 (40.0)
No	58 (48.3)
Prefer not to answer	14 (11.7)
Type/source of exposure interventions	
Self-medication	23 (19.2)
Hospital	18 (15.0)
Herbalist	7 (5.8)
Veterinary doctor	11 (9.2)
Nothing	8 (6.7)

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Univariate and Multivariate Analyses of Socio-Demographic Characteristics of the Respondents and Perceived Risk of Rabies

A binary logistic regression model was designed to determine if sex and educational background could predict the likelihood that respondents would eat rabid dogs, eat all parts of dog meat including the head, obtain appropriate post-exposure intervention, should they get bitten during handling, slaughtering, and processing, and if they thought eating dog meat could predispose them to rabies.

The results of the logistic regression model were statistically significant for the combination of sex and educational (tertiary) background to predict the likelihood that respondents would eat all parts of dog meat, $\chi 2$ (2) = 7.023, P-value = 0.03. The model predicted an effect size of between 6.2% (Cox and Snell R^2) and 8.4% (Nagelkerke R^2) respectively, of the variance in likelihood to eat all parts of dog meat and correctly classified 60.9% of cases. Of the two predictor variables, only educational background (tertiary) was statistically significant. Estimated risk to eat all parts of dog meat among this category of respondent was 0.4, P-value = 0.016; 95% CI: 0.161 – 0.827 (Table 5). The results of the logistic regression models for the combination of sex and educational background to predict the likelihood of respondents to eat rabid dogs ($\chi 2$ (2) = 5.643, P-value = 0.06), obtain appropriate post-exposure intervention ($\chi 2$ (2) = 2.411, P-value = 0.3), and perceive the risk of rabies infection ($\chi 2$ (2) = 4.636, P-value = 0.09) from dog consumption were however not statistically significant (Table 5). Of the two predictor variables for the likelihood that respondents would eat rabid dogs, effect of sex alone was significant (P-value = 0.028; 95% CI: 0.101 – 0.876) with an estimated risk of 0.3 to eat rabid dog (Table 5). Similarly, the effect of educational level alone was mildly significant (P-value = 0.049; 95% CI: 1.004 - 16.835) for perception of risk of rabies infection as respondents, especially in the higher educational level were more than four times likely to have perception of rabies risk (Table 5).

Dog handlers and traders were sometimes bitten in the process of their routine operations as depicted on Plate A.

Plate A: Right palm of a dog handler bitten and treated using local medications

Table 5: Regression analysis for predictors of rabies risk perception among dog handlers and dog meat consumers

1) **Dependent variable: Eat all parts of dog meat**								
Variable	**Odds**	**Std. Error**	**Sig.**	**OR**	**95% CI**		**χ2**	**P-Value**
					Upper bound	**Lower bound**		
Sex	- .691	.474	.145	.501	.198	1.269		
Education	- 1.008	.417	.016	.365	.161	.827		
Regression output for a combination of sex and educational background to eat all parts of dog meat							7.023	0.03
2) **Dependent variable: Eat rabid dog meat**								
Variable	**Odds**	**Std. Error**	**Sig.**	**OR**	**95% CI**		**χ2**	**P-Value**
					Upper bound	**Lower bound**		
Sex	-1.210	.550	.028	.298	.101	.876		
Education	-.074	.412	.857	.928	.414	2.082		
Regression output for a combination of sex and educational background to eat rabid dog meat							5.643	.06
3) Dependent variable: Rabies risk perception								
Variable	**Odds**	**Std. Error**	**Sig.**	**OR**	**95% CI**		**χ2**	**P-Value**
					Upper bound	**Lower bound**		
Sex	-.090	.845	.915	.914	.174	4.786		
Education	1.414	.719	.049	4.112	1.004	16.835		
Regression output for a combination of sex and educational background to perceive risk of rabies infection							4.636	.098
4) **Dependent variable: To obtain appropriate PEP intervention**								
Variable	**Odds**	**Std. Error**	**Sig.**	**OR**	**95% CI**		**χ2**	**P-value**
					Upper bound	**Lower bound**		
Sex	-.388	.564	.491	.678	.225	2.048		
Education	.552	.448	.219	1.736	.721	4.180		
Regression output for a combination of sex and educational background to obtain appropriated PEP							2.411	.300

DISCUSSION

The results of this study showed that majority (95.8%) of respondents have awareness about rabies and can identify the disease. Many of them had seen cases of rabies in humans and dogs. However, almost all respondents did not think that rabies can be contracted via consumption of dog meat. Some participants had even eaten rabid dog meat without fear of contracting the disease. The results of the current study is similar to that by Awuni *et al*. (2019), where more than 70.0% of study participants had some knowledge about rabies transmission contrary to the findings in some other studies where only 60.5% (Ameh *et al*., 2014) and 55.0% -70.0% (Pal *et al*., 2021) of respondents did. Rabies awareness among dog owners should be a veritable safeguard against the disease scourge in humans as it is expected to propel dog owners to vaccinate their animals. This was the case in a study by Ishola *et al.* (2021), where rabies awareness in 86.9% of dog owners propelled vaccination in 82.6% of the dog population studied.

However, head knowledge and awareness about the disease do not always translate to adequate precautions. In the current study, a large proportion of respondents did not think that exposure to dog meat and/or its consumption could predispose them to rabies. This probably, explains the reasons why many of them were not taking appropriate post-exposure interventions whenever they were exposed during dog handling and dog meat processing.

An understanding of the factors that influence voluntary intentions of dog owners and handlers to take appropriate precautions is important for effective rabies control. A study by Beyene *et al.* (2018), seeking to understand what influences dog owners' intentions to vaccinate their dogs, showed that knowledge about rabies, though positively associated with intentions to vaccinate, was not useful because distance from vaccination centers was a barrier.

In the current study, sex was significantly associated with the habit of eating rabid dog meat (P-value = 0.028). None of the female respondents answered 'yes' to eating rabid dog meat. This may not be unconnected with the careful disposition of females to issues relating to their health as women have been noted to pay better attention to their health (Budesa *et al*., 1994; Ek, 2015).

Furthermore, educational level was associated with the perception of risk of rabies infection (P-value=0.049; OR=4.1), as respondents with higher educational qualifications had better perception of rabies risk compared to those at lower levels. Educational level was equally associated with the choice of meat portion (P-value = 0.016; OR=0.4) and thus a lower likelihood to consume all parts of dog meat including the brain, where the concentration of rabies virus is highest. Awuni *et al*. (2019) also found educational level to be associated with good knowledge of rabies and dog vaccination. Education has been seen as an important tool for appropriate health decision-making (Kazadi *et al.*, 2017). Although acquisition of formal education may not be feasible for all dog owners, handlers and consumers, public enlightenment via television, radio, and other social media may be used by government, non-governmental organizations, and other stakeholders in Nigeria, to fight the scourge of rabies.

In a bid to achieve the global agenda of rabies elimination by 2030, atypical means of rabies transmission should be addressed. This is possible via activities that enhance rabies risk perception among concerned groups with lower educational level and involvement in dog trade.

Conclusion

Head knowledge and awareness about rabies are not as much of a problem but the translation of these into appropriate actions that help to control rabies in the study locations. Majority of our study respondents have knowledge that do not translate into taking appropriate precautions against rabies. Factors that influence converting head knowledge into a useful tool for taking the right approach to rabies prevention among dog owners, handlers and consumers need to be investigated. In addition to vaccination of dogs and administration of PEP to exposed people, government interventions in form of strict policies that prohibit indiscriminate dog trade, slaughter, and processing of dog meat need to be promulgated. Where this is not feasible, ante- and post-mortem inspection of slaughter dogs by Veterinary Officers are inevitable. Authors of this research believe that the foregoing strict measures targeted against atypical means of rabies transmission would be an additional useful approach in the drive towards rabies elimination in Nigeria by 2030.

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Conflict of Interest

The authors declare that they have no conflict of interest.

Authors Contribution

CAM, VII and IST conceived the idea, designed the study and drafted the original manuscript; BA and EP collected or facilitated data collection; LK provided additional data from the field; CIO, VII and ETA processed and analysed the data; TIS and OIC reviewed and prepared the final manuscript; All authors carried out final editing of the manuscript; MM approved the final version of the manuscript.

REFERENCES

Ajayi, B. B., Rabo, J. S. and Baba, S. S. (2006). Rabies in apparently healthy dogs: histological and immunohistochemical studies. *The Nigerian Postgraduate Medical Journal*, *13*(2), 128–134. Retrieved from https://europepmc.org/article/med/16794650. Accessed August 23, 2022

Ameh, V. O., Dzikwi, A. A. and Umoh, J. U. (2014). Assessment of knowledge, attitude and practice of dog owners to canine rabies in Wukari metropolis, Taraba State, Nigeria. *Global Journal of Health Science*, *6*(5), 226–240. https://doi.org/10.5539/gjhs.v6n5p226

Awuni, B., Tarkang, E., Manu, E., Amu, H., Ayanore, M. A., Aku, F. Y., Ziema S., A., Bosoka,S., A., Adjuik, M.and Kweku, M. (2019). Dog owners' knowledge about rabies and other factors that influence canine anti-rabies vaccination in the Upper East region of Ghana. *Tropical Medicine and Infectious Disease*, *4*(3), 1–13. https://doi.org/10.3390/tropicalmed4030115

Beyene, T. J., Mindaye, B., Leta, S., Cernicchiaro, N., and Revie, C. W. (2018). Understanding factors influencing dog owners' intention to vaccinate against rabies evaluated using health belief model constructs. *Frontiers in Veterinary Science*, *5*(JUL), 1–9. https://doi.org/10.3389/fvets.2018.0015

Budesa, T., Egnor, E. and Howell, L. (1994). Gender Influence on Perceptions of Healthy and Unhealthy Lifestyles Tracy Bud. *Hispanic*. Retrieved from https://digitalcommons.unf.edu/ojii_volumes/3/ Accessed on 23rd August, 2022

Consumption of dog meat is documented in 15 countries (https://taazakhabarnews.com/dogs-in-the-pot/) Accessed March 10, 2023

Ek, S. (2015). Gender differences in health information behaviour: A Finnish population-based survey. *Health Promotion International*, *30*(3), 736–745. https://doi.org/10.1093/heapro/dat063

Ekanem, E. E., Eyong, K. I., Philip-Ephraim, E. E., Eyong, M. E., Adams, E. B. and Asindi, A. A. (2013). Stray dog trade fuelled by dog meat consumption as a risk factor for rabies infection in Calabar, Southern Nigeria. *African Health Sciences*, *13*(4), 1170–1173. https://doi.org/10.4314/ahs.v13i4.44

Garba, A., Oyetunde, I.L., Kumbish, P.R., Clement, A.M, Chiko, .L.K., Ahmed, I.S., Lapang,H.B, Dashe, Y., tuned, O. and Banyigyi S.A. (2005). A retrospective study of bitting dogs and rabies in vom, plateau state. *Vom Journal of Veterinary Science, I (2) 57-63*.

Ishola, O. O., Ohore, O. G. and Adigun, O. D. (2021). Rabies awareness among dog owners and detection of antibody levels against rabies in dogs presented for treatment at selected veterinary clinics in Abeokuta, Ogun state, Nigeria. *Veterinaria Italiana*, *57*(1), 71–77. https://doi.org/10.12834/VetIt.1787.9429.2

Iwuozo, E. U., Kohol, E. S., Okeke, A. U., Bitto, T. T., Mbaave, T. P. and Ogiator, M. O. (2022). An Eight-Year Review of the Frequency and Outcome of Dog Bite and Clinical Rabies in a Teaching Hospital in North Central Nigeria. *World Journal of Neuroscience*, *12*(04), 203–215. https://doi.org/10.4236/wjns.2022.124021

Kazadi, E. K., Tshilenge, G. M., Mbao, V., Njoumemi, Z., & Masumu, J. (2017). Determinants of dog owner-charged rabies vaccination in Kinshasa, Democratic

Republic of Congo. *PLoS ONE*. https://doi.org/10.1371/journal.pone.0186677

Nguyen, A. K. T., Nguyen, D. V., Ngo, G. C., Nguyen, T. T., Inoue, S., Yamada, A., Dinh, X.K., Nguyen, D. V., Phan, T. X., Pham, B. Q., Nguyen,H. T. andNguyen, H. T. H. (2011). Molecular epidemiology of rabies virus in Vietnam (2006-2009). *Japanese Journal of Infectious Diseases*, *64*(5), 391–396. https://doi.org/10.7883/yoken.64.391

Odeh, L., Umoh, J. and Dzikwi, A. (2013). Assessment of Risk of Possible Exposure to Rabies among Processors and Consumers of Dog Meat in Zaria and Kafanchan, Kaduna State, Nigeria. *Global Journal of Health Science*, *6*(1), p142. https://doi.org/10.5539/GJHS.V6N1P142

Odita, C I, Tekki, I. S., Moses, D. G., Barde, J. I., Egwu, K. O., Idachaba, S. E., Ahmed, J. S ., Ifende, V. I. , Makanju, O. , Ugbe, D. A. , Zhakom, P. N. , Nzekwe, E. , Watsamanda, N., Okpala, G. , Dashe, Y., Nwosuh, C., Okewole, P., A. and Shamaki, D. (2019). Dog anti-rabies vaccination coverage in Jos South LGA of Plateau State , Nigeria. *Sokoto Journal of Veterinary Sciences*, 17(3), 56 - 59. http://dx.doi.org/10.4314/sokjvs.v17i3.5

Odita, Christianah Ibironke, Tekki, I. S., Abass, A., Barde, I. J., Hambolu, E. S., Moses, G. D., Davou, J. A,, Dashe, Y., Nwosuh, C., Ocholi, R. and Mohammad, M. (2021). Effects of road networks and human population density on the risk of dog bite incidents and rabies in Nigeria. *International Journal of Public Health, Pharmacy and Pharmacology*, 6(1), 25-38.

Pal, P., Yawongsa, A., Bhusal, T. N., Bashyal, R. and Rukkwamsuk, T. (2021). Knowledge, attitude, and practice about rabies prevention and control: A community survey in Nepal. *Veterinary World*. https://doi.org/10.14202/vetworld.2021.933-942

Tasiame, W., El-Duah, P., Johnson, S. A. M., Owiredu, E. W., Bleicker, T., Veith, T., Schneider, J., Emikpe, B., Folitse1, R. D., Burimuah, V., Akyereko, E., Drosten, C. and Corman, V. M. (2022). Rabies virus in slaughtered dogs for meat consumption in Ghana: A potential risk for rabies transmission. *Transboundary and Emerging Diseases*, *69*(4), e71–e81. https://doi.org/10.1111/tbed.14266

Tekki, S. I., Odita, C. I., Idachaba, S. E., Akanbi, B., Moses, D. G., Barde, J. I., and Al, E. (2016). Dog Bites and Rabies: A Decade Perspective in Nigeria (2005-2014). *World's Veterinary Journal*, *6*(1), 19–24.