A HOUSEHOLD SURVEY TO ASSESS KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING RABIES CONTROL AMONG DOG OWNERS IN OMUSATI REGION – NAMIBIA:

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Abstract

Rabies is a viral zoonotic disease of warm-blooded animals caused by Lyssavirus of the Rhabdoviridae family that attacks the Central Nervous System, provoking fatal acute encephalitis. Domesticated dogs are the main vector, responsible for almost 99% of human rabies cases. Namibia with the rest of the world is engaged in fight to eradicate dog mediated rabies. There is a need to explore the knowledge gaps, attitudes and practices regarding rabies control among dog owners. The purpose of this study was to perform a household survey, assessing knowledge, attitudes and practices regarding rabies control among dog owners in the Omusati region, Namibia.

The researcher applied a quantitative, cross-sectional, descriptive, household survey on residents of five constituencies in Omusati region. The researcher employed a structured questionnaire translated in the local language (Oshiwambo). Participants were selected through a simple random sampling method, and one questionnaire was completed per selected household. The data was analysed through Epi-Info 7 and Microsoft Excel and arranged in descriptive statistics such as frequencies, percentages and proportion to determine the Knowledge, Attitudes and Practice levels. The Chi-square test on categorical variable was used at p-value 0.005 statistical significance.

A total of 342 respondents took part in the study; more than half (53%) were male and 50% had secondary education level and only 18% were employed. At least 98% of the respondents knew that rabies is a zoonotic disease and could identify the disease through local names; 55% had no knowledge that rabies is caused by a virus even though 67% were certain the diseases could be transmitted to human through rabid animal bites. Ninety percentages (90%) of the respondents knew that vaccination is the only form of prevention against rabies, and 96% would seek medical help at the hospital after an animal bite. Ninety-five percentages

(95%) of the respondents kept guard dogs yet only 29% would report or take a suspected rabid dog to the nearest animal clinic. Sixty-eight percentage (68%) of the respondents consumed dog meat and 71% have had their dogs vaccinated during the last vaccination campaign. Employed respondents were more likely to keep dogs in an enclosure away from stray dogs, significant at chi-square 5.0514, p-value 0.0241. Employment status does not influence dog's vaccination status at household level, non-significant at chi-square 0.7086, p-value 0.3999.

Household knowledge and attitude levels with regards to rabies control in the five constituencies of Omusati region are well above average; however there are gaps in practices in the community. Despite the right knowledge, communities engage in practices that predispose them to rabies infection and others that are hampering and jeopardising efforts towards rabies control.

Key words: Omusati, Rabies, Household, Knowledge, Attitudes, Practices and Dog owner

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List of Abbreviations and Acronyms

ABLV	Australian Bat Lysavirus
CNS	Central Nervous System
CSF	Cerebro – Spinal – Fluid
DEFF	Designer Effect
DUVV	Duvenhage Virus
DVS	Directorate of Veterinary services
EBLV	European Bat Lyssavirus
FAO	Food and Agriculture Organisation
FELTP	Field Epidemiology and Laboratory Training Program
GARC	Global Alliance for Rabies Control
KAP	Knowledge, Attitudes and Practices
HIS	Health information system
LBV	Lagos Bat Virus
MAWF	Ministry of Agriculture Water and Forestry
MOHSS	Ministry of Health and Social Services
MOKV	Mokola Virus
NamFELTP	Namibian Field Epidemiology and Laboratory Training Program

NCA	Northern Communal Area
OIE	World Organisation of Animal Health
PEP	Post Exposure prophylaxis
PSU	Primary Sampling Units
RMT	Regional Management Team
RNA	Ribonucleic acid
SRS	Simple Radom Sampling
UNAM	University of Namibia
UREC	University of Namibia Research Committee
WHO	World Health Organization

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Dedication

This work is dedicated to my family; first of all to my grandmother Mrs Elizabeth Endjala, who raised me and my siblings, stood with us through all the storms of life and has been a pillar of strength and encouragement since day one. Secondly, I dedicate this work to my young daughter Tulimelongo Mia Kanutus who inspires me to push my limits and to be a better person every day. This piece of work is yours Mia, and I challenge you to read it "cover to cover" when you are ready.

This work is further dedicated to my siblings and cousins: Nyeuvo, Mbute, Mwatile, Tangi and Nantenya who through dedication made sure our house in Mariental was in order and our five dogs were taken care of in my absence, while I was away on campus or on the road investigating diseases outbreaks. I will always be grateful. This work is furthermore dedicated to my entire family.

Last but not least this work is dedicated to my dogs: Chiquitita, L'Algerie, Muna and Lina who endured nonstop stress every time I left home. My absence affected them negatively, but it was for the betterment of the whole team.

This work is also for my dog Mama Mia "Queen" who died while I was studying at university. The house is empty without you Queen.

Declaration

I, **Kanutus Benediktus Shiikufeni**, hereby declare that this study is my own work and is a true reflection of my research, and that this work, or any part thereof has not been submitted for a degree at any other institution.

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Name of Student Signature Date

Chapter 1: Introduction and Background of the study

1.1 Introduction

Rabies is a viral disease of warm-blooded animals, caused by a virus that belongs to the order of the Mononegavirales. It attacks the host's central nervous system, provoking an acute fatal encephalitis with hundred percentage case fatality[(1)]. These viruses (Mononegavirus) with a distinct rod or bullet shape were re-classified in the Rhabdoviridae family, which contains at least three genera of animals' viruses. Rabies falls within the Lyssavirus genus. It is a rod shaped, single stranded, non-segmented, enveloped RNA virus, encoded with five proteins [(1)].

Rabies is a zoonotic disease that is caused by a virus belonging to the Rhabdoviridae family, Sand which affects all warm-blooded animals(2). Both wild and domesticated animals are prone to rabies infection; and these animals further spreads the virus to humans through close contacts with infected saliva via bites or scratches and its pathogenesis is very peculiar; the virus is well-identified by its ability to disseminate within nerves fibres but not in blood and lymph nodes(3).

In Africa, domesticated dogs are the main carriers and vectors of rabies, responsible for almost 97% of human rabies cases(4). Rabies is a notifiable disease that is easily neglected in most African countries because of disjoined coordination between stakeholders concerned with either animal or human health where the process of eradication or the elimination of rabies is further hampered by the poor epidemiological surveillance and limited reporting of the disease to national, regional and global structures(5).

The World Health Organization (WHO) have estimated that around 55,000 humans around the world die of rabies annually of which Africa reports 24 000 deaths annually (6(6–8). People living in rural communities and children are at the highest risk of dog-related rabies,

children less than 15 years of age represent about 60% victims of dog-related bites; they often play with animals and are less likely to report bites or scratches(4).

Rabies virus has an affinity to the central nervous system, affecting the brain and leading to death within a short period. Although rabies early symptoms such as fever, headaches, general weakness, and discomfort can easily be confused with other diseases signs and symptoms, these symptoms progress to insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucination, increase in saliva, difficulty in swallowing and fear of water(9–11).

The burden of rabies in human population could be reduced if rabies is controlled in dogs' population and if access to human rabies post-exposure prophylaxis is enhanced. Furthermore, improved laboratory services that provide rapid and accurate laboratory diagnosis in humans and animals represent essential services for timely administration of post–exposure prophylaxis. Within a few hours a diagnostic laboratory can determine the diagnosis of an animal and inform the responsible medical person of the way forward(12).

Rabies is endemic to sub-Sahara Africa, Namibia and Omusati region respectively. The World Health Organisation bulletin reported that more than 99% rabies human deaths occur in developing nations yet rabies as a disease is neglected in many countries within the developing world(13). It is further stated that there is a relatively low political commitment towards rabies control since accurate data are lacking and the public health impact of rabies to the public is underestimated.

Rabies primarily spread through bites of infected dogs, and two conditions need to be present for rabies exposure to take place: a rabid dog and a bite need to happen for rabies infection to occur, be it in humans or in animals(14). The possibilities of those events occurring simultaneously hold the basic grounds that maintain the burden of rabies. As it was proven in

Haiti where one out of three dog bites occur on the streets, that type of exposure represents an elevated risk of rabies because just as in other developing countries like Namibia, rabies transmission is very high within free-roaming dogs and street dogs. Although dog bites tend to be high among children, they are most likely to be dependent on dog ownership and communities where one resides. In developing nations dog bites and rabies cases are likely to be underestimated and biased based on individuals' knowledge and perception(14).

Rabies is endemic in Namibia and other sub-Saharan African countries (4, 20). Wild rabies in Namibia is maintained within jackals, Kudus and small mammals such as squirrels and Mongoose population. Domestic rabies is maintained by feral and domesticated dogs (5), a spill over between the two groups of rabies is highly associated with the increase in density and numbers of hosts population (18). Up to 99% of human rabies cases around the globe could be attributed to domesticated dogs even though the virus can be transmitted by other domesticated animals (22, 7, 8).

1.2 Background

It is estimated that by 2010, there were around 50 000 -100 000 rabies related deaths reported world-wide annually and one quarter of those deaths were children under the age of 15 years (6). Rabies is misdiagnosed, under-diagnosed and mostly under reported in developing countries (15). According to the World Health Organisation (WHO), there are around 55 000 rabies cases in Africa and Asia annually; partially blamed on the ecological alteration in the regions, viral adaptation to the new hosts and lack of awareness on rabies' risk of exposure(16). The burden is further blamed on the inadequate knowledge, incomprehension of rabies properties and lastly, common approaches that provide appropriate prevention practices are not being reinforced(13,16). Rabies represent the greatest public health challenge to urban and rural populations in Africa and Asia, attributed to the virus being maintained and transmitted within domesticated and stray dogs (15).

A majority of rabies endemic regions are within the developing world that lack or have limited medical and veterinary infrastructure thus the control of rabies within free-ranging and domesticated dogs' population is compromised, increasing the burden of rabies on the human population (13). At times, the number of rabies related deaths reported in these regions underestimate the burden and the incidence of rabies because some patients may not be presented or recorded at the health facilities, only a very limited number of rabies cases receive laboratory confirmation and some clinical cases may not be reported to the central authorities (12).

Rabies is preventable when appropriate post-exposure prophylaxes are provided on time even in areas with a high risk of rabies exposure. Rabies is manageable when appropriate heath care seeking approach, animal bite wound management and dog vaccination is adopted(14,15). Animal (dog) bite wounds should be washed with running water and soap, this approach reduces the virus load and possible infection significantly. Dog bite victims should furthermore be advised to seek medical attention early although that is not always possible because health centres are far and hard to reach in most developing countries with impoverished heath sectors, low level of education and limited literacy(14).

Haiti provides a very good example in the fight against rabies, this country used education campaigns, where they utilised printed materials in combination with verbal engagement instead of advanced technologies such as social networks. The Haiti government further integrated rabies prevention and control messages in the school's curriculum which proved very successful in primary and secondary schools where literacy is high (14).

The challenge to Namibia, Africa and all other developing countries in the world is the difficulties in locating and sourcing rabies vaccines and the availabilities of dependable suppliers, as well as the high cost of post-exposure prophylaxis because most communities do

not have well-established health centres or health personnel with a comprehensive understanding of PEP doses and the dosing schedule to be completed by rabies victims in order to prevent rabies infection after an exposure to animal bites or scratches (14, 16).

It is believed that around 200 000 people receive rabies PEP in Africa annually, otherwise rabies deaths in Africa would have been two times higher in the absence of Post Exposure Prophylaxis (PEP) on the continent. In rural Africa, human rabies represent almost 76% of rabies cases reported annually, which could be attributed to a high dog to human ratio, lack of access to PEP, and reduced dog vaccination coverage in rural areas when compared to urban areas(16).

Rabies' economic burden is very high in Africa, not only because the cost of PEP is enormous, exceeding most families' monthly incomes, dog vaccination campaigns are also costly due to high dog populations and distances to be covered to reach all communities. The burden is further complicated by lack of accurate data on dog population and vaccination coverage, lack of financial investment, and inadequate infrastructures associated with inadequate rabies surveillance (16 -17).

Rabies control and elimination programmes should be based on surveillance, the most critical component in these approaches. Surveillance is often poor with low or limited resources at its disposal especially in developing countries. Zoonotic diseases such as rabies require combined approaches of the veterinary and medical sectors. A successful control and eventually elimination of rabies depends on effective surveillance systems (2).

It is further recommended that rabies surveillance activities be enhanced in areas with high risk rabies exposure on human population; intensify risk assessment and the evaluation of strategies critical in rabies control (17). Rabies knowledge, attitudes and practices surveys are regarded as the best in the assessment of owned dog population parameters, taking into

consideration dog density, animal bite injuries and health seeking practices in human population (17).

Despite the availability of control and preventative measures such as dog vaccinations and the provision of post-exposure prophylaxis to those exposed to the bites of rabid animals, Rabies remains among the major public health burdens in Africa and Asia (4).

Rabies could be eliminated from dog population in endemic region if only at least 70-80% of the dog population could be vaccinated. The above-mentioned vaccination coverage could only be covered during mass dog vaccination campaigns; however vaccination coverage in African countries is recorded to be way below 70% annually. Reaching free-roaming dog populations during vaccination campaigns presents the first huddle to vaccination success because injectable forms of vaccination requires that the animals get captured and restrained physically which is very difficult within free-roaming dog populations (17).

Only through an effective reporting system associated with a well-developed surveillance programmes could we aspire to successfully eradicate rabies. It is therefore imperative that effective epidemiological surveillance ensures that interventions are monitored throughout time and outbreaks interventions are done when and where necessary. Interventions are dependent on detection, and surveillance is critical in triggering an early response. An informed community will report an outbreak on time and trigger an early response.

Domesticated dogs have been highlighted to be the source of more than 99% of human rabies cases in endemic regions and Namibia is no exemption therefore in the absence of post-exposure prophylaxis, all rabies cases are fatal; rabies could be classified as the most fatal infectious disease ever known to man.

Namibia has joined hands with the rest of the world in the fight against rabies. The purpose is to eliminate rabies from the country. The fight against dog-mediated human rabies is in line with the World Organisation of Animal Health (OIE), World Health Organisation (WHO), Food and Agriculture Organisation (FAO) and the Global Alliance for Rabies Control (GARC) that are pushing towards the elimination of dog mediated human rabies by 2030(18).

Omusati region is among the seven northern regions of Namibia that are highly endemic to canine rabies. The region was chosen as a starting point for the elimination phase of dog-mediated human rabies from Namibia. A pilot phase of the rabies elimination was first launched in Oshana region of Namibia in March 2016. Following the successful launch of the pilot phase, the elimination project was then rolled out to the rest of the northern communal areas. Rabies elimination projects are aimed at intensifying and enlarging the dog vaccination coverage, increasing rabies awareness in communities, and enhancing rabies surveillance and investigation of rabies cases (19).

Omusati region is one of the fourteen regions in Namibia, situated in the northern part of the country, and shares borders with the Kunene province of Angola in the north, Kunene region on its south west border, Ohangwena region on the north east side and Oshana region on its east (24). The region has twelve constituencies (24), one veterinary clinic (25) and four district hospitals.

1.3 Statement of the problem

Despite efforts by the Ministry of Agriculture, Water and Forestry in the fight against rabies in the Northern Communal Area (NCA) through mass vaccination of dogs and awareness campaigns, cases of rabies in humans are still prevalent yet the disease is preventable with the appropriate knowledge, positive attitudes and good practices. Rabies continues to cause havoc within communities. Although rabies cases tend to be less in number when compared to other infectious diseases, it is the inexplicable horror, the pain and the hundred percentage fatality rate that really strike fear in all involved(10). Every dog bite victim in 80% geographical locations within South Africa and Namibia is considered exposed to rabies due to the wild spread of wildlife and domestic dogs that harbour the virus(10).

The Omusati region Health Information System (HIS) has recorded high numbers of human lives lost due to rabies, 10 human rabies deaths as from 2014 - 2017. The latest case (July, 2017) involved a nine year old boy who contracted rabies after he was bitten by a puppy while playing with it. The Directorate of Veterinary Services (DVS) in Omusati region has reported high figures of animals that tested positive to the Fluorescent Antibody Test (FAT) rabies test. Out of a total of 159 brain samples from different domesticated animal species that were sent to the laboratory, 89 tested positive to rabies. Out of the 59 canine brains tested, 36 of those samples tested positive for rabies. More than half of the specimens submitted for rabies analysis 51.5 % (17/33) from January to November 2017 have tested positive, of which more than half 76% (25/33) of the specimens had human contacts. There is a need to look into the knowledge, attitudes and practices of dog owners regarding control among dog owners in Omusati region, while exploring knowledge gaps that might be obstructing effective preventive measures and good practices in that way increasing unnecessary loss of human lives.

Digafe, Kifelew and Mehesso stated that rabies awareness in the community plays a crucial role in rabies prevention(17). There is therefore a need to identify knowledge gaps within the affected communities so that efforts on awareness creation and disease controls strategies can be properly targeted(17). The researcher therefore realised the need to look into the knowledge, attitudes, and local practices regarding rabies control among dog owners in Omusati region.

1.4 The purpose of the study

The Purpose of the study is to conduct a household survey to assess the knowledge, attitudes and practices regarding rabies control among dog owners in Omusati region, Namibia.

1.5 Objectives

The objectives of this household survey are to:

- Assess the knowledge of dog owners regarding rabies control in Omusati region
- Determine the attitudes of dog owners regarding rabies control in Omusati region
- Determine the practices of dog owners regarding rabies control in Omusati region

1.6 Significance of the study

This study looked into the existing knowledge base, attitudes and practices that are hampering progress towards rabies fight in the region because death cases in the region due to rabies have been on an increase. It is very critical to explore ways to prevent further loss of human lives in Omusati region and further reduce the economic burden of rabies to the community.

The findings of this study might be helpful to those planning and implementing rabies programs in the region. The outcomes of the study may furthermore assist the Ministry of Agriculture, Water and Forestry in their efforts to develop community-based rabies educational programs and community-focused rabies campaigns targeted to communal areas.

In addition, the findings may help the Ministry of Agriculture, Water and Forestry specifically the Directorate of Veterinary Services in the planning and implementation of rabies control strategies in the community. This kind of studies is also crucial as the Ministry carries out annual dog vaccination campaigns in efforts to combat and reduce the burden of rabies in the four northern regions namely, Oshana, Oshikoto, Omusati and Ohangwena.

1.7 Definition of concepts

1.7.1 Assessment: This means to evaluate, measure, and document the findings of the study. Assessment includes the collection, analysis and interpretation of population parameters which describe institutions, departments or divisions' effectiveness. It is an analysis method that provides an understanding of institutions or departments (13).

1.7.2 Knowledge: considers the community's awareness, understanding, facts and information with regards to rabies(14,18,19).

1.7.3 Attitudes: look into community outlook, approaches, defiance and assertiveness towards rabies.

1.7.4 Practices: refers to how the community carries out activities aimed at rabies control (14). Practices is defined as an actual use and application of an idea, belief or methods as opposed to the theories relating to rabies control and prevention(20). It therefore defines and describes what really happened in opposition to what is expected to happen in the community.

1.7.5 Dog owner: a dog for which a person claims responsibility (15).

1.7.6 Rabies: It is a viral pathogenesis with a high affinity to mammal's central nervous system, including humans. The virus is particularly present in the saliva and brain of infected animals (16).

1.7.7 Omusati region: Omusati region is defined in the act of the Namibian Parliament and the Namibian Statistics Agency as one of the fourteen political units, each headed by a governor(21). The region is further divided into several constituencies headed by constituency councillors. Omusati region is divided into four health administration districts of Outapi, Okahao, Oshikuku and Tsandi respectively. See the Namibian map below (Figure 1.1).

1.7.8 Household: Is defined as all people identified by the household head as being occupants of that house (at the time of recruitment) to the extent that food was regularly shared from the household pot within the last weeks(21,22).

1.7.9 Survey: It is defined as a close examination or review of the population parameters. It represents a snapshot of the population at a certain point in time(23)(24,25).

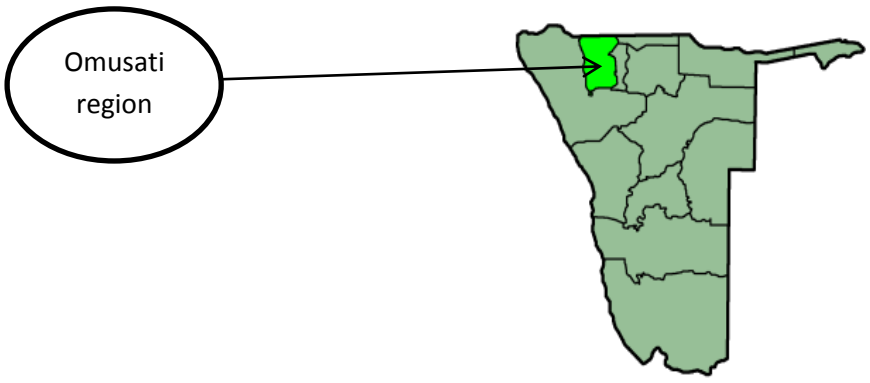

Figure 1.1 Omusati region on a Namibian Map (Wikipedia: en.wikipedia.org)

1.8 Chapters outline

The thesis is presented in the following chapters

Chapter 1: **Introduction and background of the study**

Chapter 2: **Literature review**

This chapter deals with the literature review of other similar studies on rabies within the country, and in the southern region of Africa, over the African continent, as well as within the developing, low–middle income countries and around the globe.

Chapter 3: **Research methodology**

The third chapter of this thesis explains in detail the research methods, research design and the ethical considerations of this study. Furthermore, in this chapter; data collection techniques, tools, and methods are outlined in detail and according to procedures. Data analysis tools such as Epi-Info 7 and STATAIC 15.1 software's are further described in detail too.

Chapter 4: **Data analysis**

This chapter presents the findings of the study after the analysis, portraying graphs, tables, charts and diagrams with details of the study findings.

Chapter 5: Discussion, conclusion, recommendations, limitations and summary

Summary

The first chapter of the study gave us an introduction and background on rabies' knowledge, attitudes and practices. Additionally, facts on rabies were explained in detail, with scientific backgrounds.

This chapter gave a picture on the rationale of the study and the statement of the problem that prompted the undertaking of this study. Furthermore, it highlighted the objectives and significance of the study.

The following chapter will deal with the literature review. The researchers reviewed existing literature on rabies knowledge, attitudes and practices within Namibia, Africa and the world in general.

Chapter 2: Literature review

2.1 Introduction

Literature review is an analysis of past relevant literature to create a strong foundation and advanced knowledge. It promotes the development of theories and unlocks areas where possible researches could be undertaken.

This chapter is focused on knowledge, attitudes and practices of dog owners with regards to rabies control among dog owners. Other measures that enhance rabies control within communities are discussed too. Different factors such as the link between wild rabies and domesticated rabies are elaborated. This chapter further discusses literatures on rabies based on the literature review of similar studies carried out previously by other researchers. It relates the current study to the broader on-going correspondence in literature while providing a framework that settles the validity, necessity of the study and setting the benchmark for comparison with the current study(26).

2.2 Overview of rabies

Rabies is defined as a "zoonotic disease caused by a Ribonucleic Acid (RNA) Virus" from the family Rhabdoviridae, genus Lyssavirus (25). It has a case fatality rate of almost 100% in humans, especially if prophylactic measures are not taken within a shortest time after exposure to the virus (28). Domesticated dogs are responsible for up to 99 % of human rabies in Africa and Asia (29). Namibia, through the Directorate of Veterinary Services is battling two rabies burdens, one within domesticated dogs and wild carnivores and another one within the kudu population (30).

2.2.1 Definition of rabies

Rabies is a viral infection disease caused by a neurotropic virus that belongs to the Lyssavirus genus of the Rhabdoviridae family. The virus is transmissible to all mammals with a high affinity to the nerves and the central nervous system. The virus has seven distinctive genetic lineages that are differentiable within the Lyssavirus genus. The genetic lineages are differentiated by a cross-protection test and molecular biological analysis. They are as follow; Classical rabies virus (RABV, genotype, serotype 1), Lagos bat virus (LBV, genotype 2,serotype 2), Mokola virus (MOKV,genotype 3, serotype 3), Duvenhage virus (DUVV,genotype 4, Serotype 4), the European bat Lyssavirus (EBLV); subdivided into two biotypes (EBLV 1, Genotype 5 and EBLV 2, genotype 6) and the Australian bat Lyssavirus (ABLV, genotype 7)(16).

2.2.2 Causes and prevention of rabies

Rabies is caused by a Rhabdoviridae virus which is transmitted to all mammalians (human) host via inoculation or inhalation of infectious viral materials. Almost 99% of human rabies cases are acquired through bites by infected or rabid animals, predominated by domesticated dog bites and scratches(12). Rabies virus could furthermore be transmitted to humans as they handle and get into contacts with infected animal products and contaminated food(12).

Rabies is completely preventable in human and animal populations. Humans who become animals bites victims should be administered with Post-Exposure Prophylaxis (PEP) as earliest as possible(27). PEP is critical in rabies prevention as it combats the multiplication of the virus within the host body while stimulating the immune system to take charge(27).

Animal handlers, game rangers, veterinarians and others within the animal sectors who are regularly in direct contacts with possible rabid animals receive annual Rabies Pre–Exposure Prophylaxis. Rabies prevention and control is furthermore ensured in animals' populations through mass vaccinations of domesticated dogs around the globe and wild carnivores in Europe and the Americas(7,28).

2.2.3 Signs and symptoms of rabies

Rabies presents itself in three forms; there are wide differences in rabies presentation based on the form of rabies, the spinal cord is commonly affected by rabies followed by the brain stem and then the cerebrum(29).

2.2.3.1. Paralytic rabies: Spinal form that represent Lameness, weight shifting, knuckling of one or both feet locks, ascending ataxia, paresis progressing to paralysis, hyperesthesia or self-mutilation of an extremity. The animal can be in recumbent within 3 to 5 days while maintaining normal eating and drinking habits.

2.2.3.2. Dumb rabies: Brainstem form is presented through depression, anorexia, head tilt, circling, ataxia, dementia, excess salivation, facial and pharyngeal paralysis, blindness, flaccid tail and anus, urine dribbling, and self-mutilation.

2.2.3.3. Furious rabies: Cerebral form presented through convulsions, aggression, hydrophobia, photophobia, tenesmus, circling, hyperesthesia, and self-mutilation.

Other signs reported in rabies cases are: blindness, head pressing, inability to drink or dysphagia, anorexia, constipation, paraphimosis in males, gastrointestinal signs, and genito-urinary signs. It is important to understand that to rabies forms might be present at once. Rabies incubation period varies from 9 days to 1 year. Clinical signs may progress to death within 5 to 10 days after the onset(29).

2.2.4 Pathophysiology of rabies

Rabies virus has a bullet shaped form. This virus has a cylindrical shape; one end of the virus is round and conical, while the other end is concaved. The virus consists of three layers: the first layer is a surface projection, the second layer is the envelope membrane and the third one is helical ribonucleoprotein capsid. The surface projection of rabies virus is 6 -8mm thick although it does not cover the concave end of the virus(29,30).

Rabies is regarded as one of the most unique encephalitis; provoking extensive neuronal invasion, however often very limited cell destruction apart from typical clinical signs observed before rabies victim's death. There are very limited or at times no gross changes in the central nervous system of rabies victims(30).

Before the invention of modern rabies diagnostic methods such as rabies assay, rabies infection was defined and demonstrated by the presence of the inclusion bodies within infected cells through staining procedures that bring forth the presence of infected neurons and the rabies Negri body. This process represents the specific staining with fluorescent antibody to rabies virus. It played a major role in rabies diagnostic until recently when rabies assays were discovered(16,29,30).

Jonson and Meyer (2009) carried out studies in the sixties where they discovered that rabies antigens developed and multiplied in neurons than in glial cells, meningeal ependymal or vascular cells. Rabies virus infection spreads within the Central Nervous System (CNS) along multiple pathways from the inoculation site. There is proof of active viral multiplications within the brain, spinal cord and sympathetic trunk along the CNS. The other pathways represent passive transportation of the virus in the Cerebro-Spinal Fluid (CSF) or blood. This pathway was proven when rabies viruses were isolated from the CSF of infected animals on several occasions(31).

Due to the presence of multiple CNS rabies pathways, it is very difficult or impossible to stop rabies infection after the virus has reached the Central Nervous System (Brain and Spinal Cord). Antibody, interferon and other viral inhibiting immunity factors within the body would not have access to neurosis or inhibit intracellular viral multiplication without interference to cellar function. It is therefore very critical that rabies control measures such post-exposure prophylaxis are undertaken as early as possible after rabies exposure before rabies viral multiplication reaches the central nervous system(29,30).

2.2.5 Treatment of rabies cases

Rabies infections do inevitably progress to death, and thus there is no specific treatment recommended. Rabies' supportive treatment has no effect on survival time, and most veterinarians do not condone treatment because of public health concerns. Serial neurologic examinations are needed to confirm progression of the disease while ruling out other neurologic diseases, although human exposure must be avoided(29).

2.3 Knowledge of dog owners regarding rabies

Rabies is viral zoonosis and domesticated dogs are the principle species in the transmission of the virus despite other animals such as kudus, bats, foxes and other mammals. Rabies infection usually occurs following a bite from a rabid animal however rabid animal saliva can contaminate open wounds, scratches or skin abrasions(32).

In 2016, the World Health Organisation (WHO) have estimated that rabies has caused around 60 000 human deaths annually; 95% of those deaths were people from rural areas in Asia or Africa(13,7). Yousaf et al 2012 have estimated that rabies causes around 24, 000 deaths per year in Africa while the burden of the disease in Asia reaches up to 31, 000 human deaths annually; India contributed half and a quarter of those deaths(33).

Even though rabies is vaccine-preventable, it still causes a significant number of deaths in Asia, Africa and South America, 55, 00- 60, 000 deaths annually(7). Around 40% of those bitten by suspected rabid animals tend to be children under the age of 15 years(34).

Overall, efforts in rabies eradication in many parts of the globe are hampered by in-apparent rabies infection and persistent or intermittent shedding of rabies virus by free roaming dogs' as well as rabies control around the globe being jeopardised by insufficient infrastructures, financial resources and human capital(35).

Rabies is among the very old infectious diseases which are still significant to human health with a potential to cause preventable deaths in humans and animals(36). It affects countries that cannot set up sufficient effective immune buffers that provide barriers between dogs and wildlife animals as primary sources of rabies and the secondary victims which could be other animals or human beings(32,37). The world has indeed made major advancement in technologies to control rabies with new discoveries in technical and institutional knowledge helping with control programs, yet global rabies burden remains a threat(32).

Chiroptera bats have been identified as hosts of the Lyssavirus in Africa, America, Australia and Europe; however bats in Latin America are known to be hosts and vectors of classical rabies variant. Elsewhere, different Canivora species such as domesticated dogs, foxes, wolfs, and jackals are principal hosts and vectors in the maintenance of rabies in Africa, Europe and America (34, 35, 6).

Through the rabies virus structural analysis and genome sequencing, conclusions have been reached that each of rabies principal hosts maintain and transmit distinct virus variants which are established along geographical areas. Rabies principal host species transmit the disease to secondary species (6, 36).

Susceptibility is very high among secondary species even if they could not maintain the epizootic phase due to their behaviours and population biological dynamics.

There is a correlation between rabies incubation and the excretion period of the virus that is based on population parameters such as the spread of the virus within the host population and the rate at which the virus evades the host immune system. The global fear is however that the virus will continue to colonise new hosts species as it takes over new geographical habitants where conditions and population structures permit viral propagation(6).

In other part of the world such as in Malawi's Zomba region, knowledge on rabies and awareness on how one should act around dogs were superior within school going children who have attended lessons on rabies than among children who have attended rabies vaccination campaigns in their respective communities(38). In contrast, a KAP study in villages surrounding India's Pramukhswani Medical College; almost all (98.6) of the participants were well aware of rabies and its transmission routes with only a limited percentages (31.1%) would opt for home remedies. In that same study 34.4 % of participants would seek medical doctors services although 86% of these participants aware well aware of the post exposure anti rabies vaccine and 24% knew that all pets must be vaccinated against rabies(39).

2.4 Attitudes of dog owners regarding rabies

Veterinary professionals and stakeholders in the veterinary sector have the potential, coupled with the responsibility to bring zoonotic diseases such as rabies under control(27). The first approach needs to be the control of rabies in domesticated dogs, especially among strays and free-roaming dogs which will minimise rabies' transmission to humans(27). Other measures highlighted within the rabies control strategies include controlling stray dogs populations, canine vaccinations and community education(32).

The World Health Organisation of Animal Health has reiterated the need to strengthen veterinary services capacity and other stakeholders within the animal health sectors(7). There is also a need for strong collaborations among different stakeholders such as human health services, environmental officers, police forces, municipal authorities, non-governmental organisations and the communities (dog owners)(4,7). Communication channels should be strengthened accompanied by community awareness education while encouraging public-private partnership participation for successful and sustainable rabies control(32,37).

National governments are obliged to adhere to the OIE requirements. The nations should ensure responsible control of rabies in animals reservoirs, be it domesticated dogs or wild animals, and to ensure and enforce transparency in notifications (7). The OIE requires rabies status declaration from all its member states and that member states give out notifications of rabies cases either in domestic or wild animal species.

Other measures to put in place in the face of rabies control are international pet movement controls, pet passports, and quarantine while monitoring and controlling dog populations globally(32).

Keith, Parker and Wilsnack carried out studies on foxes and skunks of North America where it became clear that those animals propagate rabies virus on that continent. They speculated that rabies adaptation to one host is characterised by high pathogenesis and a high level of viral excretion through saliva(40). Most mammalians are susceptible to rabies virus infection however, only a limited number of these animals are categorised to maintain rabies, contributing to rabies' persistence in nature. Host species do maintain rabies in nature due to their adapted traits(41).

2.5 Practices of dog owners regarding rabies

In a study conducted by Hampson, Coudeville and Lebo, it is indicated that dog vaccinations alone could not reduce the shadow of rabies on the communities; it is therefore imperative to have constant provision of affordable post-exposure prophylaxis (4). Weyer and Jacqueline further expressed the need to have an impeccable co-ordination between the medical and veterinary sector. Surveillance must also be enhanced to reduce under-reporting of the disease burden while monitoring and control measures are enforced (11).

Through mass vaccinations, dog rabies have been brought under control in some regions (countries in the WHO region of America), however the disease is still being maintained in the wild life population of carnivores (21). A successful rabies prevention effort must include elimination of exposure, vaccination, or pre-exposure prophylaxis and post-exposure treatment (21). These are possible if the public at risk have the right knowledge, possess the necessary attitudes and performs the right practices towards rabies or other zoonotic diseases (11) (27). The rabies picture is very different in Europe and North America; mass vaccinations accompanied by the culling of stray dogs have successfully controlled and eventually eliminated rabies within domesticated dogs' population (29).

The most effective rabies control approach is the mass vaccination of dogs accompanied by the elimination of unconfined and free roaming dogs and stray dogs (30). Another effective way to prevent rabies is through the elimination of exposure to rabies infected animals, vaccination of the population at high risk or through pre-exposure prophylaxis to the population that is involved with animals and post-exposure treatment to those already exposed (30).

Countries in the western hemisphere have adopted a successful tradition toward rabies control where by large scale dog vaccinations campaigns accompanied by control of free roaming

dogs population and enforcing legislation toward responsible dog ownership. It has been noted that free roaming dog population maintain rabies hot spots thus as their populations grows, herd immunity decreases therefore elevating the possibility of dog rabies. The most sorts after control and possibly eliminating dog maintained and dog sourced rabies is through improved dog herd immunity of not less than 70%, constant over time. Do herd immunity should therefore be associated with continuous active and passive surveillance, continuous community education about rabies and the risk of transmission, prevention and responsible pet ownership(42).

The WHO, FAO, OIE have organised successful rabies conferences, Kiev, 2005, Paris, 2007. The main focus of these conferences were to move towards a sustainable prevention of rabies at the point of source, looking into the establishment of a sustainable rabies control in animals and enforcing the collaboration between sector "One health approach" (20). These three key players (WHO, FAO and OIE) in global rabies strategies have a vision to achieve global elimination of rabies in domestic animals and wildlife (6) (33).

2.6 Overview on wildlife rabies versus dog rabies

Domesticated dogs could only be responsible accused for 0.1 to 0.5 cases of rabies reported in North America and Europe respectively. It is clear that there is a spill-over of rabies from wild to domesticated dogs throughout the world. On the contrary, Turkey had at one point reported cases of rabies spill-over from domesticated dogs to wild animals even though Europe and North America have very low incidences of rabies in domesticated dogs due to the way domesticated dogs are handled and owned(6,32,43).

Rabies predicament is very different in Africa and Asia where dog rabies is widely spread and accountable for up to 95% of reported human cases(32). There is a very close association between dogs and humans. On these continents, dogs roam freely over large distances of

land, transmitting the virus across villages. A study conducted in Tanzania gave an idea of dog movements where a rabid dog is said to be able to cover up to 0.88 kilometres (KM) average daily, producing numerous other secondary infections(44,45).

In contrast to the African and Asian situations, Latin America has successfully reached a transitional stage where dog rabies has been significantly reduced although wild life rabies remains relatively high(40). The reduction in domesticated dog rabies prevalence has been reached due to factors such as dog vaccinations, dog population control and promotion of responsible dog ownership(40).

At times wildlife rabies threats to human populations are underestimated yet wildlife rabies could reach human populations through domesticated animals. Europe has reported the connection of wildlife rabies to human populations during the outbreak of rabies in foxes just as it was in the United States and Canada where human rabies are a result of insectivorous bats. In Latin America, Caribbean Islands, Haematophagous bats are culprits as they transmit rabies to domestic animals and humans(46,47).

The African and Asian human rabies picture is defined by domesticated dogs. Over 99% of rabies cases are due to bites by rabid dogs(37). Strategies to control dog populations are non-existent, dog populations grow out of control due to the absence of supervision on dogs' movements and low dog vaccinations coverage. It is estimated by WHO that around 300, 000 to 600, 000 people perish annually around the world due to rabies(37). A majority of those rabies deaths are reported by developing nations who further record the highest consumption of the Post-Exposure Prophylaxis (PEP)(44,45,47–49).

Not all biting dogs are rabid and yet not every rabid dog bite victim would develop clinical rabies. Communities have different approaches to dog bites, with some seeking interventions of all kinds of healers, which is why sometimes rabies victims can be vulnerable to death(50).

Developing countries are therefore faced with challenges that affect and hinder rabies control strategies. Long distances from health facilities, availability of various traditional remedies, ignorance to seek urgent proper post-exposure prophylaxis, unavailability of PEP at private facilities, and the high prices of PEP contribute to the burden of this deadly yet preventable disease(8).

The plan to eliminate rabies within the principal host population might be overly ambitious, therefore our efforts will be better placed on educating the population on good dog-keeping practices, prevention of dog bites, appropriate dog bites treatments with PEP and dog vaccinations(51).

2.7 Overview on regional rabies perspective

Rabies is a disease of public health concern in endemic areas (regions). This may not only be due to its high case fatality rate of almost 100%, but also due to the fact that it is preventable through health education and immunisation of dog owners and the public at large (52). "Domesticated dogs are responsible for 90% of human rabies cases"(7) (10). In rabies endemic regions, it is common that the rabies virus' spread or spill-over to humans is driven by free-roaming domesticated dogs(18)(53). Muchenu, Kikuvi and Amwayi stated that despite governments' efforts through dog vaccinations in Kenya, there were still gaps regarding awareness promotion, proper dog handling techniques and the promotion of health-seeking behaviour in the community(19). Countries such as Angola, Namibia, Mozambique and Zimbabwe are considered rabies high risk areas(54). Southern Africa is colonised by two distinct rabies virus biotypes(55). The first biotype is well known to infect the Canidae family (canid virus) that include domesticated dogs (Canis familiris) and jackals' species. The other biotype is the mongoose viruses cycle that terrorises carnivores of the herpestidae family such as the yellow mongoose (Cynictis penicillata)(55).

Dog rabies is said to be maintained within communal areas where vaccination is inadequate or in urban areas sharing borders with communal areas where a large number of susceptible dog populations roam freely. Jackal rabies have been reported within large commercial farming sectors in Zimbabwe and South Africa where the Canidae rabies cycle is maintained by the black backed jackal(55).

2.8 Overview on the national rabies perspective

Rabies is endemic in many developing nations, and Namibia and other sub-Saharan African countries are not exempted by this deadly disease[(1)]. It has been established that rabies is highly under-reported and largely neglected in most of the low-income countries(52). Namibia falls within the upper middle-income economies(56) yet rabies infection in animals is under reported while a large number of suspected rabid animals are euthanized and consumed in communities, however no reports are given to the relevant authorities and no samples are taken for diagnosis.

In 1926 the first case of rabies was f reported in Namibia (then South West Africa); the virus was isolated in north central Namibia (then Ovamboland). The virus then spread southwards to Grootfontein as recorded in 1938 and eventually all over the country(53). Urban and sylvatic (wild) rabies are well documented and widely spread in Namibia(57).

Even though urban rabies which is transmitted mostly by dogs is predominant in the northern regions, there is also the wildlife rabies that is preserved mainly by jackals (Canis mesomelas) in the central region and wild cats (Felis spp.) in the southern regions of Namibia(58).

Rabies was practically unknown in Namibia until the mid-twentieth century(58). The earliest reference of rabies in Namibia were in 1887, following the massive losses of cattle and small stocks, because of rabies that was propagated by rabid dogs(58).

Schneider is of the opinion that during the mid–forties rabies has only been occurring in the northern regions (then districts) of Namibia; mainly in Kaokoland (now Kunene), Owambo (now Omusati, Oshikoto, Oshana, and Ohangwena), Kavango (now Kavango west and east) and Caprivi (now Zambezi). This situation has prevailed until today. The disease possesses a serious public health threat in those regions. These regions are densely populated and there is a high number of dog population that is freely roaming(58).

2.9 Conceptual framework

It is a network of plane or interrelated concepts that could work together to provide a comprehensive understanding of a phenomenon/phenomena. There is a need to understand why people behave the way they behave and make the decisions they make.

The rabies situation in Omusati can be easily explained by the following public health theory:

The health belief model theory: This theory suggests that an individual belief about a health condition predicts an individual's health-related behaviour. It implies that there are factors that influence the health behaviours of an individual such as an individual's perceived threat to a sickness or disease, perceived susceptibility, belief in the consequences, perceived severity, potential positive benefits of action (perceived benefits), perceived barriers to action, exposure to factors that prompt action (cues to action) and confidence in the ability to succeed (self-efficacy).

Summary

The previous chapter gave an overview on knowledge, attitudes and practices of dog owners regarding rabies control. Different strategies used by various dog owners in different countries to control rabies were addressed. Furthermore, the global measures accepted to control rabies such as mass vaccination of domesticated dogs, provision of pre- and post-

exposure prophylaxis and the importance of surveillance in rabies control were also discussed. The next chapter will focus on the research methodology.

Chapter 3: Research Methodology

3.1 Introduction

The term research methodology is defined as the whole set of strategies the researcher have used to put together different parts of the study in a coordinated way while ensuring that the research problems are effectively tackled. It comprises of a well-defined plan on data collection, analysis and further enables the researcher to tackle the research problem in a logical and without compromise(59).

This chapter gives a description of the research design and methods used during this study. It provides detailed information of the research design, data collected, and the instruments used to collect the data. It further describes methods used for data management, data analysis and how ethical requirements were met and ensured.

3.2 Research design

The researchers conducted a quantitative cross-sectional, descriptive household survey on residents in the five constituencies of Omusati region, with a population of 243, 166 residents and 46698 household. The region has 12 political constituencies and 664 clusters (Primary Sampling Units). This study employed a two stage cluster sample where the first stage is the PSUs and the second stage is the households. The researcher used a face-to-face interview using structured questionnaires (open- and close-ended questions). The study looked into the Knowledge, Attitudes, and Practices of household owners with regards to rabies control in Omusati region, Namibia.

The designs used in this study are explained by the researcher as follows:

3.2.1 Quantitative design

The quantitative design is a formal, objective based and systematic process which illustrates and test the relationship between variables(23). In this study, the researcher tested the relationship between demographic characteristics of dog owners and their levels of knowledge, attitudes and practices with regards to rabies control in Omusati region, Namibia.

3.2.2 Cross-sectional design

A cross-sectional study is one that takes a snapshot of a population at a single point in time, measuring the prevalence of the disease or outcome in connection to the exposure but does not take into consideration the risk factors. Cross-sectional studies explore and determine both exposure and outcomes simultaneously(23). Based on that, samples were collected within four weeks to determine the prevalence of dog owners' knowledge, attitudes and practices with regards to rabies control in Omusati region, Namibia.

3.2.3 Descriptive design

The researchers employed a descriptive epidemiologic study. A descriptive study is defined as a collective for statistical methods employed to summarise and organise data in a way to improve the comprehension and understanding of the data's properties. It includes the analysis of the disease patterns based on the triple epidemiological characteristics which are Person, Place and Time(23)(59). This study described dog owners' knowledge, attitudes and practices with regards to rabies control in terms of person, place and time based on the owner's demography.

3.3 Study area /Setting

The study was conducted in the five (5) constituencies of Omusati region. Two of these constituencies were chosen because they had high numbers of rabies related human deaths, six human rabies deaths within Outapi district and five within Oshikuku health district.

The other three (Okahao, Okalongo and Anamulenge) constituencies were purposely chosen due to their proximity to the two districts. Using a simple random sampling, the researcher sampled enumeration area or Primary Sampling Units (PSU) within every constituency taking into consideration the population density of every constituency, collected representative data from the defined population in order to understand the phenomenon of rabies control in the region. The numbers of clusters per constituency were proportional to its population size. The researchers set the direction of movement within the cluster. For each cluster, the interviewers were assigned a starting point and the direction was determined by tossing a coin. This helped to determine the side of the street or road to which the interviewer walked on.

Intervals between households were determined as follow: number of households per cluster divided by the number of households to be interviewed per cluster. The researcher chose one household as a starting point, and the next household was selected based on the interval calculated based on a cluster.

Table 3.1 Sample per constituency

Constituency	**Sample PSUs**	**Sample Households**	**Final Sample Households**
Oshikuku	4	60	30
Anamulenge	6	90	45
Okahao	7	105	53
Okalongo	12	180	90
Outapi	14	210	105
Total	43	645	323

Although the minimum calculated sample number was at 323 households, the researcher took into consideration a non-response rate of 10%. It was therefore deemed fit for the researcher to collect up to a maximum of 355 sample (households) without deviating from the study target.

3.3 Population

A population is defined as the largest collection of entities in which the researcher is interested(60). The community of Omusati region, living within the five constituencies (Oshikuku, Outapi, Okahao, Okalongo and Anamulenge) were purposely selected for this study.

The study population comprised all households within the five constituencies of Omusati region. Omusati region has a catchment area of around 46698 households. It covered two urban constituencies namely, Outapi and Oshikuku and three rural constituencies of Anamulenge, Okahao, and Okalongo constituency. The number of PSU per constituency is proportional to the population size. The region has 12 constituencies, served by one Veterinary clinic and four veterinary outreach offices.

3.4 Sample and sampling methods

3.4.1 Sample

A sample is defined as part of a population intended to represent that population, regarded as the part of the population of interest(23,60). The sample is chosen so that every member of the population has an equal chance of taking part. The researcher used Microsoft Excel, 2010 to determine the sample number for this study, and adjusted the prevalence of rabies to 50%,

which was done to get the maximum number of sample at 95% confidence level, design effect 1.5 and a margin of error 5%.

3.4.2 Sampling

Sampling is a process of selecting a group of entities, components, animals, people, subjects or animals to be included in the study (52). The process involves the selection of parts in representation of the population under study; this helps with the estimation or inference of factors to the entire population.

For this study, a sample size of 323 households was calculated using a simple random sampling technique for cluster. Clusters are represented by political constituencies of Outapi, Oshikuku, Anamulenge, Okahao and Okalongo respectively. A questionnaire was completed per every sampled household.

Although a minimum of 323 samples (households) was calculated, the researcher took into consideration a non-response rate of 10% at data collection. The researcher could therefore collect a maximum of 428 samples (households) without any deviation from the study target. Four hundreds (400) questionnaires were attempted in the field; fifty eight (58) were disqualified at data entry and cleaning due to incompleteness. The researcher was therefore left with 432 complete questionnaires that were part of this study data analysis in Chapter five.

The sample size from each constituency was calculated proportional to the population of the respective constituency. One individual older than 18 years of age, preferably the household owner responded to the questionnaire.

3.4.2.1 Inclusion criteria

Households that qualified for this study had the following characteristics:

- A household is defined as all people identified by the household head as being occupants (at the time of recruitment) to the extent that food was regularly shared from the household pot within the last 24 weeks(61).
- Households that own a dog or dogs
- A household that is headed by a person who is older than eighteen years
- Households that have had a dog for at least eight weeks before the study is conducted
- The researcher chose eight weeks because at that age a puppy should have been initiated on rabies vaccinations.

3.4.2.2 Exclusion criteria

Households that were excluded from this study had the following characteristics:

- Households that are headed by those who are eighteen years of age or younger
- Households that did not own a dog or dogs
- Households that owned a dog for less than eight weeks prior to the study.

3.4.2 Sample size

A sample size is defined as a calculated number of required sample sizes for a given study based on specified probabilities of alpha and beta errors and proportional to the population baseline(23,60).

The sample size is determined using the following Simple Random Sample (SRS) formula under the given conditions and adjusted to cover for the loss in sample due to non-response and clustering.

$$n = \frac{z^2 * p * (1 - p)}{E^2}$$

Where

z = Critical value for the 95% confidence level = 1.96

p = Proportion of the characteristics in the population taken as 50% since it is unknown and also to maximise the sample size

E = Desired level of precision (Margin of error) = Taken as 5%

Under these given conditions a sample of 385 households are required.

A non-response rate of 10% is assumed based on the current experiences on household surveys. Therefore, the adjusted sample size including the cover for the loss due to non-response is 428 households (385/0.90).

So far the assumption is the usage of the SRS design. But this assumption does not work because the design used is a cluster sample design. In such a design there is a loss in precision due to the clustering of the elements (households).

Hence the sample size needs to be raised to cover for this loss. The factor used is the Design effect (Deff) which is taken as 1.5. Therefore the adjusted sample size is 642 households.

Assuming 15 sample households are covered within each selected PSU the number of PSUs required in the sample is 43. The numbers of PSUs are allocated proportional to the size of the selected constituencies and after rounding the following distribution of the sample is reached.

Table 3.2: Sample adjusted with designer effect (1.5)

Constituency	**Sample PSUs**	**Sample Households**
Oshikuku	4	60
Anamulenge	6	90
Okahao	7	105
Okalongo	12	180
Outapi	14	210
	43	645

Due to the time limit (short period to carry out this study) and limited financial resources, the researcher decided to reduce the number of samples per PSU. This was achieved by reducing the number of samples from every PSU in half. The researchers sampled eight households from every selected PSU.

Table 3.3 Final sample number

Constituency	**Sample PSUs**	**Sample Households**	**Final Sample Households**
Oshikuku	4	60	30
Anamulenge	6	90	45
Okahao	7	105	53
Okalongo	12	180	90
Outapi	14	210	105
Total	43	645	323

3.5 Data collection instruments

Data collection instruments are used to collect the data.

The researcher made use of a structured questionnaire to collect data through face-to-face interviews. The questionnaire consists of closed- and open-ended questions in English.

The same questions were translated into Oshiwambo (Oshindonga) which is the local language spoken in the region. The questionnaire consists of four sections.

Section A: this section captured demographic and socio-economic information such as age, sex, education background, employment status and family status.

Section B: This section captured household knowledge on rabies and behaviours of rabid animals (rabies symptoms and transmission route).

Section C: This section focused on attitudes of the participants towards rabies

Section D: This section focused on practices towards rabies and vaccination status of dogs.

These sections will be described further under data analysis on page 38.

3.5.1 Selection and training of field assistants:

Interviewers were recruited from Ogongo UNAM Agricultural campus and were trained for two days before data collection commenced. Training sessions were focused on the content of the questionnaire, mock interviews among interviewers in English and Oshiwambo. The questionnaire was pretested on twenty households within Outapi town as described under the pilot study.

3.5.2 Selection of interviewees

Houses were selected following an interval which was determined using the following formula: a household was selected as a starting point; the direction of movement was determined by tossing a coin. Every tenth household towards the pre-determined direction was knocked at and an interview held if it met the requirements. In cases where the tenth house did not meet the requirements, the next household was deemed fit to be taken as a representative.

3.5.3 Pilot study

A pilot study is defined as an experimental small-scale preliminary study, conducted in an order as an evaluation of the study feasibility, time, cost and adverse effects while further helping with adjustments and improvements on the study design well in advance before commencement of the full-scale research project. It helps with testing of research instruments such as questionnaires, preparing and training the interviewers and perfecting interview schedules. It is used when prediction of an appropriate sample size of a full study or the amelioration of some aspects of a study design.

It further provides answers to the researcher whether the full-scale study can be carried out in the way it has been planned or whether alterations should be done to some components(23).

The pilot study explores and evaluates the feasibility of processes, resources, data management and other aspects of the research process, and looks into complies and non-complies of the questionnaire(23).

For this study, a pilot study was conducted in Outapi, a town situated in the heart of Omusati region. Outapi is the capital city of Omusati region(21,22). The pilot study was held within the boundaries of Outapi town, on randomly selected households on the western side of the B1 road that traverse through Outapi to Ruacana from Oshakati and on the northern side of the road that link Outapi state hospital to the B1 road. A total of 45 randomly selected households responded to the call out of the 55 houses approached. The refusal rate was observed at 18%. The pilot study took two weeks to complete, and was done in October 2018.

Participants in the pilot study were randomly selected based on the study selection criterion. Households were randomly selected, according to any person, preferably the household owner over the age of 18 years of age, in a house that owns a dog or have owned a dog in the last nine months.

A household was selected as a starting point, the direction of movement was determined tossing a coin. Every tenth household towards the pre-determined direction was knocked at and an interview held if it met the requirements. In cases where the tenth house did not meet the requirements, the next household was deemed fit to be taken as a representative. After the pilot study, adjustments were made to the research instruments. Households that were selected for the pilot study were excluded from the actual data collection.

3.5.4 Reliability

This concept explores the precision or the ability of the research instruments to constantly measure and provide constant results on repeated trials. (23). Whenever the consistency and stability of the instrument increases, the reliability of the results goes up too. The questionnaire used in this study is considered reliable because it is consistent with those used in rabies KAP surveys in other parts of Africa and the rest of the world(1,34,41,62). After a pilot study on forty-five households of Outapi town, a few changes were made on the questionnaire such as the elimination of repeated questions, categorising dog owners' age into age groups because dog owners were hesitant to provide their exact age, refining and rephrasing complex questions as per respondents' comprehensions and categorising dog owners' occupation into categories of occupation. Data were collected by professionals from Ogongo agricultural college who understand and speak the local language.

3.5.5 Validity

Validity refers to the ability of the research instrument to measure what it is designed to measure (knowledge, attitudes and practices). The validity of the instruments was evaluated at the design stage by ascertaining the contribution of each question to the variables to be observed. Validity was again reassured and evaluated at the pre-testing stage through pilot testing.

3.6 Data collection

Data were collected on a face-to-face basis, using a structured questionnaire. Data collection for this study started after an approval letter and an ethical clearance certificate were obtained from the Ministry of Health and Social Services and the University Of Namibia Ethical Research Committee respectively (UREC). Data were collected by a team of four researcher assistants under the supervision of the main researcher.

The team spent six weeks in the field, between November and December, 2018 collecting data in Outapi, Okahao, Okalongo, Oshikuku and Anamulenge constituency of Omusati region.

Data collection followed an established sampling frame that was clearly explained in the earlier topics of this report under Sampling. The team collected a total of 342 samples out of 400 attempts. A total of 58 questionnaires were disqualified during data entry because they were incomplete and/or damaged. Data collection followed a simple random sampling technique in the five pre-selected constituencies of Omusati region, namely; Anamulenge, Oshikuku, Okahao, Okalongo and Outapi respectively.

A household was selected as a starting point at the entry of a constituency during the beginning of every data collecting session. The direction of movement was established through coin tossing whereby a “head toss” directed the data collection process to the house on the right hand side of the researcher while a “tail toss” directed the data collecting process to the house on the left-hand side of the researcher. Every tenth household on that predetermined direction was selected for the study and interviews were held. In cases where the selected house did not meet the inclusion criteria for this study, the following house was selected.

A researcher assistant entered the selected house where he or she gave a brief introduction, background and purpose of the visit. The household representative then filled in the questionnaire. The consent form was explained to the respondent and signed before the process of data collection started. The researcher assistant completed questionnaires on behalf of the household head in households where occupants could neither read nor write. One questionnaire was filled in for every eligible household.

Health education was given on rabies transmission, prevention and control measures to every participating household at the end of the data collection session.

3.7 Data analysis

After data collection has been completed, data was then cleaned and analysed. This is defined as the process by which the researcher systematically applies statistical techniques to describe, illustrate and recap the data (28).

A questionnaire was created in Epi-Info 7. After interviews in the field, data were captured on Epi-Info 7 which was further used to clean and analyse data accordingly. Microsoft excel was used to portray data in charts, table and graphs. Data were further arranged into descriptive statistic formats such as frequencies, percentages, proportions and rates using Epi-Info 7 and Microsoft Excel.

The researchers used a Likert scale to assess the community knowledge, attitudes and practices.

Knowledge assessment: one point (1) was given for every correct answer, zero point five (0.5) for every uncertain answer and a zero (0) for every wrong answer (good (score >9), fair (score 6-9) and poor (score<6) (based on a maximum total score of 18).

Attitude assessment: one point (1) is given for a positive answer, a zero point five (0.5) for a neutral answer and zero point (0) for a negative answer (positive (score >6), neutral (score 4-6) and negative (score <4) based on a total maximum of twelve points 12).

Practices assessment: One point (1) is given for every good practice; zero point five (0.5) for every neutral practice and then a zero (0) for every negative practice (good practice (score >9) Average (score 6-9) and negative practice (score <6) based on a total maximum point of 18).

A Chi-square test was used to compare categorical variables at 0.05 p-values for statistical significance.

3.8 Research ethics

3.8.1 Permission of the study

This study was authorised by the University of Namibia Research Ethical Committee (UREC). An ethical clearance letter was obtained from the School of Public Health under the Faculty of Health Science and the Postgraduate Studies Committee of the University of Namibia (UNAM). Further approval was obtained from the Ministry of Health and Social Services (MoHSS) and Omusati Regional Health Office. This study protocols were reviewed for approval by the University Research Ethical Committee of UNAM and prior to the commencement of every data collection session, a written consent was obtained from each and every participant. Consents were obtained after the purpose, benefits and the rights of the participants were clearly explained to him/her. Participation in this study was voluntary. Information from the participants were handled and kept confidentially. Questionnaires were treated with anonymity, through the use of number identifications instead of real names.

At the end of every interview, respondents and their family members received basic education information on different aspects of rabies. Focus was placed on the zoonotic aspects of rabies, rabies modes of transmission, prevention measures and control strategies at household level.

3.8.2 Ethical principles

This is defined as a combination of ethical and professional issues faced by researchers and their obligation towards participants in their researches and challenges as outcomes of research and public health policy(23).

3.8.2.1 Principle of respect, confidentiality and privacy

This principle incorporates two elements that deal with respecting people in regard to research. The researchers respect that individuals should make their own informed decisions about whether to participate or not(23). In order to treat people as autonomous, individuals were provided with complete information about the study and decided whether to enrol or not. The information collected from participants was used strictly for academic purposes. There were no videos, photos, or audio records taken.

3.8.2.2 Principle of beneficence (do no harm)

This principle states that research should not do any harm to people participating in the study(23). The researcher's purpose was to discover new information that might be helpful to society to fight rabies and prevent human life losses. The researcher had no plan to hurt anyone or find out information at the expense of other people.

3.8.2.3 Principle of justice

This principle deals with the concept of fairness(23). Participants in this study were randomly selected. The questions used in the study are relevant to the study community and the benefits from this study will benefit the community involved in this study.

Summary

This chapter described the study's methodology thoroughly, describing terms such as the quantitative, descriptive and cross-sectional study clearly. The population was also defined as households within Omusati region from which samples were derived. Data were collected using structured questionnaires consisting of open- and close-ended questions. Consents were obtained from every study participant before data collection.

The next chapter will focus on data analysis for this study.

Chapter 4: Data analysis

4.1 Introduction

In this chapter, analysed results will be presented as per the purpose of the study. The purpose of this study was to assess knowledge, attitudes and practices regarding rabies control among dog owners in Omusati region, Namibia. The results of the study are based on data collected using a structured questionnaire as described in Chapter three. The results will be presented as follows, firstly the socio-demographic information of dog owners, followed by the presentation of analysed data on Knowledge, Attitudes and Practices.

4.2 Data management and practices

All the methods and procedures used during data collection, data capturing and data analyses are described below:

4.2.1 Data collection

Upon ethical approval from the University of Namibia Research Committee (UREC) and further ethical clearance by the Ministry of Health and Social Services (MoHSS), data collection started using an already established sampling frame. A total of 342 completed questionnaires out of 400 attempts were collected. An individual was interviewed from every eligible household as described in Chapter three.

4.2 Data analysis

Three hundred and forty-two (342) questionnaires were captured into a pre-designed form on Epi-Info 7. Data was then exported to Microsoft Excel 2007 for data cleaning and coding then re-entered onto Epi-Info 7 for analysis.

Categorical and Dichotomous variables were compared using chi-square at a p-value < 0.05 as a cut off point for statistical significance. Furthermore, descriptive statistics such as percentage and frequency were calculated using Microsoft Excel 2007 and Epi-Info 7.

4.3 Socio-demographic characteristics of the study participants in Omusati region

A total 342 respondents responded positively to the questionnaires, representing 342 households of the five constituencies of Omusati region. More than half of the respondents 180 (53.2%) were male. The youngest respondent was 18 years of age and the oldest was 98 years of age, with a mean age of 42 years. The highest number of respondents, older than forty-nine years (>49) represented 32.45% of the respondents.

The majority of the respondents came from households that have 6 to 10 members (43.27%), while more than half of the respondents 235 (68.71%) keep one or two dogs at home. From the total number of 342 respondents, 172 (50.29%) had achieved secondary education level while only 34 (9.9%) of the respondents had no formal education; however only a mere 63 (18.42) were formally employed while the other 279 (81.58%) represented the unemployed working class, farmers, retired professionals and pensioners.

4.3.1 Analysis of the Socio-demographic characteristics of the study participants

Table 4.1 Sex of the respondents

Sex	Frequency/number	Percentage
Male	182	53.22%
Female	160	46.78%
Total	**342**	**100%**

Table 4.1 shows that 182 (53%) respondents were male and 160 (48%) were female. Thus a majority of the respondents in this study were men.

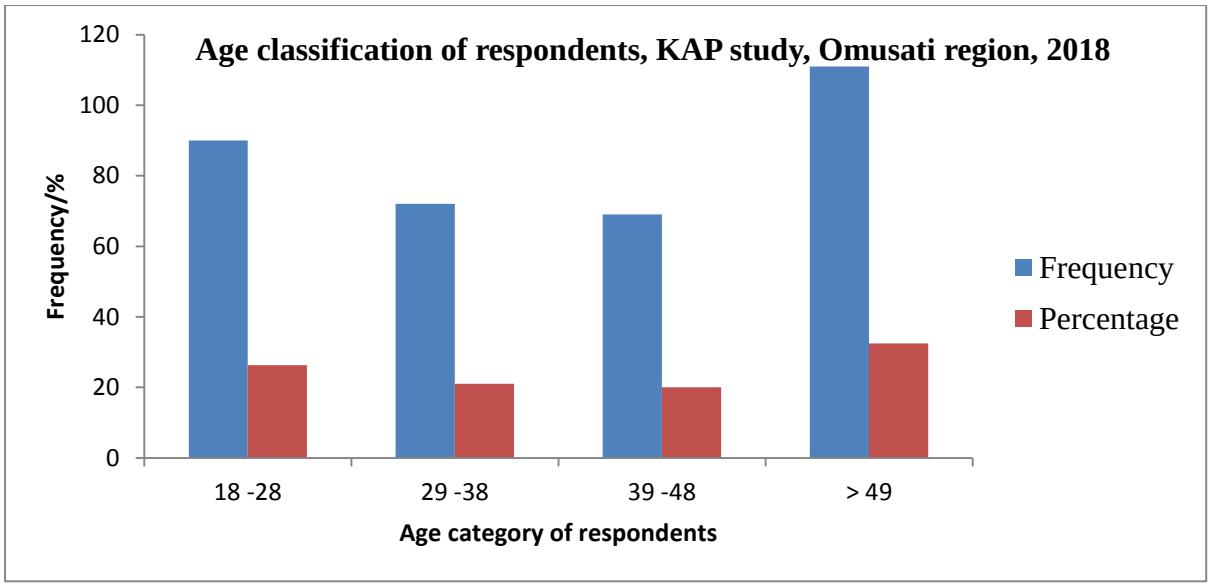

Figure 4.1 Respondents' age category

According to Figure 4.1, a majority 111 (32%) of the study respondents were >49 years, 90 respondents (26%) were between the ages of 18 - 28 years and 69 (20%) represented the age category of 39 - 48 years.

Table 4.2: Respondents' age parameters

Parameters	Mean	Variance	STD Dev	Min	Median	Max	Mode
Age	42	299.637	17	18	40	98	37

As shown in Table 4.2, the average age of the respondents was 42 years of age; the oldest respondent was a 98 year old pensioner and the youngest respondent was an 18 year old learner.

Table 4.3: Household sizes

Number of people per household	Frequency	Percentages
1-5	100	29.23%
6-10	148	43.27%
11-15	60	17.54%
>15	34	9.94%
Total	**342**	**100%**

As shown in Table 4.3 above, a majority of the 148 (43%) of the households had 6 - 10 people, 100 (29%) had 1 - 5 people per household, 60 (17%) had 11 - 15 people per household and only 34 (10%) households had more than 15 people per household.

Table 4.4: Dogs per household

Number of dogs per household	Frequency	Percentages
1-2	235	68.71%
3-4	99	27.48%
5-6	10	2.92%
>6	3	0.87%
Total	**342**	**100%**

Table 4.4 above presents that a majority of the households 235 (69%) have 1 - 2 dogs per household, the other 99 (27%) have 3 - 4 dogs per household and 3 (0.87%) have more than 6 dos per household.

Table 4.5: Educational backgrounds

Highest level of education	Frequency	Percentage
None	34	9.94%
Primary	100	29.24%
Secondary	172	50.29%
Tertiary	36	10.53%
TOTAL	**342**	**100%**

Table 4.4 shows that half of the study respondents 172 (50%) have secondary education, 100 (29%) of the respondents have primary education, 115(36%) have tertiary education and 34 (10%) have never gone to school.

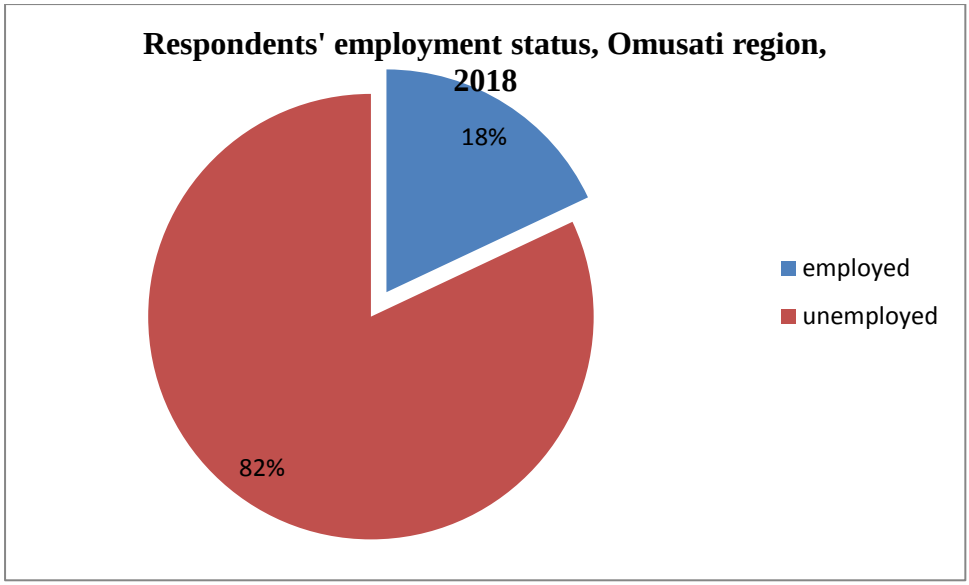

Figure 4.2: Employment status

Figure 4.2 above shows that a two-third majority 280 (82%) of the study respondents were without formal employment and 62 (18%) were employed.

4.4 Knowledge of dog owners regarding rabies control

Almost all the respondents (98%) were familiar with rabies in animals, and were able to refer to rabies using local names such as “Eemhwengu, Eemhwengu dhombwa, Okadhimu or Endambi” which are common names used in the region in reference to rabies. Over half of the respondents 189 (55.29) did not know the agent that causes rabies, 40 (11.76%) believed that rabies is associated with spirits that roam the atmosphere and falls upon unlucky dogs and only 55 (15.88%) knew that rabies is caused by a virus that is transmitted by rabid dogs.

Although 264 (77.99%) of the respondents knew that all mammals are susceptible to rabies, there were others, 67 (19.71%) who thought rabies could be transmitted to and from birds.

A majority 232 (67.8%) of the respondents were certain that rabies is transmitted to humans through rabid animal bites or scratches although 34 (9.94%) of the respondents had no idea how rabies is transmitted.

Almost all respondents 316 (92.38%) identified domesticated dogs to be major role players in the maintenance, transmission and propagation of rabies in Omusati region, followed by cats 19 (5.57%). A majority, 311 (90.94%) of the respondents knew that rabies is hundred percentage preventable, even though only 292 (86.25%) knew that dog vaccination is the most crucial part in the prevention of rabies while other respondents relayed on local strategies such as feeding a traditional cocktail of medicine or herbal extracts to their dogs to protect them against rabies and 21 (6.140%) did not know how to protect their dogs.

At least fifty percentages (50%) of this study respondent' obtained a scored above nine (>9) over the maximum of 18 points available. a score above >9 is considered a good enough knowledge on rabies with a score below nine (<9) considered way below average. This indicates that half of the respondents in the study area have an above knowledge on rabies. It is however crucial that further community education should be conducted to heighten rabies knowledge in the community.

4.4.1 Knowledge of dog owners regarding rabies control

Table 4.6: Rabies' causal agent

What causes rabies	Frequency	Percentage
Psychological problem	36	10.59%
Virus	55	15.88%
Associated with spirits	40	11.76%
Shortage of food and water	22	6.47%
Do not know	189	55.29%
TOTAL	**342**	**100%**

According to Table 4.6 a majority of the respondents 189 (55%) did not know rabies' causal agent, 55 (46%) knew that rabies is caused by a virus, 40 (12%); 36 (11%) have indicated that rabies is caused by a psychological problem and bad spirits respectively; however, the remaining 22 (6%) stated that rabies is caused by a shortage of food and water.

Table: 4.7 Rabies susceptibility based on species

Who is susceptible to rabies infection	Frequency	Percentage
All mammals	264	77.19%
Birds, humans, domestic animals	11	3.24%
Domestic mammals	67	19.71%
TOTAL	**342**	**100%**

Table 4.7 above shows that a third majority 264 (77%) of the respondents were aware that all mammals are susceptible to rabies infection, 67 (20%) of the respondents stated that only domesticated mammals are susceptible to rabies and the remaining 11 (3%) were not specific on rabies susceptibility.

Table 4.8: Rabies transmission route

Rabies transmission route		
	Frequency	**Percentage**
Bites or scratches	232	67.84%
Licking open wounds/mucous membranes	8	2.34%
Through meat	10	2.92%
All of the above	58	16.96%
Do not know	34	9.94%
TOTAL	**342**	**100%**

Table 4.8 above shows that more than half 232 (68%) of the respondents mentioned that rabies is mainly transmitted through dog bites and scratches, 58 (17%) mentioned that rabies can be transmitted through bites and scratches, through contacts with open wounds and membranes or through meat. The other 34 (10%) of the respondents did not know how rabies is transmitted.

Table 4.9: Animals commonly associated with rabies transmission

Common sources of rabies in the region		
	Frequency	**Percentage**
Dogs	316	92.38%
Cats	19	5.57%
Humans	3	0.88%
Others	4	1.17%
TOTAL	**342**	**100%**

Table 4.9 above shows that an overwhelming majority 316 (92%) of the respondents identified domesticated dogs as the main players in rabies transmission in the region, 19 (6%) identified domesticated cats, 4 (1%) mentioned other animals while 3 (0.88%) mentioned human beings as main players in rabies transmission.

Table 4.10: Perceptions towards rabies control

Best forms of protection against rabies (dogs)		
	Frequency	**Percentage**
Vaccination	295	86.25%
Feed a traditional cocktail	7	1.62%
Feed herbal extracts	19	5.55%
Do not know	21	6.14%
Total	**342**	**100**

Table 4.10 shows that 295 (86%) of the respondents believed that dog vaccination offers the best protection against rabies infection, 21 (6%) did not know that rabies could be prevented, 19 (6%) believed in the use of traditional herbal extracts and the other 7 (2%) preferred to use traditional cocktails.

Table4.11: Human protection against rabies

Best protection against rabies (Human)		
	Frequency	**Percentage**
Do not know	95	(27.77%)
Hygiene	22	(6.43%)
Kill all rabid animals	13	(3.80%)
PEP	76	(22.22%)
Stay away from pets	52	(15.20%)
Traditional doctor/Medicine	5	(1.46%)
Vaccination of pets	79	(23.09%)
TOTAL	**342**	**100%**

Table 4.11 indicates that 95 (28%) of the respondents did not know how to protect themselves against rabies, 97 (23%) chose to get their pets vaccinated, 76 (22%) choose to get the post-exposure prophylaxis after an animal bite, and 52 (15%) opted to stay away from pets. Another 40 (11%) opted to seek protection against rabies through hygiene, killing all suspected rabid animals or rather visiting a traditional doctor after an animal bite.

4.5 Attitudes of dog owners regarding rabies control

One hundred and eighty-seven (55%) of the respondents did not know how to avoid/reduce rabies infection from dogs or they opted for out-dated approaches such as traditional medicine rather than dogs vaccinations or receiving post-exposure prophylaxis immediately after an animal bite. One hundred and twenty-five (37%) of the respondents have been bitten by a dog in the past. A majority (96%) of the respondents preferred to seek medical attention from either clinic and/or hospital after a dog bite. Furthermore, a great majority (99%) of the respondents have acknowledged that rabies post-exposure prophylaxis is necessary in the prevention of rabies in humans after a dog bite and that it should be administered immediately within 24 hours after an animal bite for it to be effective, 304 (89%).

This study respondents attitudes towards rabies is very impressive with a score of above six (>6) over 12 point available, obtained by around sixty percentages (60%) of this study respondents. This score highlighted that the community has the right attitude toward rabies control.

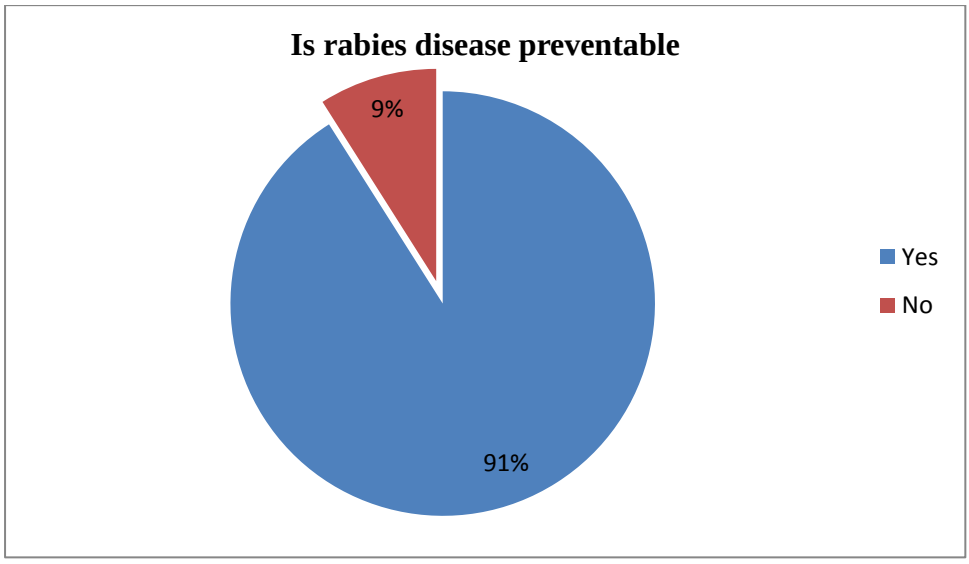

Figure 4.3 Attitudes towards rabies prevention

Figure 4.3 above shows that **a** majority of the respondents 311 (91%) had positive attitudes that rabies is completely preventable and 31 (9%) believe that rabies is not preventable.

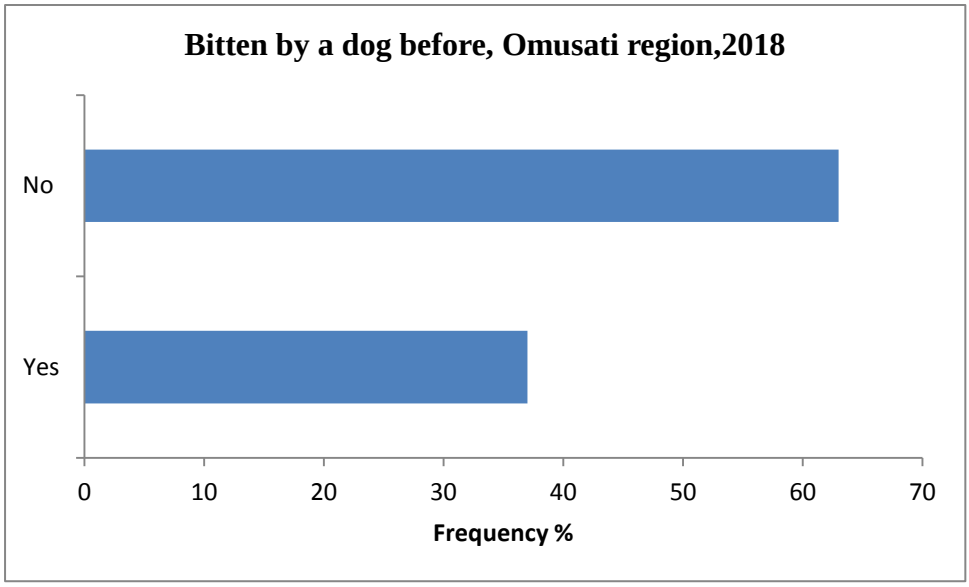

Figure 4.4: History of dog bite

Figure 4.4 above shows that the majority 215 (63%) of the respondents did not remember having been bitten by a dog before and 127 (37%) were bitten by dogs before.

Table 4.12: Attitudes towards the Post Exposure Prophylaxis

Action taken after a dog bite		
	Frequency	**Percentage**
Herbal extract at home	3	0.69%
Traditional medicine	12	3.50%
Received PEP (Hospital)	311	90.93%
No treatment	16	4.67%
TOTAL	**342**	**100%**

Table 4.12 above indicates that 331 (91%) of the respondents did seek PEP from the nearest medical centre, 16 (5%) did not seek medical help after a dog bite, 12 (4%) opted for traditional doctor, and 3 (1%) used a home-made herbal extract.

Table 4.13: Treatment options after a dog bite

Best help after a dog bite		
	Frequency	**Percentage**
Hospital or nearest clinic	331	96.78%
Traditional healer	5	1.46%
Personal wound treatments	5	1.46%
Others	1	0.29%
TOTAL	**342**	**100%**

Table 4.13 above shows that a large majority 331 (97%) of respondents trust that the hospital provides the best treatment after a dog bite, the other 11 (4%) opted either for a traditional doctor or a home-made remedy.

Table 4.14: Medical-seeking patterns after a dog bite

PEP most effective after an animal bite		
	Frequency	**Percentages**
Immediately within 24 hours	304	88.88%
Any time after 24 hours	11	3.21%
Do not know	27	7.89%
Total	**342**	**100%**

Table 4.14 above shows that the majority of respondents, 304 (89%) would go to the hospital within 24 hours of a dog bite, 27 (8%) did not know that time mattered in rabies treatments and 11 (3%) would go any time after 24 hours.

4.6 Practices of dog owners regarding rabies control

Although 140 (41%) of the respondents carried out good practices that are required after an animal bite such as washing the wound with soap water before seeking medical attention or seeking medical attention directly, two hundred and one (59%) respondents did not know what to do, 15% said they would tie the wound, and 31% responded that they would apply herbal extract.

Three hundred and twenty four (95%) of the respondents keep guard dogs, 29% would report or take their dogs to the nearest veterinary clinic when rabies is suspected, two hundred and twenty one (65%) would kill the dog suspected of rabies and 323 (68%) of the respondents consume dog meat. Two hundred and forty-three (71%) respondents had their dogs vaccinated but only one hundred and thirty-four (39%) respondents had vaccination certificates as a proof of vaccination for their pets. Two hundred and ninety-eight (87%) of the respondents kept free roaming dogs yet only a mere seventy three (21%) of these respondents had spayed bitches or castrated their male dogs.

Respondents to this study have poor practical approach to rabies control. Only thirty percentages (30%) of the respondents obtained a score > 9 which is an average score of the available 18 points. Despite good level of knowledge and impressive attitude toward rabies, respondents to this study have a poor practical approach toward rabies control and could not perform necessary tasks required to bring rabies under control in the region.

4.6.1 Practices of respondents regarding rabies control

Table 4.15: Dog bite wound management

Dog bite wound treatments at home		
	Frequency	**Percentage**
Tie the wound with a cloth	51	14.96%
Seek medical help	107	31.38%
Wash the wound with water and soap	33	9.68%
Apply herbal extract	106	31.09%
Do not know	44	12.90%
TOTAL	**342**	**100%**

Table 4.15 above shows that 107 (31%) of the respondents would not attempt wound treatment at home, 106 (31%) would apply a home-made herbal extract, 51 (15%) would tie the wound with a cloth, 33 (10%) would wash the wound with water, while 44 (3%) did not know how to treat bite wounds at home.

Table 4.16: Motives behind dog ownership

Reasons for dog ownership		
	Frequency	**Percentages**
Guard/Security dogs	324	94.73%
For meat	1	0.30%
Shepherd	2	0.60%
Hunting dogs	1	0.30%
Breeding	3	0.90%
Pets	11	3.29%
TOTAL	**342**	**100%**

Table 4.16 above shows that a large majority, 324 (95%) of the respondents in Omusati region kept guard dogs, 11 (3%) kept pet dogs and 7 (2%) respondents kept dogs for meat, hunting and breeding purposes.

Table 4.17: Communities attitudes toward suspected rabid dogs

Action taken when a dog is suspected of rabies		
	Frequency	**Percentages**
Take/report it to the nearest veterinary office	100	29.24%
Kill it	221	64.62%
Tie it up (quarantine)	11	3.22%
Let it loose	10	2.92%
	342	100

According to Table 4.17 shown above, 221 (65%) of the respondents would kill and burn a suspected rabid dog on sight, 100 (29%) would report or take it to the nearest state veterinary office, 11(3%) would tie it up and the remainder, 10 (3%) would let it loose to roam the village.

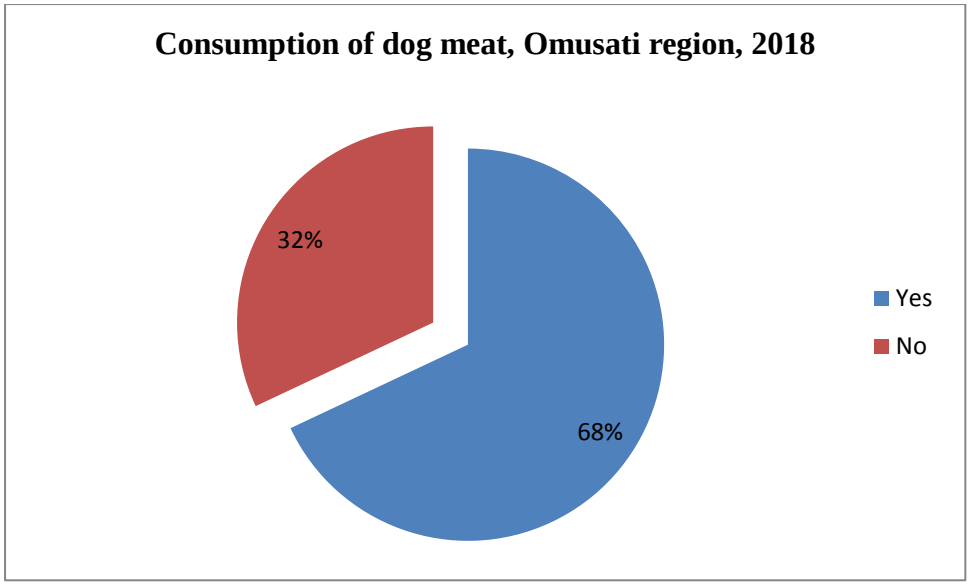

Figure 4.5: Consumption of dog meat

Figure 4.5 shown above shows that the majority 212 (67%) of this study's respondents do consume dog meat and the other 130 (32%) respondents do not consume dog meat.

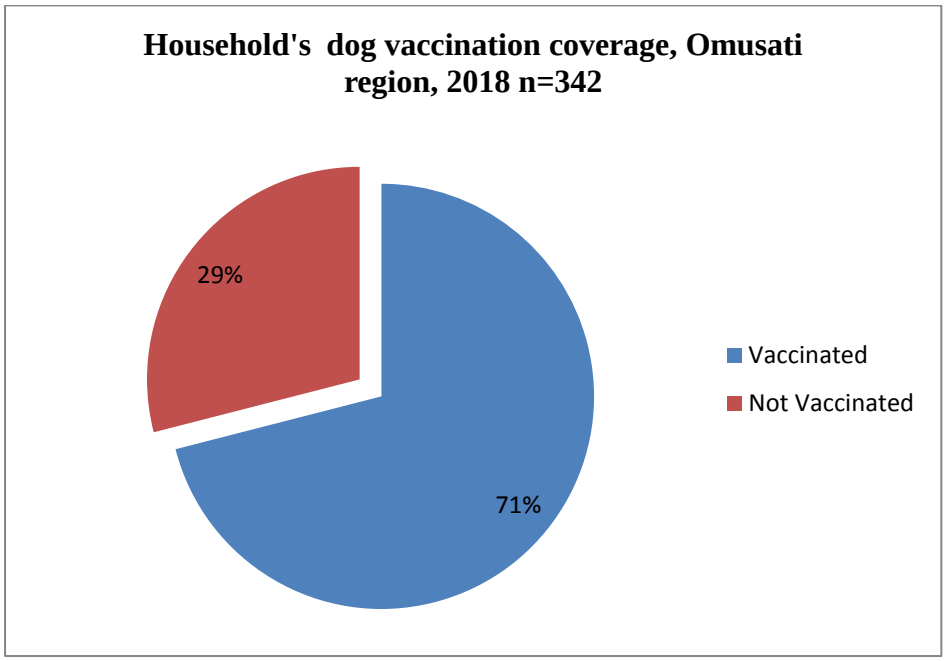

Figure 4.6: Household's dog vaccination coverage.

According to Figure 4.6 above, a large majority 243 (71%) of respondents had their dogs vaccinated during the previous rabies campaign and the other 99 (29%) did not get their dogs vaccinated.

Table 4.18: Reasons dogs were not presented at vaccination points

Why dogs were not vaccinated		
	Frequency	**Percentages**
It is healthy (dog)	3	3.03%
Missed the mass vaccination campaign	11	11.11%
No information about the campaign in the area	21	21.21%
Not tame to be handled	11	11.11%
On a working day and during school hours	22	22.22%
Small puppy	18	18.18%
Vaccination team did not reach the area	5	5.05%
Vaccination point is very far	8	8.08%
TOTAL	**99**	**100%**

According to Table 4.18, there were multiple reasons that impeded dogs' presentations to the vaccination points. 22 (22%) of the respondents mentioned that vaccination was done on a working day and during school hours; 21 (21%) stated that they had no information of the campaigning area, 18 (18%) mentioned that their dongs were too young, 11 (11%) responded that the dogs were not tame and 8 (8%) mentioned the vaccination point was very far.

4.7 Relationships between variables

There is no significant difference in dog meat consumption as one move from communal settings to urban setting although majority 180 (68%) of the respondents in rural settings admitted to consuming dog meat compared 25 (53) % of respondents living in urban setting of Omusati region, chi-square 2.0294, p-value 0.1541.

In the category of employment and the ability to keep and maintain dogs in an enclosure, away from neighbourhood dogs and stray animals, only thirty (10%) of the unemployed respondents kept their dogs in an enclosure; and fourteen (22%) of those employed kept their dogs in an enclosure. Formal employment made a highly significant to whether one is able to keep a dog in an enclosure or not, chi-square 5.0514, p-value 0.0241.

There was no significant difference in vaccination coverage of employed respondents to unemployed respondents even though 76% of the employed respondents had their dogs vaccinated to 70 % of those unemployed, chi square 0.7086, p-value 0.3999.

There was no significant difference in vaccination coverage ass one move from rural settings to urban settings as respondents from rural settings had a higher number of un-vaccinated dogs 82 (28%) compared to 15 (28%) unvaccinated dogs belonging to respondents in urban settings, chi square 0.0001, p-value 0.9917.

A majority of dogs from rural settings 261 (90%) are roaming around the communities freely while only 69% of urban dogs are roaming around the community freely, significant, chi square 15.000, p-value 0.0006.

4.8 On a Likert scale

Knowledge score: 50% of the respondents obtained a score >9 which is considered a good score of knowledge.

Attitudes: Sixty percentages (60%) of the respondents scored above >six which is considered a good attitude level.

Practices: Thirty percentages (30%) of the respondents obtained a score >9 which represents a good level of practice.

Summary: This chapter was focused on data analysis. It allowed the researchers to perform data cleansing, transformation and modelling of data into graphs, tables and other models that provided useful information and meaning. Data analysis allows the researcher to reach informed conclusions using data and is used to support decision-making.

The next chapter will give a detailed discussion of the study results, consider possible recommendations based on the results, and make informed conclusions.

Chapter 5: Discussions, Conclusions, Recommendations, Limitations and Summary

5.1 Introduction

In this chapter, results that were highlighted in Chapter four are discussed in detail. The findings of this study were discussed and compared with national, regional and international literature to bring meaning to the findings. In this chapter, conclusion will be drawn based on discussions and objectives of this study which were as follows;

- Assess the knowledge of dog owners regarding rabies control in Omusati region
- Determine the attitudes of dog owners regarding rabies control in Omusati region
- Determine the practices of dog owners regarding rabies control in Omusati region

5.2 Socio-Demographic information

Respondents in this study came from all age categories from above eighteen years of age; however respondents above forty-nine years of age dominated the study at 111respondents (34%). This is in contrast to Hikufe's findings in Ohangwena region where 60% of the respondents were just above 25 years of age, representing the most active age category(33). These findings can be explained by the fact that the researcher carried out a household based survey. The active members of the family are barely at home during the day as they go on with their daily activities. That explanation is fortified by the fact that only 63 (18%) of the respondents in this study had formal employment and 182 (53%) were males, who made up the majority of the respondents.

5.3 Discussions on knowledge, attitudes and practices

The findings of this study indicated that 171 (50%) of the questionnaire respondents had above average knowledge, (205) 60% had an above average level of good attitude, and only 102 (30%) were practicing above average practices towards rabies control.

These findings concur with those from a study by Hikufe (33), who established that only 14% of that study's respondents (dog owners) were not aware of rabies and rabies vaccination availability at local Veterinary offices in Ohangwena region, 2014 and only about 2% did not seek medical assistance after a dog bite.

These findings can further be supported by the high level of state intervention through community rabies campaigns and rabies vaccination campaigns reaching up to 242 (71%) of this study's respondents who have had their dogs vaccinated. Furthermore, an above average knowledge level score in the region could be linked to the new rabies project in the region (Rabies elimination campaign) which is aimed at eliminating dog mediated rabies transmission.

During interviews dog ownership was discussed in detail, as it is linked to the way of living based on tradition and a sense of security as dogs serve as notification alarms that warn owners of approaching dangers.; this was evident as 324 (95%) of the respondents kept guard dogs. Although all of these dogs are owned, there is not always a harmonious dog-owners relationship with some dogs being semi-wild, un-manageable and roaming free around villages and communities' pastures. Three hundred and eight (90%) of the respondents keep free roaming dogs. These findings are fully supported by Hikufe (33), who reported that 86% of the respondents of the survey carried out in Ohangwena in 2014 kept guard dogs.

Through discussions, it became evident that these guard dogs receive minimal care from their owners, as they are left to feed on their own during the day and only fed at night.

It further became evident that a majority of the respondents could not catch or get in close contacts with their dogs beyond feeding period and most of these dogs prefer younger members of the families who feed them most often(33).

This study revealed that around 229 (67%) of the study respondents in Omusati region consumed dog meat which is considered a delicacy in the region, and this is in support with the findings of a study by Winystuti in Bali, Indonesia, where a group of people (ethnic groups) were found to consume dog meat. This practice was considered to be widespread and was suspected to have contributed to the spread of the rabies virus throughout the districts and to other parts of the country(41).

One hundred and eighty seven (87%) of those who consumed dog meat live in rural settings with limited medical and veterinary services. Handling and consuming dog meat may spread and shed the virus in the community as meat products are shared between families in different villages.

Rabies knowledge, attitudes and practices in Omusati is very unique, highly related to the community, social status and level of education. These aspects influence the control mechanisms put in place at household level, the number of dogs per household and the dog–owner relationship. Although a dog is considered a member of the family, it spends the majority of its time outside depending on the role it plays such as that of a pet, shepherd or guard to which the service and care provided is highly dependent(33).

A majority 298 (87%) of the respondents stated that their dogs roam around freely and only a few of those free roaming animals could be handled, transported or presented for mass vaccination, although 243 (71%) of the respondents have had their dogs vaccinated. These findings correspond with the findings of another study in Bali, Indonesia, an island that recently lost it free rabies status in which 78% of dogs were roaming free in the

community(41). That practice have reduced contacts between a dog and its owner which severely reduced the rabies vaccination coverage below the 80% vaccination coverage required by the World Organisation for Animal Health (OIE)(32). The practice of freely roaming dogs create unmanageable dog populations, reduce vaccination coverage while further creating rabies hot spots within an unwanted dogs population or a population of stray dogs (35,63).

This study further revealed that more than half 222 (65%) of the respondents preferred to kill suspected rabid dogs on sight and only a mere 99 (29%) of the respondents would report or take a suspected rabid dog case to the nearest veterinary office. There is need to improve dog management practices within the community and the practices towards dogs and suspected rabid dogs especially in a community where more than 67% of the respondents consume dog meat(1,17). Although a majority of respondents indicated that they will kill and burn suspected rabid dogs, some suspected rabid dogs might still be consumed, thus risking lots of life.

The World Organisation for Animal Health requires that every member state sample and conduct regular rabies test on suspected animals' brains(20). The Directorate of Veterinary Services (DVS) guided by the Animal Health Act of 2011 , further requires the community to report all rabies suspected cases to the nearest veterinary office for further investigation and surveillance purposes(64).

A majority 229 (67%) of the respondents knew the correct modes of rabies transmission; these findings are superior to what Guadu discovered in a study done in Bahir, Ethiopia; where only 45% of the respondents in that study knew the correct modes of rabies transmission(62). This might be explained through constant and continuous rabies educational messages on the radio and printed medias during the rabies eradication campaign

that was launched in Outapi, Omusati region mid-2018. The other contribution to an above average knowledge could be that the study took place not more than a month after mass dogs vaccination campaigns were ended in the region. Furthermore this study analysis brought to the fore that 314 (92%) of the respondents pointed out domesticated dogs to be a common source of rabies in the region and that 311 (91%) of the respondents understand that rabies is hundred percentage preventable through dog vaccination and timely administration of the Post-Exposure Prophylaxis (PEP).

Although most respondents understand rabies' mode of transmission, this study revealed several gaps towards bite wounds management. Even though 331 (97%) of the respondents chose to go to the hospital after a dog bite and 304 (89%) understood that Post-Exposure Prophylaxis is the only effective way to prevent rabies after a dog bite.

Only 34 (10%) of the respondents will wash the wound with soap water immediately after a dog bite, 51 (15%) will tie the wound with a cloth, 31% will apply traditional medicine or an herbal cocktail (*Bercheimer discolour*), fresh barks and twigs of young *Bercheimer discolour* trees are burned and applied on a fresh bite wound while still hot, yet 44 (13%) had no clue on bite wounds management.

Many of the respondents 298 (87%) understood the importance of dog vaccination towards rabies control however several geographical, social, operational, cultural and animal-related factors have created barriers that hinder access to crucial services. Those respondents whose dogs were eligible for vaccination yet could not get vaccinated gave reasons such as: the dog looks healthy 10 (3%), missed the mass vaccination campaign due to other obligations of equal importance e.g. work 113 (33%), had no information about the mass dog vaccination campaign 72 (21%), dogs not approachable 38 (11%), young puppies 18% vaccination is very far 8% and the vaccination team could not reach the area 17 (5%).

This finding is consistent with Kevin Bardosh's finding in rural Tanzania where reasons for non-compliance to vaccination included, not being aware of the campaign taking place (16%), central vaccination point being far (14%), not being available on the day of the campaign (12%), having a dog run away during transportation or at the vaccination point (10%) and not being able to catch the dog (6%)(44).

Choosing a central vaccination point has contributed to 8% of the respondents having their dogs miss vaccination. This central point is mostly located near the road, local shops, sport fields, schools, crush-pens or other famous community centres.

These findings were further supported by Bardosh in Tanzania where locals complained of up to 16% of their dogs missing out on vaccination because those responsible chose a place where they are comfortable or most convenient to them(44). This factor contributed negatively to the vaccination coverage hence those who live far, those without cattle, those who do not visit shops and those without transport miss out on dog vaccination.

5.4 Conclusion

The conclusions were based on the discussion and objectives stated below:

- Assess the knowledge of dog owners regarding rabies control in Omusati region
- Determine the attitudes of dog owners regarding rabies control in Omusati region
- Determine the practices of dog owners regarding rabies control in Omusati region

5.4.1 Assess the knowledge of dog owners regarding rabies control in Omusati region

Conclusion

- The knowledge of dog owners regarding rabies control in Omusati region is above average, the community understands rabies signs and symptoms, modes of transmission, prevention measures and that domesticated dogs maintain and transmit the virus in the region.
- Despite sufficient knowledge in regard to rabies control, the dog owners have limited understanding on the role of Vaccination and the Post-Exposure Prophylaxis in the fight against rabies.

5.4.2 Determine the attitudes of dog owners regarding rabies control in Omusati region

Conclusion

- The attitude of dog owners regarding rabies control in Omusati region is above average yet the use of traditional and home medication on dogs and humans is very prevalent.
- Dog vaccination is not given a priority; dog owners prefer the annual vaccination campaign rather than taking their dogs to the veterinary clinics within the region.
- Dog vaccination is centralised resulting in low turn-out due to distance.

5.4.3 Determine the practices of dog owners regarding rabies control in Omusati region

Conclusion

- The majority of dog owners engaged in practices that predispose the community to rabies infection and encourage rabies transmission.
- Vaccination coverage is below the level required by the OIE.
- Dog meat is widely consumed and suspected rabid dogs are handled in the community with no veterinary intervention.
- A majority of dogs roam freely in villages, mostly untamed and difficult to manoeuvre.
- Urban dwellers tend to keep tame dogs, keep dogs in an enclosure away from the neighbours and stray dogs and vaccinate dogs too.

5.5 Recommendations

After the discussions and conclusions, the researcher made the following recommendations:

5.5.1 The Ministry of Agriculture, Water and Forestry through the Directorate of Veterinary Services:

- To intensify rabies awareness creation through visits to villages and communities in rural areas.
- To make use of public platforms such as churches, markets, schools and shops where people gather in combination with the radio and television when spreading rabies control messages to the public.
- To incorporate strategies on responsible dog ownership, dog bite prevention and appropriate medical and veterinary care for dog owners and their pets.
- To separate mass dog vaccination campaigns from the annual cattle vaccination campaigns against Contagious Bovine Pleuropneumonia (CBPP). This would allow vaccination teams to focus on dogs and other pets. It will further accommodate dog owners without cattle who feel intimidated taking a dog to a gathering were cattle are a main focus of the day.
- To shift from a central vaccination point to a house-to-house vaccination approach.
- To conduct a biannual mass vaccination campaign, creating room for dogs that might have missed their first vaccination round either due to age or other factors.
- Mass vaccination should be held on weekends; this would grant opportunities to most of the community members to present their dogs to the vaccination team.

- To promote practices that are proven and recommended in the control of rabies such as castration of male dogs, neutering of bitches, keeping domesticated dogs separate from stray dogs, vaccination of all domesticated dogs and presentation or reporting suspected rabid dogs to the nearest veterinary office.
- To create and maintain awareness until a clear distinction is made between rabies treatments and rabies vaccination

5.5.2 Ministry of Health and Social Services:

- To join hands with the Ministry of Agriculture, Water and Forestry to promote the use of PEP.
- To ensure constant availability of affordable PEP at public hospitals and further denounce the use of home-made remedies in human rabies treatment.

5.5.3 Local government (Town Councils, Municipalities and Village Councils):

- To initiate, promote and maintain effective vaccination programs of dogs within their jurisdiction to ensure vaccination of all dogs.
- To promote removal of stray dogs and unwanted dogs within their jurisdiction areas.

5.5.4 Community at household level:

- To reduce the number of dogs per household and adopt better dog management practices whereby dogs are vaccinated annually against rabies.
- To report rabies suspected dogs to nearest veterinary facilities and seek medical help when exposed to unvaccinated dog bites or scratches.
- To present their dogs to state veterinary clinics and the Directorate of Veterinary Services for free rabies vaccination shots rather than wait for the annual vaccination campaigns that go to the communities.

5.5.5 Further research

- This study needs to be extended to all the seven northern and north-eastern regions that are currently faced with a battle against dog mediated rabies.

5.6 Limitations of the study

This is a descriptive study which only looked at the KAP prevalence regarding rabies among dog owners in Omusati region. In this study, there were no cause-effect relationships drawn. While administering questionnaires, the researchers encountered lack of participation from some of the selected households. The study was conducted in one region of the northern communal regions and the results could not be generalised to other parts of the country.

The other limitations were that some of the eligible households are headed by children under eighteen years of age, who do not qualify to take part in this study due to legal matters concerning their consent. Omusati region is very vast; this posed a challenge to the limited budget for this study, the researcher therefore, focused only able on five constituencies of the region. There were communication barriers because more than half of the region's inhabitants could not communicate in English.

5.7 Delimitations of the study

Communal farmers keeping animals other than dogs were not considered. All eligible households that had not owned a dog in the last six months before the study could not be considered in this study. The researcher made provision of a 10% non-response rate in the samples. Only households that were headed by people over the age of eighteen years of age were considered in this study. The study was conducted in five constituencies of Omusati region. The questionnaires were translated into the local language (Oshiwambo). The entire team of assistant researchers in this study were fluent in Oshiwambo.

5.8 Unique contributions made

The researcher believes that his study made a great contribution to the existing pool of knowledge by changing attitudes, practices to the understanding of rabies impact in communities and rabies background in Omusati region in particular and Namibia in general. The knowledge gained should assist with implementation of intervention and control measures of rabies in Omusati region. Furthermore the implementation of the control and prevention strategies will be based on evidence-based information obtained from this study.

This study should further provide a headlight to the comprehension of factors contributing to the persistent occurrence of rabies cases in Omusati region and created recommendations required to make changes in the battle against this deadly ancient zoonosis.

5.9 Summary

During this study; discussions, conclusions and recommendations were drawn based on the three main objectives of the study. Interpretations were made to give meaning to the data after analysis with conclusions and recommendations drawn based on the study's major findings.

The next chapter will provide a list of all the references used in this document.

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ANNEXURES

Annexure A: Reesearch permission letter

CENTRE FOR POSTGRADUATE STUDIES

University of Namibia, Private Bag 13301, Windhoek, Namibia
340 Mandume Ndemufayo Avenue, Pioneers Park
☎ +264 61 206 3275/4662; Fax +264 61 206 3290; URL.: http//www.unam.edu.na

UNAM
UNIVERSITY OF NAMIBIA

RESEARCH PERMISSION LETTER

Centre for Postgraduate Studies
Office of the Director
2018 -10- 05
University of Namibia
UNAM

Date: 30/09/2018

Student Name: Kanutus B S
Student number: 200404571
Programme: Master in Field Epidemiology

Approved research title: A household survey to assess the knowledge attitudes and practice regarding rabies among Dog owners in Omusati region

TO WHOM IT MAY CONCERN

I hereby confirm that the above mentioned student is registered at the University of Namibia for the programme indicated. The proposed study met all the requirements as stipulated in the University guidelines and has been approved by the relevant committees.

The proposal adheres to ethical principles as per attached Ethical Clearance Certificate. Permission is hereby granted to carry out the research as described in the approved proposal.

Best Regards

05/10/18

Prof Marius Hedimbi **Date**
Director: Centre for Postgraduate Studies
Tel: +264 61 2063275
E-mail:directorpgs@unam.na

Annexure :B Ethical clearance certificate

UNAM
UNIVERSITY OF NAMIBIA

ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: SON /452/2018 **Date: 13 December, 2018**

This Ethical Clearance Certificate is issued by the University of Namibia Research Ethics Committee (UREC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the Faculty/Centre/Campus Research & Publications Committee sitting with the Postgraduate Studies Committee.

Title of Project: A Household Survey To Assess Knowledge, Attitudes, Practices Regarding Rabies Control Among Dog Owners In Omusati Region

Researcher: BENEDIKTUS S. KANUTUS

Student Number: 200404571

Supervisors: Lischen Haoses-Gorases (Main) Hedimbi Nehemia (Co)

Faculty: School of Nursing
Take note of the following:

(a) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the UREC. An application to make amendments may be necessary.
(b) Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the UREC.
(c) The Principal Researcher must report issues of ethical compliance to the UREC (through the Chairperson of the Faculty/Centre/Campus Research & Publications Committee) at the end of the Project or as may be requested by UREC.
(d) The UREC retains the right to:
(i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected,
(ii) Request for an ethical compliance report at any point during the course of the research.

UREC wishes you the best in your research.

Dr. J.E. de Villiers: UREC Chairperson

Ms. P. Claassen: UREC Secretary

Annexure C: Respondents Consent form

University of Namibia

Faculty of Health sciences

School of Public Health

Consent form

My name is_____

A post graduate student, studying toward a master in Applied Field Epidemiology and Laboratory Training Program, under the School of Public Health of the University of Namibia. Conducting a study title; A household survey to assess Knowledge, Attitudes and Practices regarding rabies control among dog owners in Omusati region.

The study is part of my thesis work under the supervision of the University of Namibia, the Ministry of Health and Social Services.

The purpose of this study is to evaluate knowledge, attitudes and practices of the inhabitants of Omusati region. This study consists of a questionnaires with various questions related to rabies and dogs, and vaccination.

The information obtained from this study will only be used for academic purposes and will be handled with outmost diligence and confidentiality. You do not have to provide your name for this study and participation in this study is voluntary. This might take 10 to 15 minutes of your time.

Do you understand the above mentioned? Yes / No

Do you have any question at this point? Yes / NO

Do you agree to continue? Yes/No

Serial Number: _____

Date:

Collector name: _____

Annexure D: Respondents Translated Questionnaire

Rabies KAP survey questionnaire, (Omusati Region), 2018

Socio-demographic information

A. Region – Oshitopolwa hogololo ……

B. Constituency - Oshikandjohogololo……

C. Community: Urban / village council /rural – Ehala moshigwana mpoka hokala

D. Having a dog at home (Omuna ombwa megumbo): Yes/ No Eeno/Ahawe

E. Serial number – Onomola ya yo

F. Sex: Male/Female – Omulumentu/Omukiintu

G. Age: Oomvula

H. Highest level of Education: Ondondo yuulongele ya shigako**:**

(a) None -Kandina
(b) Primary - Yongula (1-7) Ondondo 1-7
(c) Secondary – Kosekundo (8-12) Ondondo 8-12
(d) Tertiary - yOpombanda (>12) Ondondo 12 okuuka pombanda

I. Employment status - Onkatu yiilonga: Omuniilonga/Kandina iilonga Employed/ unemployed

J. Occupation: - Oholongo shike

K. Number of people per household - Omwaalu gwaantu megumbo kehe:_____

L. Number of dogs per household Omwaalu goombwa megumbo kehe: _____

M. The age of dogs currently at home - Oombwa dhi dhili megumbo odhi na emvula ngapi?

(a) Oomwedhi 0-3 months
(b) Oomwedhi 4- 11moths,
(c) Oomvula 1 – 3 years
(d) Oomvula dhivule pu > 3 years 2

Knowledge - Ontseyo

A. What causes rabies? Oshike hashi eta Endabi?

(a) Psychological problem - Uupyakadhi wo pamadhiladhilo

(b) Virus - Ombuto

(c) Associated with spirits - Ekwatathano noombepo

(d) Shortage of food and water - Ompumbwe yomeya niikulya

(e) I do not know - Kandi shi shi

B. Who is susceptible to rabies infection? Olye ta vulu oku kwatwa kEndabi?

(a)_____

(b)_____

(c)_____

C. Can rabies be transmitted from rabid animals to humans? Endabi ohali vulu oku taandela okuza kiinamwenyo yina uuvu mbuka okuya kaantu? Eeno/Ahaye Yes/ No

If yes, how can rabies be transmitted from rabid animals to other animals or human? Ngele osho, Endabi oha li taandelithwa ngiini kiinamwenyo yEdambi okuya miinamwenyo iikwawo nenge maantu?

(a) Bites or scratches - Oku lumatwa nenge oku yagwa

(b) Licking open wound or mucous membrane - Okulatha piilalo nenge momamino

(c) Through meat - Okulya onyama

(d) All of the above - Ayihe ya tumbulwa pombanda

D. Which of these animals is a common source of rabies in your area? Oshinamwenyo shinipo mwaambika momudhingoloko gwoye osho hashi tandeeleke unene Endabi?

(a) Dog - Ombwa

(b) Cat - Okambishi

(c) Human - Omuntu

(d) Others - Yilwe

E. Symptoms of rabies in animals? Omadhidhiliko gEndabi miinamwenyo ogeni?

(a) _____

(a) _____

(c) _____ 3

F. Symptoms of rabies in human are: Omadhidhiliko gendabi maantu ogo:

(a) _____

(b) _____

(c) _____

G. Is rabies curable in human: Edambi maantu oha li pangwa ngaa? Eeno/Ahawe yes/No

H. Can rabies be prevented? Endabi ohali vulu oku kelelwa? Yes/ No

If yes, how?

Attitude - Omaihumbato

A. How do you protect your dogs from rabies? Oombwa dhoye oto dhi gamene ngiini kuuvu wEndabi

(a) Vaccination – Oku dhi wenditha

(b) Herbal extract - Oku dhi pa iigwanga/iihemba

(c) Feed them a traditional cock tail - Oku dhipa iikulya yo pa shiwambo

(d) Do not know - Kandi shi wo

B. How do you protect yourself and your family from rabies? Oto igamene ngiini ngoye mwene naanegumbo lyoye kEndabi?

A_____

B_____

C_____

C. Have you been bitten by a dog before? Owa li kile nale kombwa monkalamwenyo yoye? Eeno/ Aawe Yes/No

If yes, what action did you take after a dog bite? Ngele osho, owa pelwe epango li ni?

(a) Herbal extracts at home - Owa pelwe Iigwanga/iigwanga

(b) No treatment - Ino pangwa

(c) Traditional medicine – Owa pelwe omuti gwo pamuthigululwakalo

(d) PEP from a clinic - Omuti gwoku ku gamena kuukwatwe kombuto *(PEP= Post-Exposure Prophylaxis).*

(e) Other (Specify) Yilwe (yi tumbula)……..

D. **Where to go for help after a dog bite? Openi wuna oku mona ekwatho ngele wa lumatwa kOmbwa?**

(a) Hospital or nearest clinic - kOshipangelo

(b) Personal wound treatment- Oku ipanga mwene

(c) Traditional healer - Onganga yo pamuthigululwakalo

(d) Others (specify) Yilwe (yi tumbula)…….

E. Do you think anti rabies prophylaxis (PEP) is necessary? Sho wa tala otuntila (oku keelela waahakwatwe komukithi gwendabi oya pumbiwa ngaa? YES/NO **Eeno/Aawe**

F. When is the anti-rabies prophylaxis (PEP) most effective? Uunake etuntila yo kwiigamena kEndabi hayi longo nawa?

a. Immediately within 24 hours - Meendelelo muule woowili omi 24

b. (b) Later than 24 hours - Konima yoowili omi 24

c. Any time after an animal bite- Kehe ethimbo konima show a lumatwa kombwa

d. I do not know – Kandi shiwo

Practice – Iilonga

A. Immediate actions after an animal bite – Shoka wu na oku ninga meendelelo uuna wa li ka kombwa.

(a) Tie the wound with a cloth - Manga oshilalo nelapi

(b) Wash with water and soap – Yoga oshilalo nomeya gothewa

(c) Apply an herbal extract - Gwayekapo iigwanga/iihemba

(d) Seek medical help from the nearest health facility - Kakonge ekwatho lyopaunamiti kendiki lyuukalinawa lyo popepi.

(e) Do not know – Kandi shiwo

B. Why do you keep a dog ? Ombwa owuyi nine shike ?

(a) Guard/Security dogs – Okutonatela nEgameno

(b) Hunting dogs – Dho kUukongo

(c) For meat – Dhokulya/omweelelo

(d) Breeding – Okumuna 6

(e) Shepherd – Dho kulitha/kUusita

(f) Pets - Oshitekulwanamwenyo

C. Do you eat dog meat? Oholi onyama yOmbwa Yes/no Eeno/Aawe

D. Action taken when a dog is suspected of rabies? Ngele Ombwa oya fekelelwa endabi, oshike wuna okuninga?

(a) Take/report it to the nearest veterinary office - Otoyi fala/ lopota koshipangelo shiinamwenyo sho popepi

(b) Kill it - Otoyi dhipaga

(c) Tie it up (quarantine) - Otoyi manga/ikalekele

(d) Let it loose - Otoyi mangulula/etha yiye nuuyuni

(e) Others (specify)……Yilwe(yi tumbula)…….

E. Have your dog/dogs been vaccinated? Ombwa/Oombwa dhoye odha tuntilwa ngaa? YES/NO Eeno/Aawe?

If no, why not? Ngele aawe, omolwashike? _____

F. When last was your dog/dogs vaccinated against rabies? Ombwa yoye oyi ihula oku tuntilwa uunake omolwa Endabi? _____

Proof of vaccination provided: Uumbangi wa shike wuna wetuntilitho:

(a) Verbal – Wo pakana

(b) Vaccination cards – Okakalata ketuntilo

(c) Vaccine labels - Uumbapila/uukende womuti gwetuntilo

(d) No proof available - Kapena sha

G. Are dogs/dog kept in an enclosure away from stray and neighbourhood pets? Oombwa dhoye odha edhililwa oku kala kokule niinamwenyo yilwe yo pomudhingoloko? Yes/ No Eeno/Ahawe

H. Are male dogs/dog castrated and the female dogs/dog neutered? Oombwa dhoondume owe dhi thonitha ngaa, no ku ngambekitha onkiintu oluvalo? Yes/ No Eeno/Aawe