PREVALENCE OF RABIES IN SLAUGTHERED DOGS AND KNOWLEDGE, ATTITUDE AND PRACTICE OF RESIDENTS OF ABUJA MUNICIPAL AREA COUNCIL OF THE FEDERAL CAPITAL TERRITORY, NIGERIA TOWARDS RABIES

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FEBRUARY, 2014

ATTESTATION

I declare that the work in this thesis entitled "Prevalence of rabies in slaughtered dogs and knowledge, attitude and practice of residents of Abuja Municipal Area Council of the Federal Capital Territory, Nigeria towards rabies" was carried out by me in the Department of Community Medicine under the supervision of Prof. J.U. Umoh and Dr. A.A. Dzikwi of the Department of Veterinary Public Health, Faculty of Veterinary Medicine, Ahmadu Bello University Zaria.

The information derived from literatures have been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at any university.

Edukugho, Aboyowa Arayuwa _____ _____

Name of Student Signature Date

CERTIFICATION

This dissertation titled "PREVALENCE OF RABIES IN SLAUGTHERED DOGS AND KNOWLEDGE, ATTITUDE AND PRACTICE OF RESIDENTS OF ABUJA MUNICIPAL AREA COUNCIL OF THE FEDERAL CAPITAL TERRITORY, NIGERIA TOWARDS RABIES" by Edukugho, Aboyowa Arayuwa meet the regulations governing the award of the Degree of Master of Public Health in Veterinary Epidemiology of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation

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DEDICATION

This project work is dedicated to God Almighty for the privilege of being part of this programme and the help He gave to me through the course of this work.

This work is also dedicated to my loving and ever helpful wife, Caroline and sweet children, Temisan, Itse and Tosan for their understanding and to my parents, Rev (Dr) and Rev (Mrs) Alfred Odeworitse Edukugho for their prayers, support, belief in me and the good foundation that was set for me early in my life.

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ABBREVIATIONS

AMAC	Abuja Municipal Area Council
B.C.	Before Christ
CDC	Centers for Disease Control and Prevention
DFA	Direct Fluorescent Antibody
FAT	Fluorescent Antibody Test
FCT	Federal Capital Territory
KAP	Knowledge Attitude and Practice
MED	Medicine
MPH	Masters of Public Health
NFELTP	Nigerian Field Epidemiology and Laboratory Training Programme
PBS	Phosphate Buffer Saline
PEP	Post Exposure Prophylaxis
RNA	Ribonucleic Acid
RNP	Ribonucleokapsid
WHO	World Health Organization

SUMMARY

Rabies is a fatal encephalitis caused by a lyssavirus. It is endemic in Nigeria and dog is the main reservoir of this disease of public health significance. A cross sectional study was carried out in Abuja Municipal Area Council of the Federal Capital Territory to assess the prevalence and knowledge of rabies in this area. The objectives were to determine the prevalence of rabies in slaughtered dogs, determine the knowledge of rabies, determine attitude and health seeking behavior, determine practices and good dog ownership behavior and compare these indices between dog and non dog owners among residents. Two hundred and twenty four structured questionnaires were administered to residents of Gwarinpa, Life Camp and Asokoro of the Federal Capital Territory by random and systemic sampling techniques. In addition, 150 dog brain samples were collected from apparently healthy dogs and checked for the presence of rabies antigen using fluorescent antibody test. Approximately 55% of respondents were dog owners. All (100%) were aware of the mode of transmission of rabies, the dog as the reservoir, the fatal nature of rabies and prevention by vaccination. Some (54%) believed that rabies could be cured after symptoms appeared. About 87% knew where to get vaccination for dogs, 87% would seek medical treatment from the hospital when bitten by a dog but only 36.7% knew that washing wound with soap and water was a good first aid practice in a case of dog bite. Among dog owners, 65% would restrict their dogs in kennels with minimal movement within the compound and 94% had vaccinated their dog against rabies and other preventable diseases. Dog owners (52%) were more annoyed by the presence of a stray dog than non dog owners. Out of the 150 samples analyzed for rabies antigen, 12% was positive. Positivity to rabies antigen was neither associated with sex nor location of slaughtered dogs. The level of awareness of rabies and responsible dog ownership were high. Dog owners were more tuned to reporting a case of dog

bite than non-dog owners. Production of informative materials on rabies to sustain the awareness should be carried out. The role that can be played by slaughtered dogs in spread of rabies should be investigated and residence should be enlightened on the role of stray dogs in spreading rabies.

Key Words: Prevalence, Knowledge, Attitude, Practice, Rabies antigen

CHAPTER ONE - INTRODUCTION

1.1 Background Information

Throughout human history, few illnesses have provoked as much anxiety as has rabies. Known as a distinct entity since at least 500 Before Christ (B.C), rabies has been the subject of myths and legends across time and cultures and has continued to inspire dread today. Amidst this concern is a great deal of misinformation about the disease.[1]

Rabies is a widely distributed zoonotic disease of major public health importance[2] that has been well known since ancient ages and has been known for more than 4300 years.[3,4] Rabies remains a zoonotic viral disease that affects human, domestic and wild animals[5] but the importance of wild animals in its spread has not been determined.[6] It is one of the most feared of all diseases because its terrifying symptoms almost invariably end with death. It remains incurable and survivors are extremely rare.[2] There are only six known cases of a person surviving symptomatic rabies, and only three known cases of survival in which the patient received no rabies specific treatment either before or after illness onset.[7]

More than 3 billion people globally are living in countries/territories where dog rabies still exists and are potentially exposed to the disease. It is estimated that at least 55,000 human rabies deaths occur yearly in Africa and Asia following contact with rabid dogs. In many countries of those continents, few activities are underway to prevent rabies occurrence in humans and to control rabies in dogs, even when the number of human deaths is high.[8]

Dog licensing, killing of stray dogs, muzzling, and other measures contributed to the elimination of rabies from the United Kingdom in the early 20th century. More recently, large-scale

vaccination of cats, dogs and ferrets has been successful in combating rabies in many developed countries.[8]

The first documentation of rabies in Nigeria in humans was in 1912 and in dog in 1925[9] and since then many authors[6,10–13] have established that the disease is endemic in the country with more recent reports[8] showing that the prevalence of the disease is on the rise. The dog is the principal host that maintains and transmits the disease to other animals and man in Nigeria.[14–19]

The pattern of rabies in Nigeria still implicates dogs as the principal vector of the disease.[20] Dogs are listed as only moderately susceptible but are without any doubt the animals most likely to spread infection to human beings, while squirrels and other rodents are also susceptible.[21] In Nigeria, particularly in Maiduguri, a survey of the apparently healthy dogs revealed that 32 percent were carriers of the rabies virus and in another studies carried out in the Northwestern states of Nigeria the results revealed that 23.1 percent were positive for rabies.[22,23]

1.2 Statement of the Problem

In unvaccinated humans, rabies is almost always fatal after neurological symptoms have developed, but prompt post-exposure vaccination may prevent the virus from progressing.[24]

Between 1980 to 1998 there were eleven children with rabies in Sokoto, Nigeria (6 males, 5 females, aged 3 to 13 years old) all had history of dog bites but in only 2 cases was post exposure anti-rabies vaccination commenced.[25]

Two dogs, inoculated with a rabies virus strain from Ethiopia recovered from clinical rabies.[26] This implies that virus carrying and virus excreting healthy dogs are assumed to exist. The

implication of healthy carriers, in-apparent infection and recovery from clinical rabies is that they compound human exposure to unrecognized carriers.[19,27]

In the developed world, the disease is now controllable because it has been controlled in the domestic animals. In less developed countries, including Nigeria, where there is no infrastructure to provide controls and where effective vaccines and post- exposure treatments are not affordable, rabies is still a significant threat to man.

Lack of public education campaigns is another factor affecting rabies elimination in Nigeria. Though, public awareness of the human health risks of zoonotic infections has grown in recent years[28], reliable data on rabies are scarce in many areas of the country, making it difficult to assess its full impact on human and animal health. [29]

1.3 Justification

1. Reports from Area Councils show increase in the case of dog bite in the Federal Capital Territory (FCT) in the last five years.
2. Information on perception of rabies by the residents of FCT has the benefits of enabling the health agencies to better evaluate and plan for a more efficient and effective rabies control programme
3. Transmission of rabies to human can be greatly reduced by health information and behaviour of humans towards the disease.
4. The detection of rabies antigen in slaughtered dogs will give an idea and/or a background for the research on the possible role of these dogs in the epidemiology and spread of rabies in the society

1.4 Research Questions

1. What is the prevalence of rabies in slaughtered dogs in Abuja Municipal, Area Council (AMAC)?
2. What is the knowledge and attitude of residents of AMAC towards rabies?
3. What is their practises and good dog ownership behaviour?
4. What are the KAP scores between dog and non-dog owners?

1.5 General and Specific Objectives

1.5.1 General objective

To examine the brain of dogs slaughtered in AMAC for rabies antigen and to assess the knowledge, attitude and practices of its residents towards rabies.

1.5.2 Specific objectives

1. To detect the prevalence of rabies antigen in slaughtered dogs in AMAC
2. To determine the knowledge and attitude of residents of AMAC toward rabies
3. To determine their practices and dog ownership behaviour.
4. To assess if dog ownership affect KAP scores

CHAPTER TWO - LITERATURE REVIEW

2.1 Prevalence of Rabies

Almost all human deaths caused by rabies occur in Asia and Africa. There are an estimated 55,000 human deaths annually from rabies worldwide.[8] Asia has an estimated 31,000 human death due to rabies[8] and India, among the Asian countries, having the highest number of about 20,000 human deaths primarily as a result of stray dogs that has increased by the passage of law in 2001 that forbade killing of dogs.[30] Other parts of Asia with high rate of human rabies are Vietnam, Thailand[31] and China.[32]

Rabies was once rare in the United States outside the southern states, but raccoons in the mid-Atlantic and northeast United States have been suffering from a rabies epidemic since the 1970s, that is now moving westwards into Ohio.[33] Whether as a result of increased vigilance or only the common human avoidance reaction to any other animal not normally seen, such as a raccoon, there has only been one documented human rabies case as a result of this variant.[34,35] In the midwestern United States though, skunks are the primary carriers of rabies, composing 134 of the 237 documented non-human cases in 1996. The most widely distributed reservoir of rabies in the United States, however, and the source of most human cases in the U.S., are bats. Nineteen of the twenty-two human rabies cases documented in the United States between 1980 and 1997 have been identified genetically as bat rabies.[36] On September 7, 2007, U.S. Centers for Disease Control and Prevention said that canine rabies had disappeared from the United States. It emphasized that the disappearance of the canine-specific strain of rabies virus in the US does not eliminate the need for dog rabies vaccination as dogs can still become infected from exposure to wildlife.[37]

Nine deaths from rabies were reported in Germany between 1981 and 2005.[38] but on 28 September 2008, the World Organization for Animal Health declared Germany as free of rabies.[39]

The UK was declared rabies free in 1902 but there were further outbreaks after 1918 when rabid dogs were smuggled into Britain. The disease was subsequently eradicated and Britain was declared rabies-free in 1922 after the introduction of compulsory quarantine for dogs.[38,40]

The Netherlands has been designated rabies-free since 1923, Belgium since 2008. Though isolated cases of rabies involving illegally smuggled pets from Africa, as well as infected animals crossing the German and French borders do occur.[41]

In the Middle East, Israel since 1948, have reported the death of 29 people from rabies. The last death was in 2003, when a 58-year-old Bedouin woman was bitten by a cat and became infected. She was not inoculated and later died.[42]

Approximately 24 000 people die annually in Africa[43] a rate of approximately 23 per million population.

In South Africa between 10 to 30 cases of human rabies are confirmed every year.[44] Dogs are the main vector (especially in the east of the country) for the disease but also wildlife including the bat-eared fox, yellow mongoose and black-backed jackal.

At least 10,000 people are exposed to contracting rabies every year from infected dogs in Nigeria, where up to 70% of the animals are unvaccinated., Eight people died in four council areas in Cross River in 2013. The Nigeria's human burden of rabies remains uncertain because

the cases are "under-diagnosed and under-reported due to lack of diagnostic facilities and trained personnel."

Many countries and territories have been declared to be free of rabies by the Centers for Disease Control and Prevention in a publication based on countries and political units that reported no indigenous cases of rabies (excluding bat rabies) during 2009. However, New Zealand and Australia have never had rabies.[42] Rabies has also never been reported in Cook Islands, Jersey in the Channel Islands, mainland Norway, Saint Vincent and the Grenadines and Vanuatu.[42]

2.2 Epidemiology of Canine Rabies

The increasing importance of canine rabies worldwide necessitates the adaptation of effective control measures to the existing epidemiological conditions in developing countries. Factors of influence to the epidemiology of canine rabies are several, such as the prevalent virus reservoir, the degree of adaptation of rabies virus to dogs and related canines, the natural virus spread, the. degree of virus excretion, the existence of asymptomatic carriers, the structure and dynamics of the dog population as well as the correlation of human and canine rabies.[45]

2.2.1 The rabies virus

Rabies virus belongs to the order Mononegavirales, viruses with a nonsegmented, negative-stranded RNA genomes. It is bullet shaped classified in the Rhabdoviridae family, genus Lyssavirus which includes rabies virus, Lagos bat, Mokola virus, Duvenhage virus, European bat virus 1 & 2 and Australian bat virus.[24]

2.2.2 The structure of rabies

This is as described by WHO.[46] The RNA genome of Lyssaviruses is 12 kilobases long, non-segmented and of negative polarity encoding five viral proteins (3´ to 5´): nucleoprotein N, phosphoprotein P, matrix protein M, glycoprotein G and polymerase L. The bullet-shaped lyssavirus particle has 100–300 nm in length and 75 nm in diameter. It is composed of two structural and functional units:

i. The lipid bilayer from the host cell builds the outer envelope. It is covered with spike like projections corresponding to G-Protein trimers, which recognise and bind cell receptors. The G-Protein is essential for lyssavirus pathogenicity and for the induction of the immune response.

ii. The internal ribonucleokapsid (RNP) is of helical structure and is composed of the genomic RNA intimately associated with protein N, polymerase L and its cofactor protein P (formerly named M1). The ribonucleocapsid complex ensures genome transcription and replication in the cytoplasm.

iii. The matrix protein M (formerly named M2) occupies an intermediate position between the ribonucleocapsid and the envelope, and is responsible for virus budding and the bullet-shaped morphology.

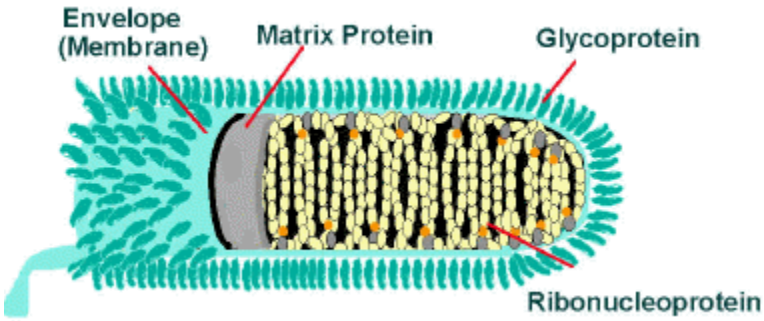


Figure 1: Structure of Rabies Virus

All species of mammals are susceptible to rabies virus infection, but only a few species are important as reservoirs for the disease. [24] While infection can occur in any warm-blooded animal, some (such as foxes, coyotes and wolves) are highly susceptible, while others (such as opossums) are much less susceptible.[47]

2.3 Risk Factors for Rabies

A publication by Healthgrage on right diagnosis for rabies [48] identified risk factors for rabies as those that do not seem to be a direct cause of the disease, but likely to be associated in some way. It further stressed that having a risk factor for rabies makes the chances of getting a condition higher but does not always lead to rabies. Also, the absence of any risk factors or having a protective element does not necessarily guard you against getting rabies.

Being in contact with an infected dog, namely receiving a bite from said dog, is the main risk factor in contracting rabies.[49]

Other factors that can increase risk to rabies are international travelling,[50] or living in developing countries where rabies is more common, including countries in Africa and Southeast Asia, activities that are likely to put you in contact with wild animals that may have rabies, such as

exploring caves where bats live or camping without taking precautions to keep wild animals away from your camp site and wounds to the head or neck, which may help the rabies virus travel to your brain more quickly.[51]

Persons at greatest risk of exposure include animal control officers, spelunkers, laboratory workers,[50] animal handlers and veterinarians.[49] These people should consider receiving pre-exposure vaccination. This process simplifies the post-exposure prophylaxis (PEP) series required if a person is bitten by a rabid animal.[50]

All pets should be considered "at risk" for rabies. Special risk factors that may expose pets to risk of rabies transmission are exposure to wildlife and exposure to other pets that may not be vaccinated.[50]

2.4 Transmission of Rabies

Transmission of the virus usually begins when an uninfected animal comes in contact with the saliva of an infected host. Other routes of transmission include contamination of mucous membranes and aerosol transmission, often in caves inhabited by bats. Another rare occurrence of rabies transmission occurred via a corneal transplant to a patient in France.[52]

2.5 Distribution of Rabies

Rabies is widely distributed across the globe (WHO, 2013) except Australia, Antarctica, some islands where there is strict quarantine system, rigorous eradication or natural barrier like mountains and rivers [53] and New Zealand.[49]

2.6 Pathogenesis of Rabies

Rabies virus gains entry into a new host by introduction of virus-containing saliva into a bite wound. Entry may also be gained by saliva contamination of the mucous membranes of the mouth, eyes and nasal passages. The virus does not penetrate intact skin.[54] At the site of entry, there may be local viral proliferation in non-neural tissue followed by viral attachment to nerve cell receptors and entry into peripheral nerve endings.[55] The virus is transported along afferent axons, eventually reaching the central nervous system where proliferation is followed by widespread distribution of the virus throughout the brain and spinal cord. Following centrifugal transport along efferent cranial nerves, the salivary glands become infected and virus particles are shed in the saliva. Infection of the brain commonly leads to behavioural changes that induce the host to bite other animals, thereby transmitting the virus. The clinical picture can be highly variable between different species, individuals of the same species, and even within the course of the disease in a particular individual. The widespread central nervous system infection almost inevitably leads to death, usually through respiratory paralysis, but also through secondary circulatory, metabolic or infectious processes. Shedding of virus in saliva usually occurs simultaneously with, or soon after, the appearance of clinical signs. However, the virus may be shed before the appearance of clinical signs. During most of this incubation period, the virus is in transport along axons.[56] However, in exceptionally long incubation periods, lasting more than four months, it is thought that the virus may remain latent, probably at the site of introduction before entry into the peripheral nervous system.[57] The length of the incubation period is affected by several factors. Bite sites in close proximity to the brain, such as those on the head, tend to have shorter incubation periods. Likewise, deep or very severe bites, where a higher dose of virus is introduced, have a greater probability of disease development and shorter incubation periods.[54] Once the virus is affecting the central nervous system and its function, the clinical

course is acute and progressive with death usually within 10 days in animals and five days or less of the onset of rabies symptoms in humans. Following central nervous system infection, the virus is transported entrifugally along cranial nerves and along motor and sensory pathways as well as the spinal cord. This results in the presence of viral particles in peripheral nerve tracts in many tissues, particularly those of the head. Therefore, a diagnosis of rabies may sometimes be possible by examination of skin sections, where antigen can be detected within nerve tracts, or corneal smears.[58,59] Rabies virus has been detected in small quantities in several non-neural tissues, including corneal epithelium and hair follicles at the base of the neck, although the replication of rabies virus is not usually pronounced in nonneural tissue other than the salivary glands. In all mammalian species the host is not infectious for most of the incubation period. Rabies infection is fatal in all species and no species is known to have a carrier state where virus is shed in the absence of clinical signs or imminent clinical signs. Although rare exceptions may occur, human survivors of clinical disease have usually had severe residual neurological sequelae.

2.7 Immunity to Rabies

The immune mechanism by which rabies virus is cleared from the host is not well understood. Protective immunity against rabies involves both B-cell (humoral) and various pathways of the T-cell response.[60] The effective humoral response is directed only against the glycoprotein envelope of the virus. Other proteins do not play any role in generating neutralizing antibodies. Cytotoxic T-cell responses are directed against the glycoprotein, nucleoprotein and phosphoprotein components of the virus. Where the host has been successfully vaccinated, virions within a wound will be cleared mainly by the humoral immune system through neutralization before they gain entry into the nervous system. Once inside the neurons, virions

are inaccessible to this immune pathway. This is the main reason for urgent initiation of post-exposure vaccination and passive immunoglobulin treatment. Additional cytolytic immune mechanisms may operate against intracellular virus. This may be the cause of the characteristic paralytic signs seen when rabid animals are improperly vaccinated. Inoculation of rabies virus-containing saliva into a wound does not normally induce a detectable immune response.

Animal and human rabies vaccines consist of inactivated whole-virus antigens grown on a cell culture or neural tissue substrate and, in the case of more modern cell-culture vaccines, partially purified to remove unnecessary proteins. Generally, veterinary vaccines are used for pre-exposure treatment, while human vaccines, which are considerably more expensive to produce, are used post-exposure. Pre-exposure prophylaxis may be recommended in people at high risk. There are no records of human rabies cases that have occurred in people fully vaccinated according to World Health Organisation (WHO) recommendations with pre-exposure regimens by the intramuscular route. Post-exposure treatment of humans, using vaccine and immunoglobulin according to WHO recommendations provides rapid and effective protection if administered soon after exposure. The most frequent causes of failure of post-exposure treatment are delays in administering the first vaccine dose or immunoglobulin, failure to complete the vaccine course and failure of correct wound management. Infiltration of the wound with immunoglobulin does not interfere with stimulation of the immune system by vaccine, which is administered at a site distant from the wound. Rabies vaccine strains in current use protect against many Lyssavirus serotypes. Animal models predict that the vaccines will protect against all true rabies strains, the European bat lyssaviruses and Duvenhage virus.[61] Further evidence for the lack of protection against Mokola virus is the discovery of Mokola virus infection in several vaccinated cats.[62]

2.8 Diagnosis of Rabies

There are many diagnosis methods for detection of rabies in animals like direct florescent antibody, mouse inoculation technique, tissue culture infection technique, and polymerase chain reaction. All these techniques are recommended by WHO.[63] The gold standard for routine rabies virus detection is a direct fluorescent antibody test (FAT) that uses postmortem brain tissue.[64] It is now the most widely used method for diagnosing rabies infection in animals and humans. It is carried out as microscopic examination, under ultraviolet light, of impressions, smears or frozen sections of nervous tissues after treatment with antirabies serum or globulin conjugated with flourescein Isothiocyanate. The test is accurate and results can often be obtain within 30 minutes of reaction with specimen, although for routine purposes a period of 2 - 4 hours is desirable for the fixation in acetone. Historically, microscopic examination of histological preparations was the primary means of identifying evidence of rabies infection in post mortem samples from animals and humans. Fresh brain smears or microtome-cut sections of formalin fixed paraffin-embedded tissue were stained with combinations of basic fuchsin and methylene blue or with hematoxylin and eosin.[65] Histopathologic evidence of encephalitis includes signs of inflammatory response, such as perivascular cuffing and cellular infiltrations. The presence of acidophilic intracytoplasmic inclusions, called Negri bodies, found prominently in the purkinje cells of the cerebellum and the pyramidal cells of the hippocampus, is virtually pathognomonic for the disease.[66]

2.9 Treatment for Rabies

There is no established therapy for human patients with rabies. An approach to the management of human rabies by Jackson in 2003[67] recommended using a combination of therapies and discussed the pros and cons of using a variety of specific agents. The first documented case of

recovery from a naturally acquired case of human rabies was by Hattwick.[68] Since then, five other instances of recovery have been documented. Five of the six known survivors of rabies infection received prophylaxis prior to developing clinical symptoms.[69] In 2004, a 15-year-old patient survived rabies who had not received rabies vaccine 50 prior to the onset of clinical disease.[70] This is the only documented survivor who had not received not received vaccination prior to onset of clinical disease.

The therapy included therapeutic (induced) coma using intravenous midazolam for seven days; a burst-suppression pattern on the electroencephalogram was maintained and supplemental phenobarbital was given. Also given was therapy with ketamine and antiviral therapy, including ribavirin and amantadine. There was improvement and the patient was discharged from the hospital with neurologic deficits, but subsequently had 11 progressive neurologic improvement.[71] However, since that time, there have been at least 13 known cases in which[71] the main components of this approach (the "Milwaukee" protocol) have been used, and fatal outcomes have resulted.[72] The Milwaukee protocol is an experimental course of treatment of an infection of rabies in a human being. The treatment involves putting the patient into a chemically induced coma and administering antiviral drugs. It was developed and named by Rodney Willoughby, Jr., M.D., following the successful treatment of a patient.[73] The Milwaukee protocol is sometimes referred to as the "Wisconsin protocol".[74,75]

2.10 Prevention of Rabies

Reliable data on rabies are scarce in many areas of the globe. This makes it difficult to assess the full impact on human and animal health.[43] However, vaccination of pet animals provides a barrier to transmission of rabies to humans. This has provided a major mechanism for prevention

by breaking the link between rabies cycles in wildlife and transmission to domestic animals; the latter providing a ready means to pass the infection on to humans.[76]

Since dog has been established as the predominant vector of rabies in Nigeria, the most logical and cost effective approach to rabies control is the elimination of stray and ownerless dogs combined with a programme of single mass vaccination in the shortest possible time, at least 80% of the entire dog population.[43]

2.11 Knowledge, Attitude and Practice on Rabies

In a multi-centric KAP survey in India, it was revealed that 60.7% of respondents had misconceptions with regard to rabies transmission; only 31.9% felt that wound washing is the best action immediately after dog bites; and bite wounds were treated by local application of chilies, turmeric powder, lime, kerosene, and herbal paste (2.3%-11.4%).[77] In another study in rural New Delhi, 84.0% of respondents were aware that dog bites might cause death but as many as 48.0% of dog bite recipients used local home treatments such as chilies and salts. Also Almost 42 percent preferred to use household treatments of chili application on wound as is locally practiced. The reason for this may be due to the past experience that many dog bites do not result in rabies and usually rabies are rare in domestic dogs. The knowledge that dog bite can cause death leads many of them to visit the hospital and therefore, there is a need for imparting education in this regard on the deadliness of the disease. [78]

In another study in Sri Lanka, participants in a survey showed higher pre-intervention levels of knowledge with regard to misconceptions on rabies transmission (16.0%), adequate wound washing after dog bites (77.1%), use of home or traditional remedies (0.2%), and the fatal nature of rabies (89.5%).[79]

In a related study in Philistine it showed that the common practise is to bleed wound caused by animal bite. This stem from the believe that if they allow blood to flow, the virus may be removed and contamination of the tissue avoided.[80]

In another study on "Rabies-related knowledge and practices among persons at risk of bat exposures in Thailand", education at the community level was found to be an important strategy in the prevention of human rabies. Although there was decreasing incidence of human rabies in Thailand due to the effectiveness of past and present rabies education efforts, the findings demonstrate a need to raise public awareness of the potential risk of rabies associated with bat exposures.[81]

CHAPTER THREE – METHODOLOGY

3.1 Study Area

Abuja Municipal Area Council (AMAC) was created on 1st of October, 1984. It is located on latitude 9°4'0''N and longitude 7°29'0''E. It is one of the six (6) Area councils in the Federal Capital Territory (FCT) with the population size is about 776,298[83]. It is located on the eastern wing of the Federal Capital Territory. It is bounded on the east of Nasarawa State, on the West by Kuje Area Council, North-West by Gwagwalada and on the North by Bwari Area Council. It is multi cultural and cosmopolitan society. It accommodates both government and privately owned Veterinary and Medical facilities spread across it. Figure 2 shows the geographical location of the study area.

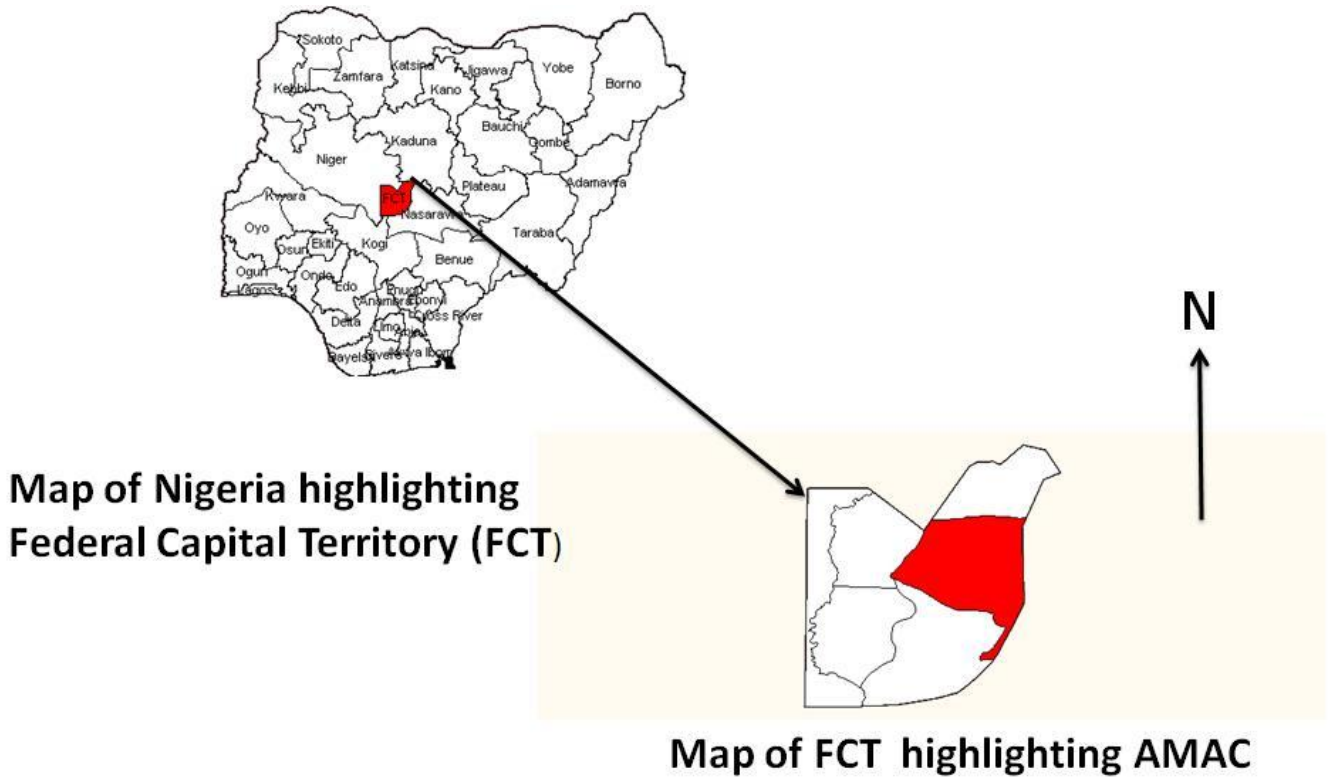


Figure 2: Map showing the geographical location of the study area

3.2 Study Design

- A cross sectional descriptive study was conducted to determine the knowledge, attitude and practice of residents of AMAC concerning rabies and to detect the presence of rabies antigen in apparently healthy slaughtered dogs in AMAC.

These studies were carried out from January to April 2013

3.3 Study Population

- Study Participants

  Study participants were residents of AMAC that were administered the KAP.

- Laboratory Specimen

  Heads of apparently healthy adult dogs slaughtered within the study period

3.3.1 Inclusion criteria

- Residents of AMAC above 18yrs of age for the KAP
- Healthy dogs above three months of age and above slaughtered for food to detect rabies antigen

3.3.2 Exclusion criteria

- Residents of AMAC less than 18yrs of age and those not willing to participate
- Sick dogs and puppies less than three months of age slaughtered for food

3.4 Sample Size Determination

- For detection of rabies in dogs slaughtered for food

$$n = \frac{Z^2 pq}{d^2}$$

Where: N = sample size

P = prevalence rate 15.8% [83]

Q = 1-P

d = desired absolute precision 6% (0.06)

Z = appropriate standard deviation 1.96

Therefore $N = \frac{1.96^2 \times 0.158 \times 0.842}{0.06^2} = 141.96 \approx 142$

A total of 150 samples was used.

3.5 Sampling Technique

Multistage sampling was employed for the KAP. Three districts were chosen out of the nine districts through simple random sampling. One street out of the available streets was also randomly picked. The first household was picked randomly and every 5^{th} household selected systematically from each side of the streets until the required number was achieved. An adult member of the household was interviewed for 10 minutes using the structured questionnaire (Appendix 1).

Three areas were dogs are slaughtered were chosen. They were chosen because they are known to be dog slaughter points, as such make it easier and more accessible for such specimens to be collected or purchased.

3.6 Study Instruments

- A structured questionnaire for KAP
- Rabies Fluorescent Antibody Assay DFA (monoclonal antibody FITC-conjugate) catalog No.5100 reagent from Chemicon International Inc. 1-800-437-7500 was used

3.7 Data Collection Methods

Trained interviewers administered the KAP questionnaires. Interviewers were drawn from private practicing veterinarians in AMAC. Ten of them participated in a day training that was organized to acquaint them with the questionnaire and how to administer it. Two were assigned to one district and the remaining four were placed on standby incase of any eventuality. The questionnaire included the purpose of the study. The first section sought socio-demographic data while the other three sections sought information on the knowledge, attitude and practice on rabies. A face-to-face interview was carried out.

To detect rabies antigen in slaughtered dogs, one hundred and fifty (150) dog heads were purchased from slaughtered points in Gwarinpa, Life Camp and Abacha Barracks, all in the FCT. On purchase, the samples were carefully packed and transported as described by Barrat and Anon to the Viral Zoonoses Laboratory, Department of Veterinary Public Health and Preventive Medicine, Faculty of Veterinary Medicine, Ahmadu Bello University Zaria for analysis

Collection of brain tissues was carried out by inserting a drinking-straw (5mm in diameter) through the occipital foramen (foramen magnum) which is exposed after the dog head is cut off the body at the atlanto-occipital joints, according to World Health Organization recommendations (Barrat, 1996).This is a technique for collecting brain samples without opening

the skull.The technique allows samples to be taken from the medulla oblongata, the base of the cerebellum, the hippocampus (Ammons horn and the cerebral cortex).

The brain tissues of each dog collected was stored in refrigerator at -20^{o} C. Rabies fluorescent antibody assay DFA (monoclonal antibody FITC-conjugate) catalog No.5100 reagent from Chemicon International Inc. 1-800-437-7500 was used.

Aliquots of DFA reagent diluted 1:40 in working phosphate buffered saline PBS pH (8.0) for testing are stored in freezer. A known positive dog brain sample (positive control) and a three weeks old normal mouse brain sample (negative control) was used as controls. Thin impression smears of the test brain specimens was made at the centre of properly labelled glass slides. Similarly, smears of the positive and negative controls was made on different slides, also properly labelled. The smears was air-dried, fixed in cold acetone at – 20^{o}C contained in coplin jars for one hour in a freezer. The slides were then brought out and air dried for about three minutes and the smears were encircled with wax pencil. The slides were afterwards placed onto a moist chamber to prevent drying. Two drops each of the diluted aliquot DFA reagent were added to cover the smears within the encircled areas of the slides in the moist chamber and was incubated for one hour at 37^{0}C. Thereafter the slides were rinsed four times in distilled water for about 5 minutes to remove the unbound DFA reagent in the smears. The slides were then air dried and examined by ultraviolet microscopy. The microscope used was Meiji Techno Model FL-PWJ.

The smears were examined with X20 magnification. The presence of clear cut rounded dots or clusters of apple green fluorescence indicate the presence of rabies antigen while the contrary

meant the absence of rabies antigen. The findings in the test sample smears were compared with the findings in the positive and negative control smears.

Samples were considered positive when brilliant apple green shining inclusions/dots/particles of varying sizes and shapes are found in the microscopic field; and negative when there is no brilliant apple green shinning inclusions/dots/particles in any microscopic field.

3.8 Data Management

Data collected entered, cleaned, entered and analyzed using Microsoft Office Excel and Epi Info ™ 3.5.3

3.8.1 Measurement of variables

Knowledge, attitude and practice of respondents on rabies was graded on a scale into ten domain, a point was scored for correct responses and zero for wrong responses with a maximum score of ten and a minimum score of zero. Total score of 0-4 was graded as poor, 5-7 as fair while 8-10 as satisfactory.

Rabies antigen from brain samples of slaughtered dogs were determined as positive or negative based on the test result.

3.8.2 Statistical analyses

Statistical test performed include univariate analysis for frequencies and proportions of socio-demographic characteristics of respondents and KAP of respondents towards rabies. Bivariate analysis to identify factors related to KAP was also performed. The Chi-square test or Fisher's exact test (2-tailed) was used, as appropriate, to evaluate for significance of differences in responses between dog owners and non-dog owners as it relates to KAP and association between

socio-demographic characteristics and KAP of respondents. A P-value of <0.05 was considered to be significant.

3.9 Ethical Clearance

Approval was obtained from the Research Ethical Committee of Ahmadu Bello University, Zaria. Informed consent of the participant in the study was obtained and respondents were assured of confidentiality of information supplied

3.10 Limitations

Non availability of head of apparently healthy puppies at the slaughter points which was a limitation in knowing the prevalence of rabies in puppies in the study area.

CHAPTER FOUR - RESULTS

4.1 Socio-demographic Characteristics

A total of 224 respondents were interviewed. One hundred and thirty nine (62.1%) were males, 168 (75%) married, 211 (94.2%) had postsecondary education and 107 (47.8%) were public servants. One hundred and twenty three (54.9%) own dogs and 187 (83.5%) practiced Christianity as a form of religion (Table 1)

Table 1: Frequency distribution of respondents according to demographic characteristics in AMAC, FCT, Nigeria

Variables	Frequency	Percent (%)
Sex		
Female	85	37.9
Male	139	62.1
Age Group (Years)		
15-29	46	20.5
30-39	88	39.3
40-49	54	24.1
50-59	27	12.1
>-60	9	4.0
Marital Status		
Married	168	75.0
Single	56	25.0
Educational Status		
Post Secondary	211	94.2
Secondary	13	5.8
Occupation		
Private	93	41.5
Public Servant	107	47.8
Self Employed	24	10.7
Dog Ownership		
With Dog	123	54.9
Without Dog	101	45.1
Religion		
Christianity	187	83.5
Islam	37	16.5

4.2 Knowledge of Rabies among Respondents

One hundred and eighty four (82%) of the respondents had satisfactory knowledge of rabies (Figure 3)

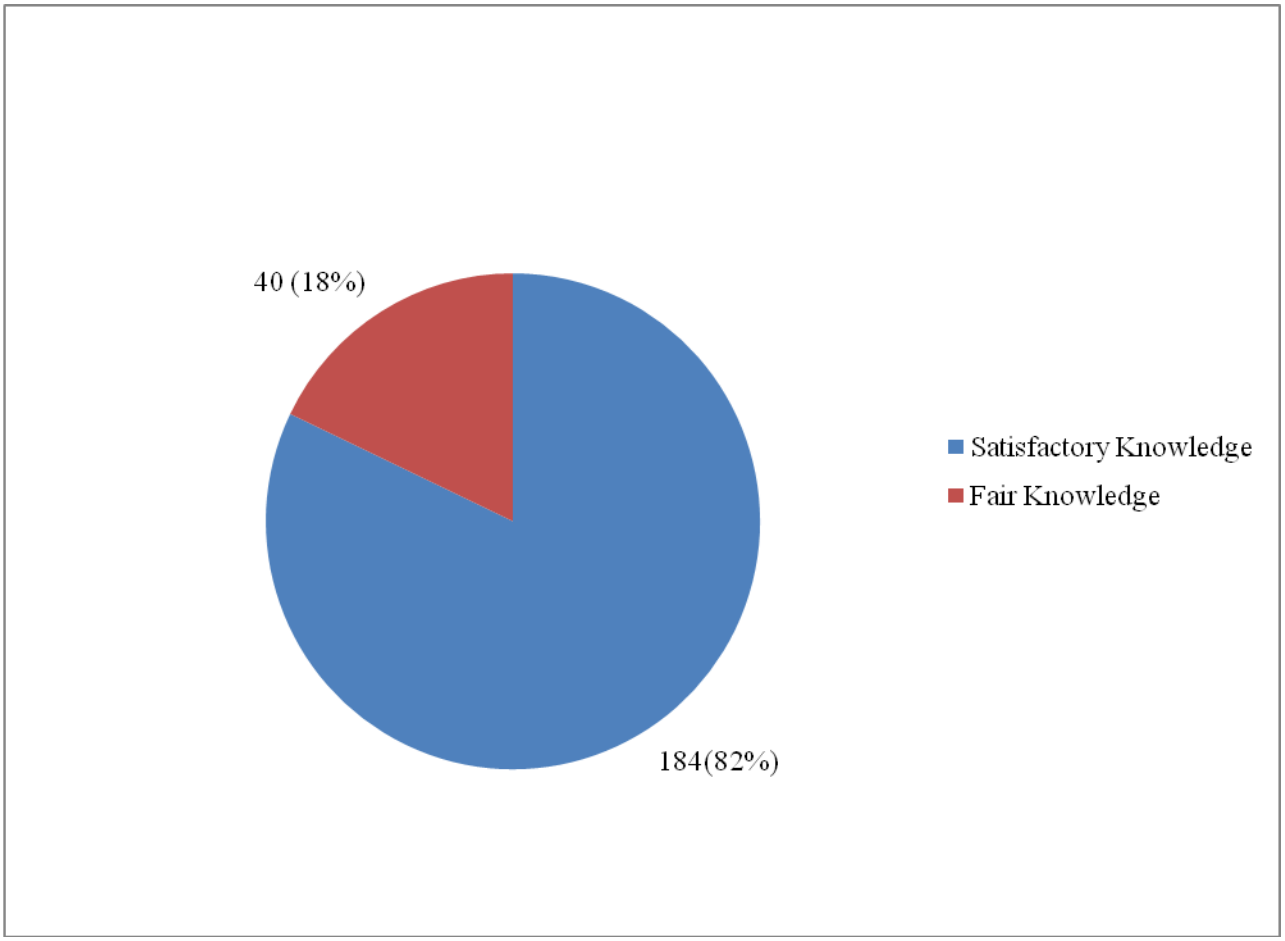


Figure 3: Knowledge of rabies among respondents in AMAC, FCT, Nigeria

4.2.1 Distribution of knowledge among respondents

All the respondents (100%) were aware that bite from a rabid dog is the mode of transmission of rabies, that dogs are the main reservoir of rabies in Nigeria, that rabies is fatal, that rabies can lead to death and that rabies can be prevented by vaccination. One hundred and eighty eight (83.9%) of the respondents know that rabies affect both human and animal, 199 (88.8%) knew the signs observed in a rabid dog and 121 (54%) believed that rabies can be cured after symptoms appear (Table 2).

Table 2: Knowledge of respondents about rabies in AMAC, FCT, Nigeria

Variable	Frequency	Percent (%)
Host of Rabies		
Animals	12	5.4
Both	188	83.9
Humans	24	10.7
Knows signs of rabies		
Biting objects and people	199	88.8
Sleeping	6	2.7
Don't know	19	8.5
Cure rabies after appearance of symptoms		
Yes	121	54.0
No	93	41.5
No answer	10	4.5
Where to obtain rabies vaccination for pets		
Veterinary clinic	195	87.1
Hospital	18	8.0
Don't know	11	4.9
Frequency of administration of rabies vaccination		
Monthly	15	6.7
Quarterly	14	6.3
Biannually	6	2.7
Annually	95	42.4
Biennially	3	1.3
Don't know	91	40.6
Knows that suspected pet head to be submitted to a veterinarian		
Yes	174	77.7
No	34	15.2
Don't know	16	7.1

4.3 Attitude towards Rabies among Respondents

Respondents attitude towards rabies shows that 165(74%) had positive attitude while only 4(2%) showed negative attitude (Figure 4)

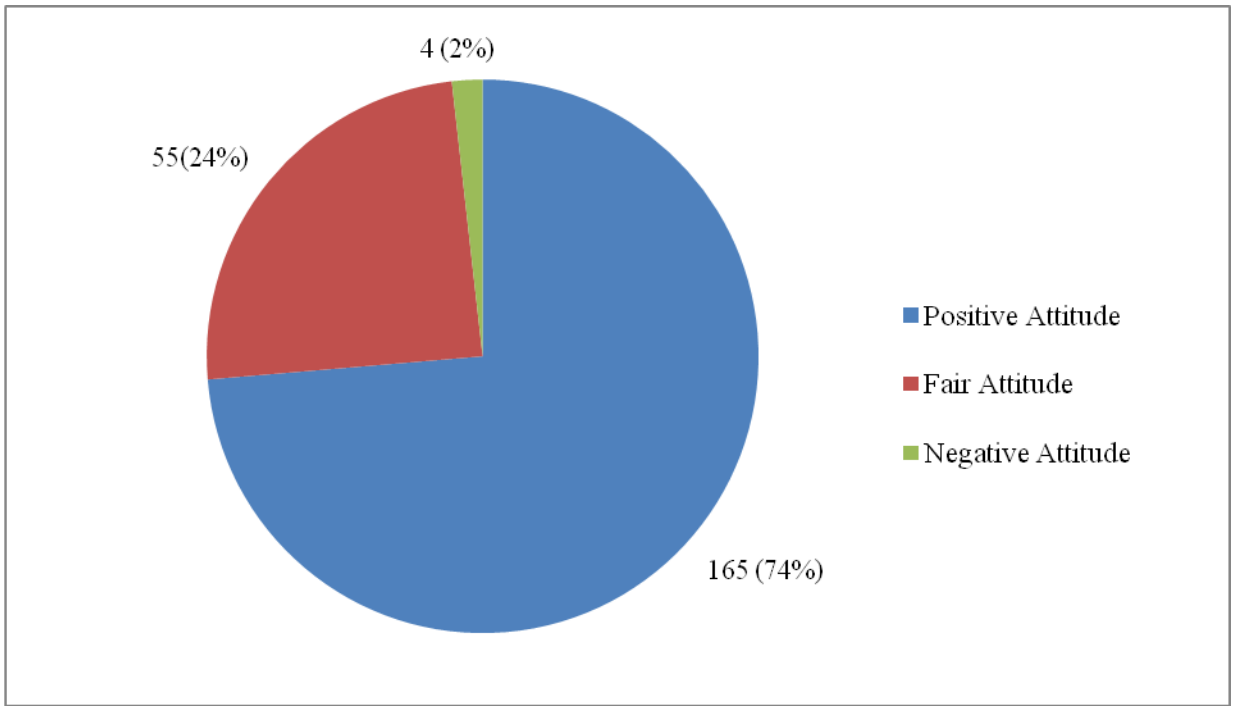


Figure 4: Attitude of respondents towards rabies in AMAC, FCT, Nigeria

4.3.1 Distribution of attitude of respondents towards rabies

All respondents (100%) were willing to register their pet with the veterinarian. A total number of 196 (87.5%) would report a case of dog bite to the local authority (veterinarian or police), 165 (73.7%) would be willing to euthanize pet if found to be rabid while 178 (79.5%) would send the head of a suspected rabid animal to the veterinarian. One hundred and ninety (84.8%) said the presence of stray dog annoys them and 168 (75%) said they would like these stray dogs to be euthanized. One hundred and ninety four (86.6%) of respondents would seek medical care in the hospital when bitten by a dog while only 82 (36.6%) know what first aid treatment to apply in the event of a dog bite (Table 3)

Table 3: Attitude of respondents towards rabies in AMAC, FCT, Nigeria

Variables	Frequency	Percent (%)
Report dog bite to the authority (veterinarian or police)		
Yes	196	87.5
No	22	9.8
Don't know	6	2.7
Euthanize pet if found to be rabid		
Yes	165	73.7
No	36	16.1
Don't know	23	10.3
Send head of suspected rabid animal to the veterinarian		
Yes	178	79.5
No	46	20.5
Annoyed by the presence of stray dogs		
Yes	190	84.8
No	21	9.4
Sometimes	13	5.8
Euthanize stray dogs		
Yes	168	75.0
No	56	25.0
Seek medical Treatment		
Hospital	26	11.6
Veterinary Clinic	194	86.6
Don't know	4	1.8
First aid after dog bite		
Clean wound with disinfectant	110	49.1
Wash wound with soap and clean running water	82	36.6
Tie wound surface	17	7.6
Don't know	15	6.7

4.4 Practice of Responsible Dog Ownership among Respondents

A total number of 91 (75%) respondents of the 123 that own dogs had satisfactory practice (Figure 5)

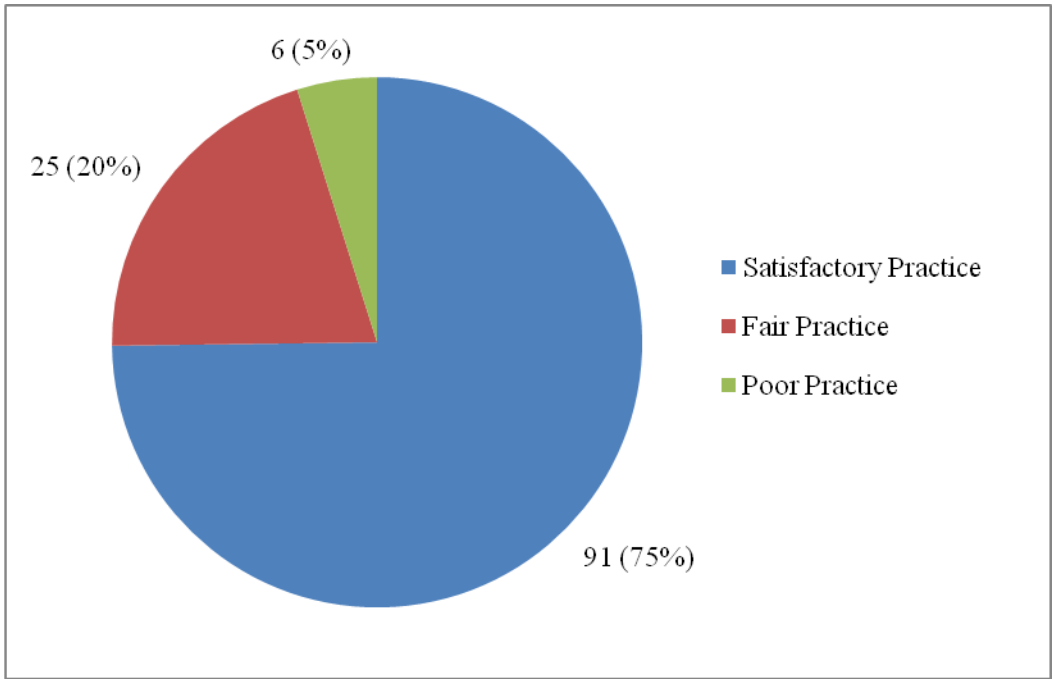


Figure 5: Practice of responsible dog ownership among dog owners in AMAC, FCT, Nigeria

4.4.1 Distribution of respondents according to practices and responsible dog ownership behaviour

Among dog owners 80 (65%) housed their dog in kennels which sometimes were allowed to freely roam within the compound, 116 (94%) patronize veterinary services and had vaccinated their dog against rabies. Of all dog owners only 1 (0.8%) did not give an answer if he would be willing to vaccinate if his dog had not been vaccinated (Table 4)

Table 4: Responsible dog ownership among dog owners in AMAC, FCT, Nigeria

Variables	Frequency	Percent
Keep dog		
Housed in Kennels and free to roam within the compound	80	65.0
Housed in Kennels	23	18.7
Freely roam the compound	12	9.8
No response	8	6.5
Wash kennel		
Daily	47	38.2
Weekly	51	41.5
Monthly	25	20.3
Feed dogs		
Family members	115	93.5
No response	8	6.5
Bath dog		
Yes	122	99.2
No	1	0.8
Frequency of bath		
Weekly	28	22.8
Monthly	95	77.2
Vaccination against rabies		
Yes	116	94.3
No	7	5.7
Other vaccinations		
Yes	116	94.3
No	7	5.7
Evidence of vaccination		
Yes	106	86.2
No	17	13.8

4.5 Characteristics of Respondents and Ownership of Dogs

Respondents who had post secondary education were 4.7 times more likely to own dogs than those with secondary education. Respondents who are above forty years of age were 1.9 times more likely town dogs than those less than forty years of age. There was no association (OR 0.9, CI 0.5-1.6) in dog ownership between males and females (Table 5)

Table 5: Demographic characteristics and ownership of dog in AMAC, FCT, Nigeria

Variable	Respondents	Ownership of Dog		Odds Ratio (CI)	P Value
		Own Dog	Do not Own Dog		
	n=224	n=123	n=101		
Sex					
Male		75(54%)	64(46%)	0.9(0.5-1.6)	0.41
Female		48(56.5%)	37(43.5%)		
Age					
≥40		41(45.6%)	49(54.4%)	1.9(1.1-3.2)	0.02
<40		82(61.2%)	52(38.8%)		
Educational Qualification					
Post Secondary		112(53.1%)	99(46.9%)	4.7(1.1-22.5)	0.02
Secondary		11(84.6%)	2(15.4%)		

4.5.1 Knowledge of rabies and ownership of dog

Dog owners were 1.8 times more likely to know that rabies affect both man and animals and 1.4 times more likely to know that rabies can not be cured after the development of clinical symptoms (Table 6).

Table 6: Knowledge of respondents about rabies and ownership of dog in AMAC, FCT, Nigeria

Variable	Respondents	Ownership of Dog		Odds Ratio (CI)	P Value
		Own Dog	Do not Own Dog		
	n=224	n=123(%)	n=101(%)		
Rabies affects					
Man and animal		99(52.7)	89(47.3)	1.8(0.8-3.8)	0.09
Man or animal		24(66.7)	12(33.3)		
Can rabies be cured?					
Yes		62(51.2)	59(48.8)	1.4(0.8-2.3)	0.14
No		61(59.2)	42(40.8)		
Dog rabies vaccine from?					
Veterinary clinic		12(41.4)	17(58.6)	0.5(0.2-1.2)	0.09
Human hospital		111(56.9)	84(43.1)		
Frequency of Rabies administration					
Annual		71(75.5)	23(24.5)	0.2(0.1-0.4)	<0.001
Others		22(40.0)	78(60.0)		

4.5.2 Attitude by dog ownership

There was no significant difference in dog ownership and reporting a case of dog bite. Dog owners were 2.6 times more likely to be annoyed by the presence of stray dogs than those without dogs. In seeking medical treatment after a case of dog bite, dogs owners were 1.5 times more likely than non dog owners to seek treatment from the human hospital. There was 2.4 times more likelihood for dog owners to wash wound with soap and running water than non dog owners (Table 7)

Table 7: Attitude of respondents towards rabies and dog ownership in AMAC, FCT, Nigeria

Variable	Respondents	Ownership of Dogs		OR(CI)	P Value
		Own Dog	Do not Own Dog		
	n=224	n=123	n=101		
Attitude towards dog bite					
Will report bite		107(54.6)	89(45.4)	1.1(0.5-2.5)	0.48
Will not report bite		16(57.1)	12(42.9)		
Are you annoyed with stray dogs					
Yes		98(51.6)	92(48.4)	2.6(1.2-5.9)	0.01
No		25(73.5)	9(26.5)		
Where do you seek medical treatment in case of dog bite?					
Human hospital		104(53.6)	90(46.4)	1.5(0.7-3.3)	0.21
Veterinary hospital		19(63.3)	11(36.7)		
What first aid treatment will you give after dog bite?					
Wash wound with soap and running water		34(41.5)	48(58.5)	2.4(1.4-4.1)	0.002
Others		89(62.7)	53(37.3)		

4.6 Determination of KAP of Rabies

4.6.1 Association between demographic characteristics and knowledge

Table 8: Knowledge of rabies by socio-demographic characteristics of respondents in AMAC, FCT, Nigeria

Variables	Knowledge (%)		OR(95%CI)	P value
	Satisfactory	Fair		
Sex				
Male	113(81.3)	26(18.7)	0.9(0.4-1.8)	0.81
Female	71(83.5)	14(16.5)		
Age				
>40	112(83.6)	22(16.4)	1.3(0.6-2.5)	0.61
<40	72(80.0)	18(20.0)		
Marital Status				
Married	48(85.7)	8(14.3)	1.4(0.6-3.3)	0.55
Single	136(81.0)	32(19.0)		
Educational Qualification				
Post Secondary	11(84.6)	2(15.4)	1.2(0.3-5.7)	0.58
Secondary	173(82.0)	38(18.0)		
Dog Ownership				
Own Dog	34(97.1)	1(2.9)	7.8(1.0-62.0)	0.02
Do not own Dog	65(81.3)	15(18.8)		
Religion				
Christianity	151(80.7)	36(19.3)	0.5(0.2-1.5)	0.32
Islam	33(89.2)	4(10.8)		
Occupation				
Public servant	94(87.9)	13(12.1)	2.2(1.1-4.5)	0.05
Private employee	90(76.9)	27(23.1)		

4.6.2 Association between demographic characteristics and knowledge

Dog owners were 7.8 times more likely to have satisfactory knowledge of rabies compared to non-dog owners. Respondents who were public servants were 2.2 times more likely to have a good knowledge than those who are private employees. There was no significant finding between the socio-demographic characteristics of respondents and attitude and health seeking behaviour towards rabies (Table 9)

Table 9: Attitude towards rabies by socio-demographic characteristics of respondents in AMAC, FCT, Nigeria

Variables	Attitude (%)		OR(95%CI)	P value
	Positive	Negative		
Sex				
Male	123(88.5)	16(11.5)	0.6(0.2-1.6)	0.39
Female	79(92.9)	6(7.1)		
Age				
>40	119(88.8)	15(11.2)	0.6(0.3-1.7)	0.54
<40	83(92.2)	7(7.8)		
Marital Status				
Married	46(82.1)	10(17.9)	0.4(0.1-0.9)	0.04
Single	156(92.9)	12(7.1)		
Educational Qualification				
Post Secondary	10(76.9)	3(23.1)	0.3(0.1-1.3)	0.12
Secondary	192(91.0)	19(9.0)		
Dog Ownership				
Own Dog	32(91.4)	3(8.6)	1.9(0.5-7.1)	0.27
Do not own Dog	68(85.0)	12(15.0)		
Occupation				
Public servant	97(90.7)	10(9.3)	1.1(0.5-2.7)	0.99
Private employee	105(89.7)	12(10.3)		

4.6.3 Association between demographic characteristics and practise

There was no association between socio-demographic characteristics of respondents and their practice of responsible dog ownership (Table 10)

Table 10: Practice of responsible dog ownership by socio-demographic characteristics of respondents in AMAC, FCT, Nigeria

Variables	Practice		OR(95%CI)	P value
	Satisfactory	Poor		
Sex				
Male	70(93.3)	5(6.7)	0.3(0.03-2.7)	0.25
Female	46(97.9)	1(7.1)		
Occupation				
Public servant	56(91.8)	5(8.2)	0.1(0.02-1.6)	0.10
Private employee	60(98.4)	1(1.6)		

4.6.4 Association between knowledge and attitude

Knowledge of rabies was 3.8 times likely to produce a positive attitude towards rabies (Table 11).

Table 11: Knowledge as it affects attitude of respondents towards rabies in AMAC, FCT, Nigeria

Variables	Attitude		OR(95%CI)	P value
	Positive	Negative		
Knowledge				
Satisfactory	171(92.9)	13(7.1)	3.8(1.5-9.7)	0.01
Fair	31(77.5)	9(22.5)		

4.7 Detection of Rabies Antigen

4.7.1 Zoographic characteristics of slaughtered dogs

One hundred and fifty heads of dogs were collected from apparently healthy dogs slaughtered at Abacha Barrcks, Gwarinpa and life Camp areas of FCT Abuja. All the dogs were adult dogs and were local breed. One hundred twenty three (82%) of the slaughtered dogs were male (Figure 6). Of the slaughtered dogs, 40 (80%) males were slaughtered in Abacha Barracks and Gwarinpa 40 (80%) and 43 (86%) from Life Camp (Figure 7).

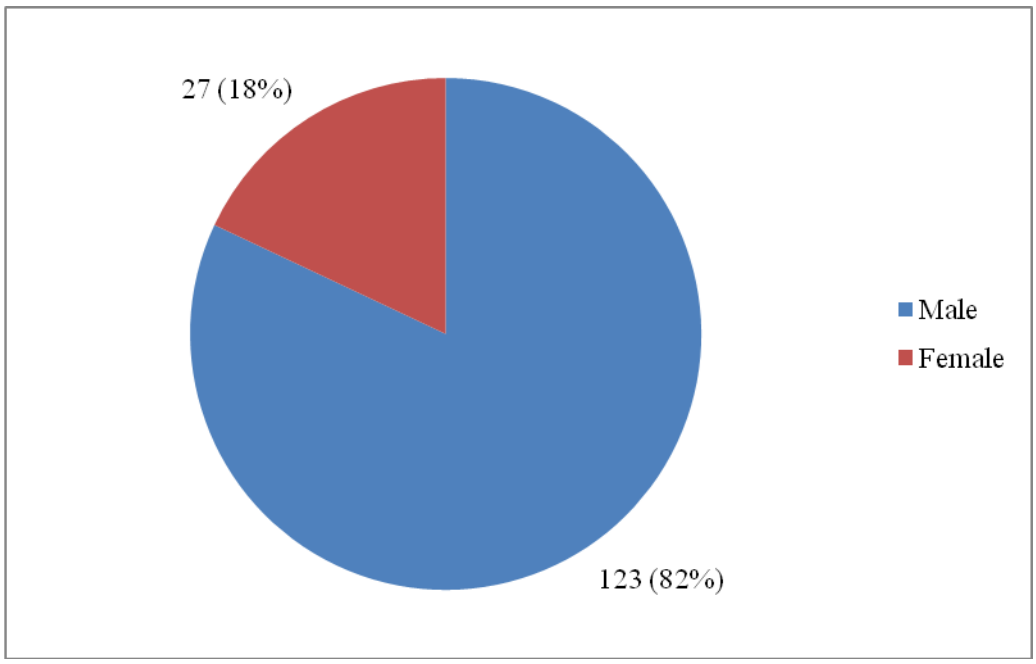


Figure 6: Sexual characteristics of slaughtered dogs in AMAC, FCT, Nigeria

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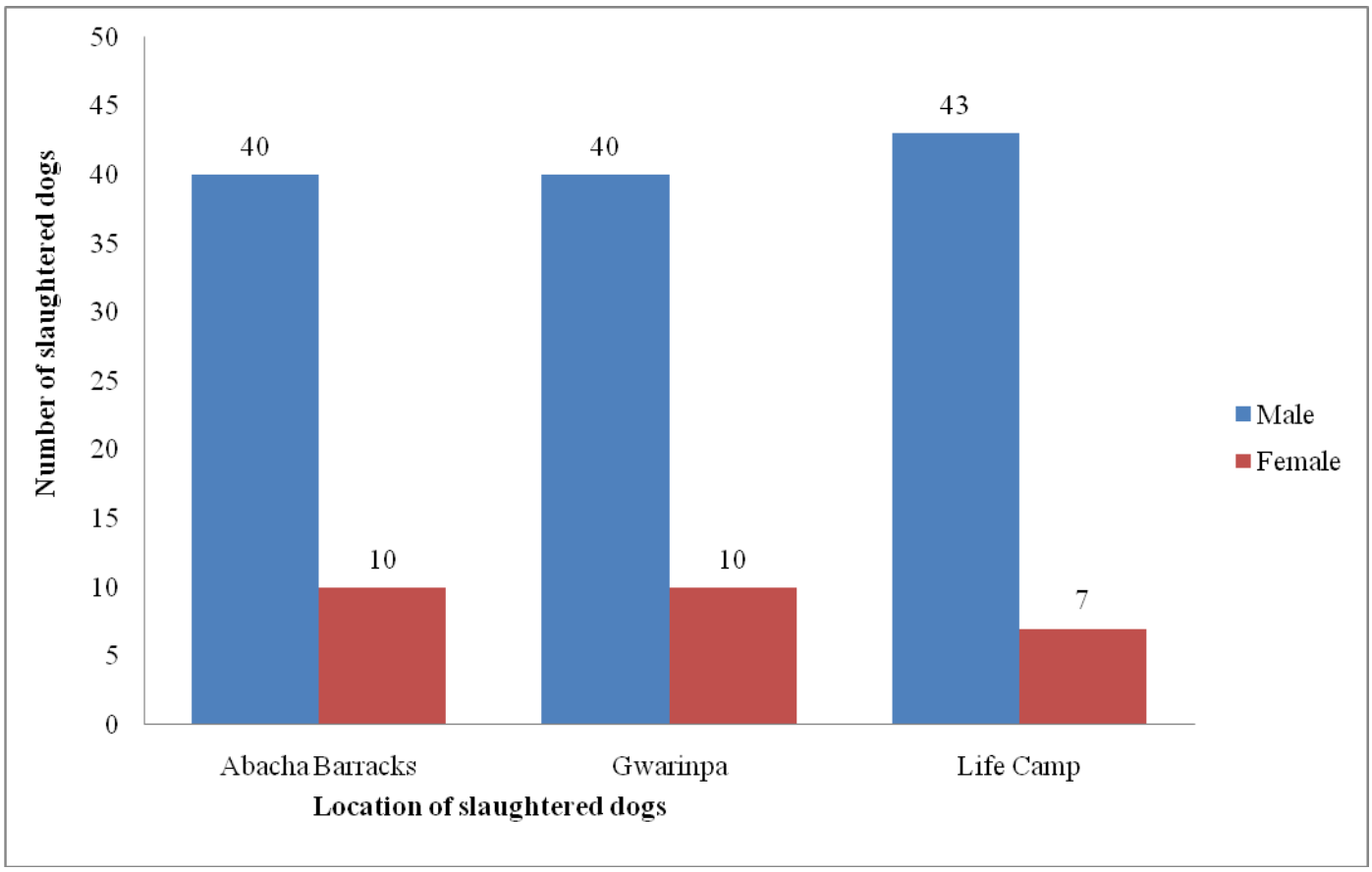


Figure 7: Distribution of samples by sex and location in AMAC, FCT, Nigeria

4.7.2 Rabies antigen in slaughtered dogs by F.A.T.

Of the 150 samples examined for rabies antigen detection, 18 (12%) were positive.

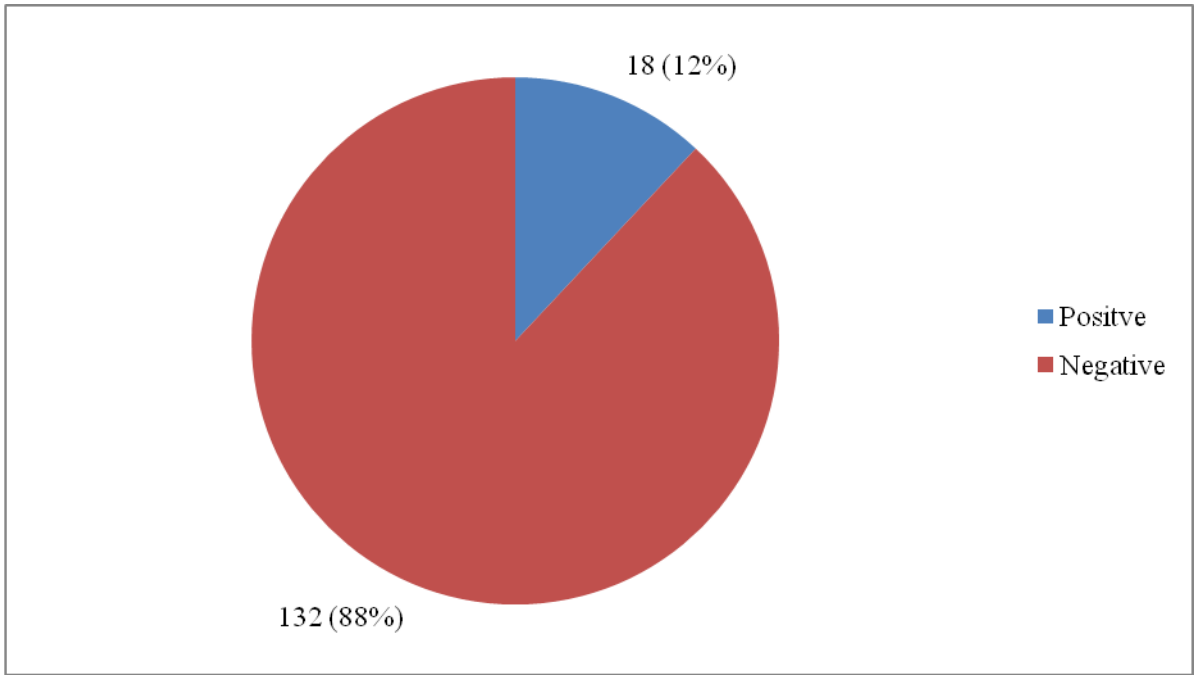


Figure 8: Presence of rabies antigen in slaughtered dogs in AMAC, FCT, Nigeria

Table 12: Presence of rabies antigen in slaughtered dogs by location in AMAC, FCT, Nigeria

Locations	Number of Slaughtered Dogs	Positives (%)
Abacha Barracks	50	7
Gwarinpa	50	6
Life Camp	50	5
Total	150	12

4.7.3 Distribution by sex

Analysis of sexual distribution of slaughtered dogs revealed that more male dogs 123 (82%) were slaughtered. Out of these 16 (13.01%) were positive. There was no significant differences between male and female dogs with respect to positivity of rabies antigen on bivariate analysis (Table 14)

Table 13: Distribution by sex of slaughtered dogs and positivity of test for viral antigen in AMAC, FCT, Nigeria

Sex	Number Slaughtered	Frequency	Positives (%)
Male	123	16	13.01
Female	27	2	7.41
Total	150	18	12

CHAPTER FIVE - DISCUSSION

The socio-demographic characteristics of respondents showed approximately 94% of the respondents had post secondary education. This is likely due to the fact that AMAC houses both the seats of FCT and Federal Government and as a result you have people from all works of life, professionals, technocrats, diplomats, coming to work and reside. Majority of the respondents were public servants. This also follows the fact that AMAC is an abode of government so there is likelihood of having more people working for the it than other employers of labour as observed in most state capitals.[83] More than 55% of the respondents owned dogs. Since majority of residents are elites, they probably keep dogs as pets, objects of affluence and for security purposes.

Majority of the respondents were male. The man is regarded as the head of the home in this part of the world even when married, they take ownership of the home, the reason why they answered the questions even though their wives were around. Seventy five percent of the respondents were married.

Our study showed that there is a satisfactory knowledge of rabies. All respondents knew the reservoir of rabies, its fatal nature, the signs observed in dogs and its prevention by vaccination. This may be connected to the fact of the elite nature of the city and that quite a number of veterinary clinics situated in AMAC. Gwarinpa alone has four veterinary clinics located on major streets of the district. Veterinary services are also available as house calls services. This high level of knowledge agrees with what was found out in a similar study.[80]

The general attitude and health seeking behavior towards rabies was found to be 74%. One hundred percent of the respondents said they were willing to register their pets. This may be due to the high level of literacy of residents of the study site. More than 84% responded as being annoyed by the presence of stray dogs, 73.7% supports euthanizing stray dogs and more than 87.5% said they would report to the appropriate authority when bitten by a dog. This response may be because stray dogs are rare in the residential quarters and they see them as risks and dangers to rabies transmission. A similar study reported the same findings.[79] The correct use of first-aid measure was acceptable to 36.6% as recommended by WHO[8] and 6.7% do not know what to do. More than 49% responding for the use of disinfectant as a sole measure of first-aid could be due to the fact that disinfectants are generally regarded to take care of most germs and contaminants. More than 86% of the respondents would seek medical care from a hospital or a doctor after being bitten by a dog. This reflects the level of their knowledge to rabies. This however contrast to a survey in India where 42% preferred household treatment such as chili application.[78]

Of the total number of respondents, only 54.9% owned dogs and these were the only ones that responded to the practice section of the KAP. Generally, among the dog owners there was 75% satisfactory practice. Sixty five percent practiced housing the dog in the kennel which also freely roams about. The practise of allowing dogs to freely roam was thought to spread rabies in animal population and would facilitate the spread of rabies a continuing zoonotic threat to humans. Over 94.3% had their dogs vaccinated against rabies and other diseases. This good practice helps to reduce the incidence of disease. This is higher than the 80% vaccination of total dog population recommended by WHO which gives protection against rabies thereby curbing the spread its spread [84]

The good practice of responsible dog ownership of bathing dogs (99.2%) was however not well consolidated with the frequency of weekly bath going as low as 22.8%. This may due to the busy nature of respondents who are mostly employed and may be too engaged for such activity frequently.

Demographic characteristics of respondents by dog ownership revealed that age >40 years and post secondary education has association with dog ownership. This could be that at these levels, the residents probably have the financial capacity to acquire dogs either as pets or as security. The use of a proper first-aid treatment after a bite from a dog seem to be 2.4 times higher for dog owners than non dog owners. This could be due to their ownership and constant contact with dogs and veterinary care.

Our study shows that a dog owner is 8 times more likely to have more knowledge than a non-dog owner about rabies. Dog ownership possibly allows him to interact more with the veterinarian, which could bring about the knowledge. Public servants are 2 times more likely to have more knowledge than a private employee is. An average public servant is more likely to be more knowledgeable than his counterpart in the private sector because they attend a lot of workshops, seminars and trainings when not even relevant to their work schedule or area of discipline. Therefore, the probability of stumbling into training about rabies is likely.

On knowledge and attitude, this study reveals that knowledge of rabies is likely to gives someone about 4 times positive attitude than someone without knowledge. There are laws and ordinances regulating dog keeping. A knowledgeable person may keeps these laws to escape the punishment of violating them or just keep the laws because it has helped him to know how to handle dog and

all issues concerning dogs including diseases. These knowledge of these laws probably regulates their attitude towards rabies.

The presence of rabies virus antigen in 12% of the dogs slaughtered for food reinforces the fact that rabies can be found in apparently healthy dogs. This high number in AMAC may be that the source of these slaughtered dogs may be outside the city. However, the presence of rabies antigen in apparently healthy dogs in this study agrees with other studies that apparently healthy dogs could habour rabies virus without showing signs of it.[26] Of the slaughtered dogs, more males (82%) were slaughtered just like it has been recorded by other studies. This could be because female dogs are kept more for breeding purposes than the male dogs. A male can actually be used to cross breed a number of females so preserving more of the females. Prevalence by location showed Abacha barracks as having a higher prevalence of 7% than the other slaughter points. This could result from the fact that the barrack is in an area in AMAC that shares border with a another state and so may have more influx of dogs from that state. However, this same finding was seen in Yola[33]where the barrack had the highest prevalence of rabies antigen in slaughtered dogs than other areas surveyed.

CHAPTER SIX - CONCLUSION AND RECOMMENDATION

6.1 Conclusions

It can be concluded in this study that:

- The presence of rabies antigen in slaughtered dogs in the study area is being re-affirmed with a prevalence of 12 %.
- Knowledge and attitude with regards to rabies among the residence of AMAC is generally satisfactory.
- Practices and dog ownership behaviour is satisfactory
- Dog ownership do not affect KAP scores.

6.2 Recommendations

1. The Health Department of AMAC should produce and use IEC materials to sustain rabies Knowledge, attitude and practice of residence.
2. Public Enlightenment campaign should be carried out by the appropriate authority to sensitize residents of AMAC on rabies and role that can be played by apparently healthy dogs in the spread of the disease
3. The appropriate authority of AMAC should organize Anti-Rabies Campaign to vaccinate dogs
4. There should be enforcement of the Dog Law which ensures stray dogs are removed from environment

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APPENDIX 1: QUESTIONNAIRE

KNOWLEDGE ATTITUDE AND PRACTICE ON RABIES

Good day sir/ma
My name is..... I am from the Federal Ministry of Agriculture. We are conducting a study to determine the knowledge attitude and practice on rabies in the Federal Capital Territory. The result of this investigation will assist the community and the government in instituting an efficient and effective measure to control and prevent rabies in our community. I want to ask you a few questions and will appreciate if you can spend 20mins talking with me. All your responses will be treated with outmost confidentiality. Your participation is voluntary and you may decide not to participate if you wish. However, you participation will be highly appreciated.
Do I have your permission to continue?

Yes...
No...

Socio-demographic data

1. Name:……
2. Sex
    a. Male
    b. Female
3. Age
    a. 15-29
    b. 30-39
    c. 40-49
    d. 50-59
    e. 60 and Above
4. House Address:……..
5. Religion
    a. Christianity
    b. Islam
    c. Traditional worshipper
    d. Others (specify)
6. Marital Status
    a. Single
    b. Married

7. Highest Educational level
    a. No Formal education
    b. Primary
    c. Secondary
    d. Post-Secondary

8. Occupation
    a. Unemployed
    b. Self employed
    c. Public servant
    d. Work in a Private organization

B. Knowledge

1. Rabies can affect
    a. Humans and animals
    b. Humans only
    c. Animals only
    d. Don't know

2. How is rabies transmitted?
    a. Bite from a rabid dog
    b. Bite from insects
    c. Witchcraft/supernatural
    d. Don't know

3. The main reservoir for rabies in Nigeria is
    a. Dog
    b. Cat
    c. Cattle
    d. Don't know

4. What signs do you observe in a rabid dog?
    a. Biting of objects and people
    b. Sleeping
    c. Don't know

5. Is rabies fatal?
    a. Yes
    b. No
    c. Don't know

6. Can rabies lead to death?
    a. Yes
    b. No
    c. Don't know

7. Can rabies be cured once symptoms begin to manifest?
    a. Yes
    b. No

8. Can rabies be prevented by vaccination?
    a. Yes
    b. No
    c. Don't know

9. Where can rabies vaccination be obtained from for pets?
    a. Veterinary clinic
    b. Hospitals
    c. Don't know

10. How often is vaccination against rabies administered?
    a. Monthly
    b. Quarterly
    c. Biannually
    d. Annually
    e. Biennially
    f. Don't know

11. Do you know that the head of a suspected pet should be submitted to the veterinarian?
    a. Yes
    b. No
    c. Don't know

C. Attitude

12. Will you be willing to register your pet if you have one?
    a. Yes
    b. No
    c. Don't know

13. Will you report to the authority (Veterinarian or Police) if bitten by a dog?
    a. Yes
    b. No
    c. Don't know

14. Would you euthanize pet if found to be rabid?
    a. Yes
    b. No
    c. Don't know

15. Would you send the head of a suspected rabid animal to the veterinarian?
    a. Yes
    b. No

16. Does the presence of stray dogs annoy you?
    a. Yes
    b. No
    c. Sometimes

17. Would you like stray dogs to be euthanized?
    a. Yes
    b. No

18. Where do you seek medical treatment when bitten by a dog?
    a. Hospital
    b. Veterinary hospital
    c. Traditional healer
    d. Spiritual house
    e. Pharmacy/chemist
    f. Self medication
    g. Don't know

19. What first aid treatment do you give after a bite from a dog?
    a. Wash wound with soap and clean running water
    b. Clean wound with disinfectant
    c. Tie wound surface
    d. Rub wound with mud made from saliva and sand
    e. Don't know

D Practices

20. Do you own a dog?

a. Yes
b. No

21. Where do you keep your dog?
    a. Housed in kennels
    b. Tied outside the house
    c. Living inside the house
    d. Free to roam around
    e. Housed in kennels and free to roam sometimes

22. How often is the kennel washed?
    a. Daily
    b. Weekly
    c. Monthly

23. How is your dog fed?
    a. Finds its own food
    b. Fed by neighbors
    c. Fed by family members

24. Do you bath your dog?
    a. Yes
    b. No

25. How frequent is your dog bathed?
    a. Monthly
    b. Daily
    c. Weekly

26. Do you patronize veterinary services?
    a. Yes
    b. No

27. Has your dog been vaccinated against rabies in the last one year?
    a. Yes
    b. No

28. Apart from vaccination against rabies, is your dog vaccinated against any other disease?
    a. Yes
    b. No

29. Do you have an evidence of vaccination (certificate)

a. Yes
b. No

30. If you have not vaccinated your dog, will you be willing to vaccinate your dog if you have the opportunity to do so?
    a. Yes
    b. No

Scoring

A. Knowledge

1. A
2. A
3. A
4. A
5. A
6. A
7. B
8. A
9. A
10. D
11. A

8-11 = Satisfactory
5-7 = Fair
0-4 = Poor

B. Attitude

1. A
2. A
3. A
4. A
5. A
6. A
7. A
8. A

6-8 = Positive attitude
4-5 = Fair
0-3 = Negative attitude

C. Practice

1. No answer
2. E

3. A
4. C
5. A
6. B
7. A
8. A
9. A
10. A
11. A

8-11 = Satisfactory

5-7 = Fair

0-4 = Poor



Plate 1: Showing Preparation of Dog Brain Samples for Rabies Antigen Identification



Plate 2: Picture showing the use of a Fluorescent Microscope to view Stained Slides to Detect Rabies Antigen